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THE IMPACT OF GLOBALIZATION ON ENVIRONMENTAL DEGRADATION: EVIDENCE FROM NIC COUNTRIES *

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Abstract

This study aspires to investigate the effect of globalization on environmental degradation in NIC countries. For this purpose, the data of 10 NIC countries for the period from 1970 to 2016 are included in the analysis. In the study, carbon emission (metric tons per person) was given as the dependent variable and KOF Globalization Index was used as the independent variable. In the study, the long-run relationship between the variables was investigated. As a result of the analyses, a long-run relationship was found between the variables in NIC countries. The panel cointegration model is estimated with the DOLSMG estimator. The analysis has revealed that globalization intensifies environmental degradation in NIC countries. Then, the Dumitrescu - Hurlin panel test was carried out and the results showed that the causal relationship between variables is bidirectional. Policy recommendations have been put forward within the scope of the findings obtained.

Anahtar Kelimeler: Environmental degradation, globalization, NIC

Jel Kodları : *Q5, F6, O5.*

KÜRESELLEŞMENİN ÇEVRESEL BOZULMA ÜZERİNDEKİ ETKİSİ: NIC ÜLKELERİNDEN KANITLAR

Öz

Bu çalışmada NIC (Newly Industrialized Country) ülkelerinde küreselleşmenin çevresel bozulmaya etkisinin araştırılması amaçlanmaktadır. Bu amaç doğrultusunda 10 NIC ülkesine ait 1970-2016 dönemini kapsayan veriler analize dahil edilmiştir. Çalışmada bağımlı değişken olarak karbon emisyonu (kişi başına metrik ton), bağımsız

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değişken olarak ise KOF Küreselleşme Endeksi kullanılmıştır. Çalışma kapsamında belirtilen amaç doğrultusunda değişkenlerin uzun dönem ilişkisi araştırılmıştır. Analizler gerçekleştirildikten sonra NIC ülkelerinde değişkenler arasında uzun dönemli ilişki tespit edildiği gözlemlenmiştir. Panel eşbütünleşme modelinin tahmini ise DOLSMG tahmincisiyle yapılmıştır. Bu analiz sonucunda NIC ülkelerinde küreselleşmenin çevresel bozulmayı artırdığı tespit edilmiştir. Daha sonra Dumitrescu-Hurlin panel nedensellik testi yapılmış ve değişkenler için çift yönlü nedensellik ilişkisi saptanmıştır. Elde edilen bulgular doğrultusunda politika önerileri ortaya konulmuştur.

Keywords: Çevresel bozulma, küreselleşme, NIC.

Jel Classification : *Q5, F6, O5.*

INTRODUCTION

After the end of the Holocene epoch and with the beginning of the Anthropocene epoch, the process of environmental degradation seems to have increased. Human impact on the environment has reached dangerous levels with the advent of the Anthropocene epoch. The environment is being seriously damaged by increasing energy consumption, use of fossil fuels, industrialization, urbanization, etc. On a global scale, all of these and similar factors threaten environmental sustainability

Carbon dioxide emissions are a widely seen sign of environmental degradation. Global CO_2 emissions rose 1.2 per cent to 37.1Gt CO_2 in 2017, after two years when they were essentially flat at 0.0 per cent for 2015 and 0.4 per cent for 2016. A large part of the increase of 0.4 % in 2016 compared to 2015 was due to the fact that 2016 was a leap year. CO_2 emissions from China and the European Union (14% of world total) enhanced by 0.9 per cent and 1.1 per cent successively. CO_2 emitted by the United States (which accounts for 14% of the global total) fell by 0.8% (Muntean et al, 2018: 5).

The United Nations Framework Convention on Climate Change (UNFCCC), an international treaty on the environment, works on reducing, preventing and adapting to greenhouse gas emissions. On 12 December 2015, deputies of 195 countries progressed a consensus at the 21st Conference in Paris and adopted the Paris Agreement, or COP21 (21st Conference of the Parties). By the end of August 2017, the climate change agreement had been identified by 160 countries. The Paris Agreement has no legally binding provisions, which would be a requirement for countries to have domestic legal measures in place (Clemencon, 2016: 3).

Rising emissions are starting to become a global concern for policymakers. Global consumption patterns, energy-driven economic growth trajectories and natural resource depletion are creating a dilemma for maintaining intergenerational equity. This undermines the foundations of sustainable development. To tackle this global problem, the United Nations has started the Sustainable Development Goals (SDGs). By the end of 2030, countries around the world will have to meet 17 development targets (Xue et al, 2022: 899; WHO, 2019).

Globalization is not a singular design that can be described and constituted within a specific time frame. Nor is it a process that can be definitely identified with a starting and an end. Moreover, it cannot

be described with accuracy and applied to all people and in all assumptions. Globalization is a holistic process, a design, a breakthrough and "the establishment of the world trade devoid from socio-political screening", involving economic integration, the transfer of policies across borders, the transfer of knowingness, cultural solidity, the reproduction of power relations and discussions (Al-Rodhan & Stoudmann, 2006).

Globalization is a process of integration of countries into the global economy through direct investment from foreign countries, multilateral trade agreements, migration of workers and flows of capital. Globalization has greatly contributed to worldwide environmental changes. Globalisation undoubtedly promotes development, but it is also argued that globalisation can create negative externalities through environmental destruction and pollution. In recent decades, the environmental impact and the consequences of trade liberalisation resulting from the globalization process have been one of the significant issues in overseas trade (Shahzadi et al, 2019: 1).

The Industrial Revolution, which is recognised as the period in which the effects of globalisation began to be felt most strongly, is a revolution for the order of nature as well as for human beings. With the increase in industrialisation since the 1950s, when the population began to grow rapidly with the industrial revolution, the warming of the Earth has gradually increased as a result of the excessive greenhouse effect caused by gases such as CO_2 (carbon dioxide), CH_4 (methane) and N_2O (nitrous oxide), which are released into the atmosphere at high rates by industrial systems. This situation, called global warming, leads to many problems such as climate changes, melting of glaciers, floods, landslides, erosion, storms and similar natural disasters. Such environmental problems, which are increasing as a result of globalisation, can only be tackled by countries acting together.

The environmental impact of globalisation may not be the same for all countries. While in some countries the local environment may be flourishing as a result of globalisation, in others it may be deteriorating (Tisdell, 2001: 186). Which of the environmental impacts of globalisation come to the fore depends on a country's economic situation. Poor countries, which have no economic competitive advantage over developed countries other than their natural resources, become pollution havens, while industrialised and outward-looking countries, which do not yet have sufficient income levels, become pollution havens. In rich,industrialised countries, on the other hand, the environment is valued more and the tendency to comply with environmental standards increases (Çınar et al, 2012: 213).

The link between globalization and degradation of environment has attracted attention recently. Nevertheless, the literature is not rich. However, in some of the studies, globalization rises environmental degradation (Austine et al, 2014; Phong, 2019; Rafindadi and Usman, 2019; Usman et al, 2020; Adebayo et al, 2021; Chien et al, 2021; Adebayo and Kirikkaleli, 2021; Wen et al, 2021; Akadiri et al, 2022). And the other studies have shown that globalization improves environmental adequacy (Destek and Nakipoglu Ozsoy, 2015; Rahman et al, 2019; Onifade et al, 2021; Rahman et al, 2021).

Austine el al (2014), examined a relationship between globalization and environmental exacerbation for Niger Delta Region of Nigeria. The paper argued that for the Niger Delta region, globalization has been more of a curse than a blessing. On the one hand, they open the region to more foreign investment opportunities, but on the other, they open the way for the degradation of the region's environment and ecosystems, exacerbating the region's environmental and development crisis. Thus, behind the economic prospects of the country lie the seeds of further dangers to the environment. Destek and Nakipoglu Ozsoy (2015) investigated the link between economic growth, globalization, energy consumption, urbanization and environmental degradation in Turkey. They found that economic growth, globalization and CO_2 were cointegrated. Also asymmetric causality tests show that economic development lead to environmental damage, while economic globalization reduces CO_2. Phong (2019) searched the link between globalization, financial advancement and environmental quality for the ASEAN-5 countries. In the study, the estimation results show that financial development, energy use and urbanization are found to be driving factors, while globalization as a measure of economic globalization has a notable effect on CO_2 emissions. Rafindadi and Usman (2019) examined the effect of globalization on environmental exacerbation for the South Africa. They found that globalization in South Africa reduces CO2 emissions by 0.106% and 0.112% respectively. Rahman et al (2019) investigated the connection between financial development, globalization, and environmental quality for CEE Countries. The results of this study indicated that the ecological quality of the CEE economies is improving as a result of globalization.

Usman et al (2020) evaluated the effect of globalization on environmental devastation in the background of the EKC for South Africa. For this analysis, they used data between 1971 and 2014. In this study, they found that globalization is an accelerator of environmental pollution. Adebayo et al(2021) investigated the dynamic interaction between globalization, renewable energy utilization and environmental deterioration in South Korea. The prediction results show that energy use and globalization contribute to environmental devastation while technological innovations lead to environmental improvements. Chien et al (2021) analysed the effectiveness of globalisation and technological innovations in the reduction of environmental degradation in Pakistan in the light of the historical data of 1980-2018. To estimate this, they used a QARDL model. Their analysis demonstrated that globalization is an essential source to maintain a rise in carbon dioxide emissions in Pakistan. Adebayo and Kirikkaleli (2021) examined the effect of globalization, renewable energy consumption and technological innovation on environmental devastation for Japan. In this paper, for data sets considering the period from 1990Q1 to 2015Q4, a series of wavelet tools are used. Wavelet analysis empirical findings suggest that globalization, GDP growth and technological innovation increase CO_2 emissions in Japan. Onifade et al (2021) exposed the link between globalization and environmental damage for E-7 countries. In this work, the estimate of the AMG by Eberhart and Bond and the long-term estimation method by Eberhart and Teall are used in the implementation of a regression analysis of the panel. The study proves that globalization is conversely associated with environmental devastation

for E-7 countries. Rahman et al (2021) investigated the role of globalization, energy use, economic growth, exports and human capital in environmental damage for BRICS countries. In order to identify the long-run connection between the selected variables, they use DOLS, FMOLS and PMG methods. The findings indicate that the globalization inversely and significantly impact the CO_2 emissions, illustrating the enhancement on environmental quality. Wen et al (2021) analyzed the link between globalization and environmental degradation. They use FMOLS technique to do this. The empirical observations of this study indicates that globalization is definitely correlated with environmental deterioration. Akadiri et al (2022), probed the impacts of energy use and globalization on environmental degradation for Nigeria. They use time series data with a quarterly frequency over a period from 1971 to 2018. To achieve their study goals, quantile-quantile approach (Q-Q) is used in this study. Anecdotal remarks suggest that, across all quantiles globalization and energy consumption effect positively on environmental destruction. Karaduman (2022) examined the impact of productivity and economic globalization on environmental degradation. The study used data for the period 1975-2017 for 11 NIC countries. The analysis was carried out using the AMG estimator. The results of the analysis show that economic globalization reduces the ecological footprint.

This work is driven by the aim to investigate the effect of globalization on environmental degradation in NIC countries. This study differs from other studies (Karaduman, 2022) conducted for this group of countries (NIC countries) in that it covers a longer time period and uses carbon emissions, which focus on systemic change, rather than the ecological footprint, which focuses on individual responsibility among indicators of environmental degradation. The long-run links among the variables will be analyzed using data covering the period from 1970 to 2016 for NIC countries. Within the scope of the study carbon emissions (metric tonnes per capita) will be used as the dependent variable and KOF Globalization Index will be used as the independent variable and panel cointegration analysis will be performed. In the study, data set and methodology are included after the introduction. Empirical findings will be presented after the data set and methodology section. Finally, the conclusion section will be stated.

DATA AND METHODOLOGY

In this work, the analysis is carried out for the NIC (Newly Industrialized Country) countries. This group includes 10 countries: Indonesia, Thailand, Philippines, Malaysia, South Africa, China, Brazil, Mexico, India, and Turkey. Newly Industrialized Country (NIC) is a concept used in the late 20th and early 21st centuries, especially in the 1970s, for countries whose national economies changed from being based on agriculture to being based on industries operating in production branches such as manufacturing, construction and mining. The concept of a Newly Industrialized Country (NIC) describes countries that have a higher level of trade and standard of living than developing countries, but have not yet reached the economic level of highly developed countries such as the United States, Japan and Western Europe (Signal and Wokutch, 2014). A Newly Industrialized Country (NIC) can be

briefly defined as a country that is still developing, but has shown more economic development than other developing countries.

Newly industrialized countries (NICs) are constantly developing and growing through industrialization and urbanization. These countries are recipients of investment capital from highly developed countries. For industrialization and rapid production growth, they invest heavily in setting up production facilities. As a result, the rate of industrialization and productivity in the Newly Industrialized Countries is steadily increasing. (Corporate Finance Institute, 2022).

CO_2 emissions (metric tons per person) are used in the study as an indicator of environmental degradation. The Swiss Economic Institute's KOF Globalization Index is regarded as an indicator of globalization. Annual data of these variables was obtained from the World Bank's Development Indicators. The data are for the period from 1970 to 2016.

In the literature, CO_2 emissions (metric tons per person) are frequently used as an indicative of environmental degradation. As CO_2 emissions (metric tons per person) increase, environmental degradation increases, and as CO_2 emissions (metric tons per person)decreases, environmental degradation decreases. The KOF Globalization Index, which is used to measure globalization, is published annually by the Swiss Economic Institute. The KOF Globalization Index assesses globalization's social, political, and economic components. The KOF Globalization Index ranks countries on a scale of 0 to 100. As the scores of the countries get closer to 100, their level of globalization is increasing, while as they get closer to 0, their level of globalization is decreasing. The KOF Index is a multidimensional indicator that is frequently used in the works.

In this study, the impact of globalization on environmental degradation will be investigated by panel data analysis within the scope of NIC (Newly Industrialized Countries). In the study using annual data, an attempt is made to ascertain the direction of the linkage between these variables. The model developed in the study looks like this:

$$CO_{2_{it}} = \beta_0 + \beta_1 GI_{it} + \varepsilon_{it}$$

The i subscript in the model identifies the country, while the t subscript indicates the time period. $CO_{2_{it}}$ indicates the level of carbon emissions (metric tons per person). And it is also the dependent variable. GI_{it} stands for the KOF Globalization Index. It was included in the study as an independent variable. The study aims to investigate the effects of globalization on environmental degradation in NIC countries. Table 1 indicates the overview statistics of the CO_2 and GI.

Table 1: Overview Statistics

Variable	Number of Observations	Mean	Standard Errors	Minimum	Maximum
CO_2	470	2.939394	2.528166	0.312	9.979459
GI	470	50.81406	13.5497	21.36	81.56

First, there will be an examination of whether the model has cross-sectional dependence. Then, unit root test and homogeneity tests will be performed. After all these, whether there is a long-run link between the variables will be investigated by panel cointegration test and finally, the panel cointegration model will be estimated by panel and units. Stata 14 package programme was used for all these statistical analyses.

EMPIRICAL FINDINGS

In the study, Breusch-Pagan LM test was applied to test the cross-sectional dependence. N<T condition is required for the Breusch-Pagan LM test to be applied. The cross-sectional dimension of the model is 10 and the time dimension is 47. N<T condition is met and Breusch-Pagan LM test can be applied to test cross-sectional dependence in this model. Table 2 shows the results of the Breusch-Pagan LM test.

Table 2: Cross-Sectional Dependency (Breusch-Pagan LM) Test Results

	Test Statistic	Prob. Value
Breusch-Pagan LM Test	286.3	0.0000

Table 2 shows the consequences of the Breusch-Pagan LM test. The H_0 hypothesis is strongly rejected and we conclude that there is cross-sectional dependency between these countries. H_1 hypothesis is accepted. To test the cross-sectional dependency for CO_2 and GI variables Pesaran's (2004) CD test was used.

Table 3: Cross-Sectional Dependency (Pesaran CD) Test Results

	Test Statistic	Prob. Value
CO_2	33.31	0.0000
GI	44.28	0.0000

Table 3 shows the findings about Pesaran CD test. As shown in Table 3, since the probability values of the series less than 0.05, the null hypothesis is powerfully rejected and it has been identified that there is cross-section dependency between these countries.

Then, since cross-sectional dependency identified, while selecting the unit root and cointegration tests method, this scenario should be taken into consideration. Afterwards, unit root and cointegration tests accommodating the cross-sectional dependency have been also able.

Within the scope of the study, after the cross-sectional dependency tests, it was found that there is cross-section dependency in the model. In this case, second generation panel unit root tests that are sensitive to the cross-sectional dependency will be preferred. In this study, Fisher, Phillips and Perron (Fisher PP) Unit Root Test, one of the second generation panel unit root tests applied. Fisher, Phillips and Perron (Fisher PP) unit root test corrected to take into cognizance the cross-sectional dependency (Yerdelen Tatoğlu, 2017: 74).

Table 4: Fisher PP Unit Root Test Results

Variables	**Test Statistic**	**Prob. Value**	**Stationary**
CO_2	-4.6643	0.0000	First Difference
GI	-3.5262	0.0000	First Difference

Table 4 shows the outcomes of the Fisher, Phillips and Perron (Fisher PP) panel unit root test. It is observed that the series of CO2 and GI variables contain unit root at level. And these variables become stationary at first difference. In the case of series containing unit roots, the existence of a long-run relationship is investigated by cointegration tests. However, homogeneity test should be performed first.

Swamy S test was applied for homogeneity test in the study. This test was derived in 1971 and is known as the Hausman test. After applying the Swamy S test, it is determined whether the parameters are homogeneous or heterogeneous and then panel cointegration tests and estimation methods are selected according to homogeneity or heterogeneity (Yerdelen Tatoğlu, 2017: 247).

Table 5: Test Results of Homogeneity Test

	Test Statistic	**Prob. Value**
Swamy S Test	12256.41	0.0000

Table 5 shows the results of the Swamy S test. According to the value of the test statistic and the probability value, the null hypothesis is rejected and it is accepted that the parameters are not homogeneous. As a result of these findings, the estimation methods recommended for heterogeneous panels should be used.

In this study, Westerlund panel cointegration test, which can be applied in heterogeneous panels and when there is cross-sectional dependency, is used to estimate the long-run relationship between variables. This test, which is based on four statistics, is quite flexible. In addition, robust critical values can be obtained after bootstrap in case of cross-sectional dependency (Yerdelen Tatoğlu, 2017: 203).

Table 6: Westerlund Panel Cointegration Tests

Statistic	Value	Z-Value	Prob. Value	Robust Prob. Value
G_t	-4.311	-8.956	0.0000	0.0000
G_a	-34.531	-15.948	0.0000	0.0000
P_t	-12.218	-7.458	0.0000	0.0000
P_a	-16.125	-8.111	0.0000	0.0000

The results of the Westerlund panel cointegration test are shown in Table 6. Westerlund proposes two panel statistics (Pt and Pa) and two group statistics (Gt and Ga). These are error correction models used for the test of cointegration. If the panel is heterogeneous, we rely on group mean statistics, if the panel is homogeneous, we rely on panel statistics (Yerdelen Tatoğlu, 2017: 200-203). Since the panel is heterogeneous and there is cross-sectional dependency, the robust critical values of Gt and Ga group mean statistics indicate that there is a long-run connection between CO2 and GI variables. The H1 hypothesis, suggesting a cointegration relationship for all cross-sections, is accepted, whereas the H0 hypothesis, indicating no cointegration relationship for all cross-sections, is rejected.

After the cointegration test is performed, if a long-run relationship is detected between the variables, then the cointegration model can be estimated. There are estimators used for estimating the cointegration model. In this direction, these estimators are classified as first and second generation estimators according to the presence or absence of cross-sectional dependency. Again, according to the

homogeneity or heterogeneity of the panels, these estimators are categorised as homogeneous and heterogeneous estimators (Yerdelen Tatoğlu, 2017: 210).

Since cross-sectional dependency is found in the study, second generation estimators will be preferred. Considering all these, the DOLSMG estimator, which is one of the second generation estimators and heterogeneous, is preferred in the study. DOLSMG estimator was suggested by Pedroni (2001).

Table 7: DOLSMG Estimation Results for NICs

Country	**Beta**	**t-stat**
Brazil	0.1486	6.435
China	0.2415	4.075
Phillippines	0.02287	0.3179
India	0.005852	0.1495
Malaysia	0.1047	0.5052
South Africa	-0.08701	-2.073
Mexico	0.1018	2.983
Thailand	0.1575	7.635
Türkiye	0.02456	1.28
Indonesia	0.1294	3.413
Panel	0.08497	7.817
The t table value is 1.96 for α=0.05.		

Table 7 showcases the findings of the DOLSMG estimator. The parameter estimation (0.08497) is the long-run parameter. The results of the analysis show that the GI variable, which is an indicator of globalization, affects the CO_2 variable. For the overall panel, a 1 unit increase in the level of globalization increases environmental degradation by 0.08497 units. The t statistic calculated for the

overall panel is statistically significant. The DOLSMG method is also able to provide estimates of the coefficients for each country. When the t statistic values are analysed for NICs, it is observed that the t statistics for the long run parameters of Brazil, China, South Africa, Mexico, Thailand and Indonesia are statistically significant. The t statistics for the long-run parameters of the Philippines, India, Malaysia and Turkey are statistically insignificant.

Unidirectional or bidirectional causality relationship can be found between variables from variable to another variable. Causality tests are used to determine causality and its direction. The causality test to be used varies according to whether the panel is homogeneous or heterogeneous. Since the parameters are heterogeneous, Dumitrescu and Hurlin panel causality test is applied in this study to determine the existence and direction of causality. The Granger causality test was extended to heterogeneous panels by Dumitrescu and Hurlin (2012). (Yerdelen Tatoğlu, 2017: 154).

Table 8: Pairwise Dumitrescu-Hurlin Panel Causality Tests

Null Hypothesis	W-stat	Z-bar stat	Prob. value	Test Result
GI does not homogeneously cause CO_2.	36.6075	14.6408	0.0000	Rejected
CO_2 does not homogeneously cause GI.	20.2404	4.4903	0.0000	Rejected

The findings of the Dumitrescu-Hurlin panel causality tests are shown in Table 8. The null hypothesis that "GI" do not Granger cause "CO_2" is rejected at 1% statistical level of significance, indicating that globalization cause CO_2 emissions. On the other hand, the second null hypothesis was rejected at the 0.05 significance. As a result, we identified evidence of bidirectional Granger causality between the GI and CO_2 variables.

CONCLUSIONS AND POLICY RECOMMENDATIONS

Globalization refers to the process through which countries become integrated into the global economy through FDI, commerce, subnational agreements, labor migration, and capital movements. Globalization, on the other hand, is one of the primary causes of global environmental shift. Globalization, without a question, fosters progress, but it also has negative externalities in the form of environmental deterioration and pollution. In recent years, the environmental impact of globalization

and its consequences, such as trade liberalisation, has become one of the main issues in international trade. Although globalization has brought a number of positive developments such as development, good governance, technological progress, religious and ethnic tolerance, it has also led to inequality between countries, religious and ethnic tensions, and environmental problems such as degradation (Shahzadi, Yaseen, & Anwar, 2019: 1).

Opponents of globalization fear that the quality of the environment will deteriorate as production methods change and the level of economic activity increases. In addition, emerging economies are also seeking looser labour laws to attract more foreign investment. tend to adopt environmental regulation standards. With the result of trade liberalisation caused by globalization and developed countries are implementing strict environmental regulations. This can lead to the growth of pollution-intensive industries in developing countries. When these factors come together, it is seen that globalization has a significant negative impact on environmental quality (Baek, Cho, & Koo, 2009: 3).

This ever-accelerating degradation of the environment is threatens the health and livelihoods of people, the survival of species and the ecosystem services that underpin long-term economic development. Natural resources are being significantly depleted as economic and social transformation accelerates around the world. Air and water pollution resulting from environmental degradation also adversely impact human health. Economic and social transformation caused by globalization has a negative impact on environmental quality (Alam, 2010: 103).

To examine the impact of globalization on environmental degradation, econometric analyses were carried out for the NIC countries. KOF Globalization Index is used as a globalization indicator. As an indicative of environmental degradation, CO_2 emission (metric tons per person) were used. KOF Globalization Index is the independent variable while CO_2 emission is the dependent variable. The long-run relationship between these two variables was investigated. In the study, the data of 10 NIC countries covering the period between 1970-2016 are included in the analysis.

In the study where the long-run relationship between the variables was investigated with the Westerlund panel cointegration test, it was found that there is a long-run relationship between GI and CO_2 variables. An analysis of the robust probability values of the group mean statistics for G_t and G_a shows that these variables have a long-run, cointegrating relationship. H_1 hypothesis indicating cointegration relationship for all cross-sections is accepted. H_0 hypothesis is rejected. After determining the long-run relationship between GI and CO2 variables, the cointegration model was estimated with the DOLSMG estimator. The findings obtained after the analyses indicate that the GI variable affects the CO2 variable. When the overall panel is examined, it is seen that a 1 unit increase in the level of globalization for NIC countries increases the carbon emission level by 0.08497 units. When the results for countries are analysed, it is seen that the findings for Indonesia, Brazil, Mexico, Thailand, South Africa and China are statistically significant. In these countries, an increase of 1 unit in the globalization index increases the carbon emission level by 0.1294 unit in Indonesia, 0.1486 unit in Brazil, 0.2415 unit

in China, 0.1018 unit in Mexico and 0.1575 unit in Thailand. In South Africa, where the t statistic value is significant, an increase of 1 unit in the level of globalization leads to a decrease of -0.08701 units in the carbon emission level. A similar result to this finding for South Africa was found in the study of Rahman, Zaman and Gorecki (2021), who examined the relationship between globalization and environmental degradation in BRICS countries. In their study, it was concluded that the increase in the level of globalization in BRICS countries, including South Africa, decreased environmental degradation (Rahman, Zaman & Gorecki, 2021). It is observed that t statistic values are insignificant in Turkey, Malaysia, Philippines and India. After estimating the long-run relationship between the variables and the cointegration model, the causality relationship between GI and CO2 variables was investigated. In the study where Dumitrescu and Hurlin panel causality test was applied, the existence of a bidirectional causality relationship between the variables was found.

The results of the study show that as globalization increases in NIC countries, environmental degradation also increases. These results are consistent with some of the findings of previous studies (Jun, et al., 2021; Shahzadi, Yaseen, & Anwar, 2019; Kiani, Ullah, & Muhammad, 2021). It should also be noted that some of the results are not in line with the results of studies in the literature (Rafindadi and Usman, 2019; Rahman et al, 2021; Karaduman 2022). The findings indicate that environmental and trade policies should be integrated with each other in NIC countries and trade policies should be realised by considering environmental factors. It is also thought that increasing the weight of environmentally friendly technologies in commercial activities will reduce the impact of globalization on environmental degradation. The aim should be to turn the globalization process into an opportunity by promoting environmentally friendly innovation in the NICs, thereby counteracting the negative impact of globalization on environmental degradation. Apart from these, the effects of globalization can be mitigated by the methods used by developed countries. In order to prevent further environmental degradation in NICs, it is particularly important for these countries to improve their environmental laws. The deficiencies in the weak environmental laws of these countries should be eliminated and environmental protection policies should be emphasised in these countries. Environmental taxes should be used more in this process and efforts should be made to maintain environmental quality. Stakeholders such as government, the private sector and civil society should put forward integrated policies to maintain environmental quality. In NIC Countries, efforts should be made to improve environmental awareness, environmental awareness should be increased, and the negative effects of globalization on the environment should be reduced by encouraging environmentally friendly innovation. In future studies, it is expected that newly developed methodologies (MMQR, QRPD, etc.) can be applied in different country groups to contribute to the literature. Here, too, analysis can be carried out using artificial intelligence-based approaches. This would make a significant contribution to the literature.

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