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Ali Yunes Merza Amanalla Mohammed

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International Trade and its Impact on CO₂ Emission: Empirical Study of Bahrain

Ali Yunes Merza Amanalla Mohammed
College of Economics and Management, Nanjing University of Aeronautics and Astronautics, 29 Jiangsu Avenue, Nanjing 211106, China
Email: Alx-17@hotmail.com

Abstract
The objective of this paper is to determine the impact of international trade on environment. Theoretically, international trade raise ambiguities regarding the impact of international trade on environment, specifically in countries like Bahrain. Such kind of countries uses international trade to boosting economic growth. However, international trade may influence the environment. To estimate whether and how international trade influence the environment in Bahrain, this study employs time series data of 26 years. Using ARDL approach we estimated the impact of international trade on environment. Results indicate that in context of Bahrain, international trade significantly influences the environment in the long run. We can say that long run relationship exist among international trade and environment in context of Bahrain. Based upon our findings, it is suggested that an environmental regulation policy should be concerned to eliminate or minimize the environmental impact of international trade. However, the policy should be enforced with adequate consideration. Too strict environmental policy may lead to economic contraction.

Keywords: International Trade, Environment, Bahrain.

Introduction
Scientific consensus approved that incessantly rising speed of carbon emissions are distressing global warming and environmental pollution. It is necessary to address the environmental pollution. Bahrain's market is quite open and has established one of the most diversified economies in the region (Chinn, 2015). A country comprised of more than 30 islands in the Persian Gulf, and it has been used as a center of major trade routes since antiquity. The data from European commission indicates that foreign trade in the economy has represented 160% of its total GDP in 2015 (Waheed & Abbas, 2015). It has been highlighted a greater trade surplus. The current scenario of oil market may influence the Bahrain economy in upcoming years because the country most of resources are oil dependent. Industrial diversification in Bahrain is very limited in nature (Nasiriyar, Nesta, & Dibiaggio, 2014). The recent trade data of 2016 highlights...
that oil products exports of Bahrain is 60% of total exports (Mohsen, Chua, & Sab, 2017). Other major exports are metal products, in particular aluminum, chemical products (essentially created from petrochemicals) and textiles. Imports of Saudi crude oil represent more than half of Bahrain's total imports. The non-oil imports remain very stable. These are equipment goods (machinery, appliances, and electric equipment), chemical products, and transportation and food products. The main trading partners of Bahrain are the countries of the Gulf Cooperation Council (Saudi Arabia, the United Arab Emirates, Kuwait, Oman and Qatar), the United States and Japan (Weber et al., 2017).

The problem description includes the changing landscape of economic globalization has enhanced the economic activities around the globe which has in turn increased the development activities in all exporting countries (Rossi, 2012). All countries those play a role as exporters are recognized as exporter countries in this context. Being a player in international economic activities the globalization of resources and the large scale production brought many challenges to peoples. Countries have realized that this large scale have brought many problems to the life of common man (Coelho, 2013). Among these common problems the major aspect which has been noticed since last decade by the government, public and research scholars is the main aspect which has been noticed by general public, governments and research scholars is natural resources and ecological environment that suffered a lot irreversible damage. The ecological environment of Bahrain is also suffered from international trade activities (Ekins, 2002; Neumayer, 2001). The international trade activities of Bahrain are mostly related to oil products. The main environmental problem of Bahrain includes inadequacy of fresh water, pollution from oil production and desertification. Industrial development and population growth has resulted in reduction of the amount of agricultural land which can become a great cause of food security for the country in future. To address this phenomena government has started to focus on ecological environment protection (Waheed & Abbas, 2015; Zameer, Wang, & Yasmeen, 2017).

This has motivated scholars and policy makers to define the impact of international trade on the environment so that the policy of the country can be modified accordingly. Consequently, the change in global climate, which have been significantly influenced by extreme level of economic development and exploration of natural resources, it have a severe negative impact on human beings on the planet. Therefore, the scientific community and Governments have been reached on consensus to implement low carbon economy and environmental protection which is an effective method to avoid catastrophic climate change and maintain the sustainable development of human beings.

The problem statement includes the development of the international trade has been strictly limited by all kinds of green trade barriers. But whether these trade protection policies are the best solutions to deal with the environmental problems? It is of course not. It is very complex of the relationship between the international trade and the environmental protection, which will promote each other, as well as mutual conflict. From the literature existed, it is not hard to find that the relationship which has been mentioned above has called the common concern by all countries. And at the same time, the research of the clash between the international and the environmental pollution can’t be dissociated with the international economic background, which is always been referred to unequal. Although, many developed countries in Europe and United States expect to protect the environment by constantly issuing on international trade policy,
excessive limit may lead to worse result. As we know, it can be coordinated which is decided by the ultimate goal of the both. 

Previously published studies ignore the important information regarding the objective function of variables selection. They also did not pay attention to ARDL approach regarding impact of trade on carbon emission. Therefore, objective of this study is to address the phenomena, how international trade influences the environment of Bahrain so that we can formulate a policy for the government of Bahrain. This study will provide a framework how international trade in Bahrain is related to the environment and how government can protect the environment. Our contribution also includes the empirical estimation of international trade and its effects on carbon emission in Bahrain. Unlike other we have used ARDL approach to quantify the international trade on carbon emission. Additionally this study will serve as a valuable guideline for Bahrain government which will help them to redefine their policy regarding international trade and environment if needed.

**Literature Review**

Academically, international trade has expands the markets and increases the level of efficiency for resource allocation and in turn it have boosted the economic growth (Gaitan & Roe, 2012). Literature highlights some other benefits of international trade such as reduction in poverty and distribution of income is most often discussed topics (Diagne, Cabral, & Cissé, 2008). This result several countries to promote trade policies particularly free trade agreements as a method of improving economic growth (De Silva, Malaga, & Johnson, 2012; X. Liu, 2015). However, in the past the impact of international trade has been discussed to address the economic perspective but in current phenomena the major factor is ecological environment which have gain greater interest from research scholars.

With the development of economic globalization, the content of international economic activities is enriched, and international trade also got a rapid development. What is the relationship between international trade and environment. At the same time, people began to realize that such a large-scale production and carry out globalization trade brought lots problem: Our ecological environment and natural resources suffered much irreversible damage. The amount of CO2 from fossil fuel burning and cement production emission has how much increased? Global warming how much increased due to energy consumption, global climate change, which cause by excessive exploration of natural resources and economic development, would have a severe negative impact on human life, so as a whole we want to analyze that how much its impacts is on the environment.

Generally, the impact of international trade on the environment is not only dependent on the total output in the economy but it is also depending on its scale and on the use of technology (Suga & Tawada, 2010; Zameer & Wang, 2018). The older technology used in production process can increase the environmental impact of international trade (Gałaś et al., 2015). So far the increase in international trade can increase pollution in the country. On the other hand if trade reforms leads to the adoption of new technologies will less polluting the process of production. Therefore, detailed evaluations of the impact of international trade on the environment of Bahrain require a serious consideration.

Furthermore, the relationship between trade and environment is multifaceted, complex and important; trade liberalization itself on the environment there is no good or bad, its
environmental impact depends on the environment and the trade target, the target can be complementary and mutual support, to give appropriate support at the national and international economic and environmental policy. At the most basic level, trade and environment are relevant, because all economic activities are based on the environment, the environment is the basis of all basic inputs (metals, minerals, soil, forests, etc.), and it also contains the waste generated by economic activities. Trade also affected by the environmental needs, exporters must respond to the market for environmental protection demand for goods and services.

Trade creates wealth, which can be used to improve human well-being; but most governments protect national industries too much, trying to retain domestic market share of these industries, hindering foreign competitors. The government's actions have made domestic firms inefficient, domestic consumers pay higher prices, and more efficient foreign firms have been shut out, which is unfair to the country's residents. The best protection for trade is to formulate systematic rules for such behavior, such as the rules of the World Trade Organization (WTO), which all countries can comply with. Even after signing such an agreement, countries are still looking for loopholes, and banning or restricting trade on the basis of environmental protection is a possible vulnerability. Trade can actually be good for the environment, because it creates wealth that can be used to improve the environment, and the efficiency that benefits from trade means the use of less resources, and trade can enhance efficient and environmentally friendly technologies.

The main drawback that has been brushed under the cover is environment and its problems from international trade. In simple words we can argue that trade openness to international markets significantly influences the level of pollution in many countries (Mohsen et al., 2017). The new landscape of trade has increased unrestricted markets around the globe for trade and investment which have considerably amplified the negative impact of economic activities on the environment(Yanase, Kurata, & Kawabata, 2012). These dynamics are exhausting the world’s natural resource endowment and ecological carrying capacity at such a deleterious rate they jeopardize the planet’s ability to support future generations.

On the other hand, scholars in economics argue that the major impact of international trade and trade openness provide full employment (Houseman, 2014), free competition in the country(Kováč & Žigić, 2014) and full utilization of economic resources of the country(McAdam & Willman, 2013; Tian, 2016).

It is not difficult to find that, although there are many foreign economists study the relationship between international trade and environment, most of them use developed countries like US or Japan as research object. The study of (Dean, 2002)used simultaneous equation model to measure China trade openness’ effect on water pollution. He found in short term, trade liberalization would make the deterioration of environment, but trade liberalization can help to reduce pollution in long term. (Huichao & Limao, 2010)studied the change of China and the US’ international trade and carbon emission. Combining economic, energy, trade three aspects, they used input-output analysis to build carbon emission transference model of international trade. They found China made a great contribution for the US’ carbon emission. Although on the surface, China consumed a lot of natural resources and emission a lot of CO2, the fact was that, as the development of international trade, China received the pollution gas from developed countries like the US. These developed countries not only avoid the pollution of environment, but also get some capital.
Most of the foreign literatures are based on the perspective of developed countries. The developed countries have more experience on foreign trade, economic development and environmental problems. However, the literatures content have some limitation in explaining the Arabian countries’ problems of international trade and environment. Now Arabian countries like Bahrain are facing contradiction between development and environment. In general, the literatures content still provide a good reference for us to analysis the problem.

To address the relationship of international trade and environment many studies has been done in different countries. Some of them have shown the negative association among these constructs and other has highlighted the positive relationship of these factors. Previous studies on Brazil by (Jenkins, 2003), Vietnam (Jha& Mani 2013), Argentina (Jenkins 2003) and Nigeria (Feridun, Ayadi, & Balouga, 2014) has indicated that there is a negative association among international trade and environment. These studies highlighted that international trade can damage the environment. Moreover, the studies in China(Christmann & Taylor, 2001; H. Liu, Xi, Guo, & Li, 2010), India (Kakali, 2006; Krishna & Mitra, 1998) and Mexico (Ekanayake, 2011) show that international trade is useful mechanism for environment. Here author believe that both kind of relationships exist among international trade and environment based upon the country economic and social environment.
The recent study of (Mohsin, Rasheed, Saidur, 2017) in context of renewable energy to mitigate carbon emission by developing a novel model to optimize green energy production and International Food Policy Research Institute (IFPRI) by (Lofgren, Harris, & Robinson, 2002). This model is a comparative static general equilibrium model with perfect competition market and constant return to scale (CRTS) technology assumption. The other study of (Jenkins, 2003) in context of Brazil used the general factor content model which used to estimate factor content coefficients for specific country exports. The other study that has been used to determine the
impact of international trade on environment by (Feridun et al., 2014) has used GLS and OLS method on using data of trade and CO2.

Methodology
This study used the 27year time series data of Bahrain ranging from 1990 to 2016 to carry out the empirical analysis. The main indicators used in this study are the import and export of the country along with export surplus, the scale of economy that is measured using GDP/Area, Population density and co2 emission in the country. To measure the impact of international trade on the environment of Bahrain, in this study, first represent the graphical relationship of variables to get general understanding about the relationship among variables, secondly, it present the descriptive analysis, further before applying model this study apply the unit root tests on the data to check the stationary of the data so that it can be processed for further analysis. Once this process has been done, this study used the ARDL approach to measure the impact of international trade on the environment, in addition this study also used granger causality test to estimate the relationship among international trade and the environment in Bahrain.

Data
We obtained the following data from many sources but most of the data is obtained from the World Bank source. Our data set is shown in below table that we used in empirical analysis.

Table 1: Data Set

Data processing and Analysis
The data from Table 1 is being processed to get the empirical results for our study.

Initially to get the general idea of the topic, we developed a scatter diagram to show the overall relationship of carbon emission with international trade. The motive behind this was to check whether any relationship exists or not. It will not help to understand but it will also show a clear
picture before application of econometric model. The output from scatter diagram is shown in fig 1 indicates that CO2 emission is increasing with the increase in trade within the context of Bahrain.

![Scatter Diagram of CO2 Emission and Population Density](image1)

**Fig 2: Scatter Diagram of CO2 Emission and Population Density**
Further, to understand more about the topic, we developed another scatter diagram to show the overall relationship of carbon emission with population density. The motive behind this was to check whether any relationship exists or not. It will not help to understand but it will also show a clear picture before application of econometric model. The output from scatter diagram is shown in fig 2 indicates that CO2 emission is increasing with the increase in population density in Bahrain.

![Scatter Diagram of CO2 Emission and GDP](image2)

**Fig 3: Scatter Diagram of CO2 Emission and GDP**
Furthermore, we developed another scatter diagram to show the overall relationship of carbon emission with GDP of Bahrain. Also, the motive behind this was to check whether any relationship exists or not. It will not help to understand but it will also show a clear picture before application
of econometric model. The output from scatter diagram is shown in fig 3 indicates that CO2 emission is increasing with the increase in GDP of Bahrain. It can be argued that there is a similar trend which can be seen in figure 3 that indicate that CO2 emission increase as GDP increase.

Table 2: Descriptive Statistics
We also applied descriptive statistics to check the mean, median, maximum, minimum, Std. Dev, skewness kurtosis and probability. It is useful to determine about the normality of the data. At this stage research can check about the outliers and other issues that may cause problem at later stages of data analysis.

|            | LOG(CO2) | LOG(SCA) | LOG(TTR) |
|------------|----------|----------|----------|
| Mean       | 9.907077 | 16.63712 | 23.51491 |
| Median     | 9.820360 | 16.54869 | 23.30947 |
| Maximum    | 10.51855 | 17.58377 | 24.39178 |
| Minimum    | 9.296701 | 15.62873 | 22.71027 |
| Std. Dev.  | 0.364210 | 0.704350 | 0.650730 |
| Skewness   | 0.200120 | 0.031404 | 0.147536 |
| Kurtosis   | 1.763075 | 1.412432 | 1.304930 |
| Jarque-Bera| 1.901446 | 2.839856 | 3.330372 |
| Probability| 0.386461 | 0.241731 | 0.189155 |
| Sum        | 267.4911 | 449.2023 | 634.9025 |
| Sum Sq. Dev.| 3.448872 | 12.89884 | 11.00967 |

The results from table 2 highlight the descriptive statistics. It can be seen that the mean value of CO2 emission, Scale effect and Total trade 9.90, 16.63 and 23.51 respectively. The median value for CO2 emission, Scale effect and Total trade are 9.82, 16.54 and 23.30 respectively. Further we also calculated standard deviation, Skewness and kurtosis that can be also seen from table 2.

Before doing further analysis, we used to test the stationary of the data. We used augmented dicky fuller test to check it.

Unit root test
Prior to using the ARDL model and granger causality tests, in this study we applied augmented dicky fuller test to determine the order of integration I(d). The test is used as a classification mechanism for the purpose of discerning whether a variable is stationary or not. This classification is significant for data analysis in context of time series data. Since the time series data are known to be non-stationary, and such data when used tend to have meaningless regressions. Also, if the test results show the presence of variables with the same order of integration, it can be considered as a sign that these are co-integrated. Such kind of variables may cause problems in later stage of analysis. Further, these tests are highly recommended by researchers before applying the ARDL approach. Thus, in this study before moving toward our final ARDL modeling, we applied ADF test on our selected variables.
Table 3
Null Hypothesis: D(LOG(CO2)) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

|                             | t-Statistic | Prob.* |
|-----------------------------|-------------|--------|
| Augmented Dickey-Fuller test statistic | -5.109969   | 0.0000 |
| Test critical values:       |             |        |
| 1% level                    | -2.660720   |        |
| 5% level                    | -1.955020   |        |
| 10% level                   | -1.609070   |        |

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LOG(SCA)) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

|                             | t-Statistic | Prob.* |
|-----------------------------|-------------|--------|
| Augmented Dickey-Fuller test statistic | -3.064856   | 0.0036 |
| Test critical values:       |             |        |
| 1% level                    | -2.660720   |        |
| 5% level                    | -1.955020   |        |
| 10% level                   | -1.609070   |        |

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LOG(TTR)) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

|                             | t-Statistic | Prob.* |
|-----------------------------|-------------|--------|
| Augmented Dickey-Fuller test statistic | -4.253376   | 0.0002 |
| Test critical values:       |             |        |
| 1% level                    | -2.660720   |        |
| 5% level                    | -1.955020   |        |
| 10% level                   | -1.609070   |        |

*MacKinnon (1996) one-sided p-values.

The results of unit root test found that all variables has a unit root, so to smooth the data and overcome the problem of unit root, in this study we have taken first difference of the values. The result at first difference indicates that CO2 emissions, international trade and scale effect don’t have unit root. Thus, the data can be used to apply granger causality test and ARDL approach to measure the impact of international trade on the environment.

Table 4: Correlation Matrix

|       | LOG(CO2) | LOG(SCA) | LOG(TTR) |
|-------|----------|----------|----------|
| LOG(CO2) | 1.000000 | 0.933543 | 0.915560 |
| LOG(SCA) | 0.933543 | 1.000000 | 0.987070 |
| LOG(TTR) | 0.915560 | 0.987070 | 1.000000 |

Results from table 4 highlight that CO2 Emissions, Scale effect and International trade are positively correlated with each other within the context of Bahrain.
Model Testing

Results from ARDL Approach to measure the impact of International Trade

Table 4: Equation 1, Model 1

| Variable     | Coefficient | Std. Error | t-Statistic | Prob.  |
|--------------|-------------|------------|-------------|--------|
| LOG(SCA)     | 0.268296    | 0.125664   | 2.135019    | 0.0468 |
| LOG(TTR)     | 0.236651    | 0.089223   | 2.652361    | 0.0162 |

Results from ARDL model are shown in table 4. Results indicate that there is a long run relationship between international trade and environment. As it can be seen from results that if the volume of international trade increased by the volume of 1% the CO2 emissions increased with the rate 0.23% in the long run. The p-value for the impact of international trade on environment is 0.0162 and the p-value for the impact of scale on environment is 0.0468. It indicates that in the context of Bahrain the international trade significantly influences environment. And also, the scale effect has significant impact on the environment.

Table 5: Equation 2, Model 2

| Variable     | Coefficient | Std. Error | t-Statistic | Prob.  |
|--------------|-------------|------------|-------------|--------|
| TOTAL_TRADE  | 7.05E-07    | 7.73E-08   | 9.117028    | 0.0008 |
| ENERGY_USE   | 1.477332    | 0.463510   | 3.187269    | 0.0333 |
| FOOD_IMPORTS | 1.73E-06    | 2.97E-06   | 0.581930    | 0.5918 |

We developed second model to further check the impact of total trade, energy use and overall food imports on the carbon emission in Bahrain. The results indicate that total trade and energy use have significant impact on carbon emission. Whereas, food imports don’t have any significant impact on carbon emissions. The p-value for the impact of total trade on environment is 0.0008 and the p-value for the impact of energy use on environment is 0.0333. It indicates that in the context of Bahrain the international trade significantly influences environment. And also, the use of energy has significant impact on the environment.

Table 6: Equation 3, Model 3

| Variable     | Coefficient | Std. Error | t-Statistic | Prob.  |
|--------------|-------------|------------|-------------|--------|
| FUEL_EXPORTS | -6.62E-06   | 5.22E-06   | -1.268195   | 0.2200 |
| FUEL_IMPORTS | 1.11E-05    | 9.68E-06   | 1.141927    | 0.2677 |
| TOTAL_TRADE  | 1.80E-06    | 7.09E-07   | 2.544014    | 0.0198 |

We developed third model to further check the impact of total trade along with fuel imports and fuel exports on the carbon emission in Bahrain. The results indicate that total trade has significant impact on carbon emission. Whereas, fuel imports and fuel exports don’t have any significant impact on carbon emissions. The p-value for the impact of total trade on environment is 0.0198 and the p-value for the impact of fuel exports on environment is 0.2200 and for fuel imports the p value is 0.2677. It indicates that in the context of Bahrain the international trade significantly
influences environment. But, the trade from fuel imports and exports don’t have impact on environment.

Table 7: Equation 4, Model 4

| Variable          | Coefficient | Std. Error | t-Statistic | Prob.  |
|-------------------|-------------|------------|-------------|--------|
| METALS_EXPORTS    | -4.30E-06   | 5.24E-06   | -0.820455   | 0.4580 |
| METALS_IMPORTS    | 4.59E-05    | 2.14E-05   | 2.144392    | 0.0986 |
| ENERGY_USE        | 0.988458    | 0.459153   | 2.152783    | 0.0977 |

We developed fourth model to further check the impact of trade in metal along with energy use on the carbon emission in Bahrain. The results indicate that metal imports have significant impact on carbon emission. The p-value for the impact of trade in agricultural raw material imports on environment is 0.0644 and the p-value for the impact of population density on environment is 0.9486. It indicates that in the context of Bahrain the trade in agricultural raw material imports significantly influences environment.

Based upon the 27 year time series data from 1990 to 2016, we developed five different models to justify our findings. The results from empirical analysis indicate that the increase in the import and export value has significant influence on the environment. Therefore, it can be inferred that expanding the international trade in the country will increase the economic growth but it will also increase the transportation pollution, industry pollution and pollution from energy consumption. All these kind of pollution can cumulatively influence the environment. Thus, we can say that international trade can be expanded but on the cost of environment. Hereby, we find the enough evidence to reject the null hypothesis and accept the alternate hypothesis that indicates that international trade significantly influences the environment.

Table 8: Granger Causality Test

Finally, in this study to determine whether environment grangers cause trade or trade granger cause carbon emissions, we applied granger causality test. This test is a useful way to check which variable causes the other in time series data.

Pairwise Granger Causality Tests
Date: 06/10/17   Time: 23:33
Sample: 1990 2016
Lags: 2

| Null Hypothesis                        | Obs | F-Statistic | Prob.  |
|----------------------------------------|-----|-------------|--------|
| LOG(SCA) does not Granger Cause LOG(CO2) | 25  | 10.4241     | 0.0008 |
| LOG(CO2) does not Granger Cause LOG(SCA)|  0.97821 | 0.3933 |
| LOG(TTR) does not Granger Cause LOG(CO2) | 25  | 4.68470     | 0.0214 |
| LOG(CO2) does not Granger Cause LOG(TTR) | 0.06586 | 0.9365 |
| LOG(TTR) does not Granger Cause LOG(SCA)| 25  | 2.22691     | 0.1339 |
| LOG(SCA) does not Granger Cause LOG(TTR) | 2.71408 | 0.0906 |

The results from table 9 indicate that our first assumption that is scale effect does not granger cause CO2 emission is rejected as it can be seen that the p-value is 0.0008 which is less than 0.05
which means the scale effect cause the co2 emission. Our second assumption is co2 emission granger because the scale effect, the p-value is 0.3933 which is greater than 0.05, so we could not find enough evidence to reject this second assumption. Therefore we can argue that co2 does not granger cause the scale effect.

The third assumption in our analysis indicate that international trade does not granger cause co2 emissions, the results indicate the p-value 0.0214 that is less than 0.05 which means we found enough evidence from our data to reject our assumption. It means international trade cause co2 emission which further verifies our previous argument that international trade has significant impact on the environment. Fourth assumption is about measuring co2 emission granger cause international trade. Fourth assumption indicate that co2 emissions does not granger cause international trade. Results from our analysis show the p-value 0.9365 which is greater than 0.05. Therefore we could not find enough evidence to reject our assumption, it means co2 does not cause international trade, but international trade cause co2 emissions. In addition, we also checked the causal relationship among scale effect and international trade, but we could not find any causal relationship among these two variables.

**Conclusion and Implications**

This study was aimed to determine the impact of international trade on environment. From the comprehensive analysis from the subsequent part, we found that in context of Bahrain, international trade significantly influences the environment. It can be argue that trade reforms in Bahrain is not beneficial for the environment. The shift in economic structure of the country can become harmful for the environment and it can shift the economic structure toward polluting industry. When the trade policy implemented without any other complementary and significant measures for the environment, Bahrain will gain benefit on the one end through the increase in trade and growth in GDP but on the other end it will increase greenhouse gas emissions. This increase in greenhouse gas emissions is harmful for the environment and also for the society. So, we can argue that Bahrain may become polluted country if environmental protection measures were not taken into account. Hence, environmental regulations should be concerned by the government of Bahrain to ensure protection against environmental degradation.

Further, results indicate that the government should design and implement and appropriate environmental policy through which Bahrain can utilize maximum international trade without the damage of environment. Policy makes should ensure the introduction and implementation of new and up to date policies to safeguard the environment of Bahrain. Moreover, this study suggests that high degree of regulation should be emphasized. A combined policy of trade reform and environmental tax should be carefully designed. Strict environmental policy will safeguard the environment and trade liberalization will minimize the impact on environment.

**References**

Chinn, M. D. (2015). Emerging market economies and the next reserve currencies. *Open Economies Review, 26*(1), 155-174.

Christmann, P., & Taylor, G. (2001). Globalization and the environment: Determinants of firm self-regulation in China. *Journal of international business studies, 32*(3), 439-458.
Coelho, A. (2013). Global governance, currency and trade: implications of one on the other, common problems and how to address cooperation through law at the international level. *Browser Download This Paper.*

De Silva, N., Malaga, J., & Johnson, J. (2012). Trade liberalization, free trade agreements, and economic growth: The case of Sri Lanka. *Journal of International Agricultural Trade and Development, 8*(2), 241.

Dean, J. M. (2002). Does trade liberalization harm the environment? A new test. *Canadian Journal of Economics/Revue canadienne d'économique, 35*(4), 819-842.

Diagne, A., Cabral, F. J., & Cissé, F. (2008). Trade policies, regional integration, poverty and income distribution in Senegal.

Ekanayake, E. (2011). Determinants of trade: The case of Mexico. *The International Trade Journal, 15*(1), 89-112.

Ekins, P. (2002). COLE (MATTHEW A.). *Trade Liberalisation, Economic Growth and the Environment. ECONOMIC JOURNAL-LONDON*, F146-F147.

Feridun, M., Ayadi, F. S., & Balouga, J. (2014). Impact of Trade Liberalization on the Environment in Developing Countries The Case of Nigeria. *Journal of developing societies, 22*(1), 39-56.

Gaitan, B., & Roe, T. L. (2012). International trade, exhaustible-resource abundance and economic growth. *Review of Economic Dynamics, 15*(1), 72-93.

Gaľaš, S., Gaľaš, A., Zeleňáková, M., Zvijáková, L., Fialová, J., & Kubičková, H. (2015). Environmental impact assessment in the visegrad group countries. *Environmental Impact Assessment Review, 55*, 11-20.

Houseman, S. (2014). Trade, Competitiveness and Employment in the Global Economy.

Huichao, Y., & Limao, W. (2010). Carbon Emission Transfer by International Trade: Taking the Case of Sino—US Merchandise Trade as an Example. *Journal of Resources and Ecology, 1*(2), 155-163.

Jenkins, R. O. (2003). Has trade liberalization created pollution havens in Latin America? *CEPAL Review.*

Kakali, M. (2006). Impact on the Environment of Thailand's Trade with OECD Countries [J]. *Asia-Pacific Trade and Investment Review, 2*(1), 25-46.

Kováč, E., & Žigić, K. (2014). International competition in vertically differentiated markets with innovation and imitation: trade policy versus free trade. *Economica, 81*(323), 491-521.

Krishna, P., & Mitra, D. (1998). Trade liberalization, market discipline and productivity growth: new evidence from India. *Journal of development Economics, 56*(2), 447-462.

Liu, H., Xi, Y., Guo, J. E., & Li, X. (2010). Energy embodied in the international trade of China: an energy input–output analysis. *Energy Policy, 38*(8), 3957-3964.

Liu, X. (2015). Trade Agreements and Economic Growth. *Southern Economic Journal.*

Lofgren, H., Harris, R. L., & Robinson, S. (2002). A standard computable general equilibrium (CGE) model in GAMS (Vol. 5): Int1 Food Policy Res Inst.

McAdam, P., & Willman, A. (2013). Technology, Utilization, and Inflation: What Drives the New Keynesian Phillips Curve? *Journal of Money, Credit and Banking, 45*(8), 1547-1579.

Nasiriyar, M., Nesta, L., & Dibiaggio, L. (2014). The moderating role of the complementary nature of technological resources in the diversification–performance relationship. *Industrial and Corporate Change, 23*(5), 1357-1380.
Neumayer, E. (2001). Trade liberalisation, economic growth and the environment. *Journal of Environmental Policy & Planning*, 3(3), 245-254.

Rossi, B. (2012). The changing relationship between commodity prices and equity prices in commodity exporting countries. *IMF Economic Review*, 60(4), 533-569.

Suga, N., & Tawada, M. (2010). Trade and the Environment: Spatial Separation under Product Differentiation. *The International Economy*, 2010(14), 95-112.

Tian, X.-L. (2016). Participation in export and Chinese firms’ capacity utilization. *The Journal of International Trade & Economic Development*, 25(5), 757-784.

Vishuphong, P. (2015). Rethinking the Relationship between International Trade and Environment: Thailand as a Case Study.

Waheed, A., & Abbas, S. (2015). Potential Export Markets for Bahrain: A Panel Data Analysis. *International Journal of Trade, Economics and Finance*, 6(3), 165.

Weber, A. S., Turjoman, R., Shaheen, Y., Al Sayyed, F., Hwang, M. J., & Malick, F. (2017). Systematic thematic review of e-health research in the Gulf Cooperation Council (Arabian Gulf): Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates. *Journal of telemedicine and telecare*, 23(4), 452-459.

Yanase, A., Kurata, H., & Kawabata, Y. (2012). Free trade agreement and vertical trade with a manufacturing base. *Review of International Economics*, 20(5), 1070-1081.

Zameer, H., & Wang, Y. (2018). Energy production system optimization: Evidence from Pakistan. *Renewable and Sustainable Energy Reviews*, 82, 886-893.

Zameer, H., Wang, Y., & Yasmeen, H. (2017). Perceived Positioning of ‘Made in China': Perspective of Means-End Theory. *International Journal of Customer Relationship Marketing and Management (IJCRMM)*, 8(3), 54-69.