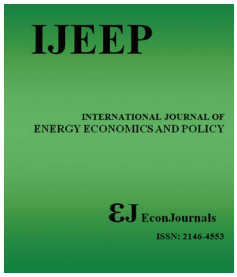

International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2022, 12(5), 432-440.

The Impact of Green Finance, Agriculture Growth and Creativity on Carbon Emissions of High Carbon Emissions Producing Countries

Maximillian M. J. Kapa[1]*, Agus A. Nalle[2], Paul G. Tamelan[3], Worakamol Wisetsri[4]

[1]Department of Agribusiness, Faculty of Agriculture, University of Nusa Cendana Kupang, Indonesia, [2]Faculty of Animal Husbandry, Nusa Cendana University, Indonesia, [3]Faculty of Education and Training, Universitas Nusa Cendana, Indonesia, [4]Department of Social Science, Faculty of Applied Arts, King Mongkut's University of Technology North Bangkok, (KMUTNB), Thailand. *Email: mmjkapa@gmail.com

Received: 01 July 2022 **Accepted:** 08 September 2022 **DOI:** https://doi.org/10.32479/ijeep.13562

ABSTRACT

Correct predictions are needed to measure the future level of energy performance across the country in sequence to develop clear policies for monitoring and reducing carbon and other harmful emissions. Using the most correct and recognized procedures of the six countries like China, Japan, India, Indonesia, Russia, and the United States that account for 61% of global emissions, we have made a correct guess on the number of carbon emissions. Thus, the present study investigates the impact of green finance, agriculture economics and creativity on carbon emission. The data was extracted from WDI covering the period from 2006 to 2020. The paper employed Fixed effect model as well as robust standard error to test the hypotheses. The results revealed that green finance, agriculture economics and creativity share negative relation with the carbon emission of selected countries, while other variables such as population and economic growth shares a positive connection with carbon emission. This research also proposes some enlightenment for researchers and policymakers who admire and decrease carbon emissions.

Keywords: Carbon Emission, Green Finance, Creativity, Research and Development, Economic Growth, Agriculture Growth
JEL Classifications: F43, F65, K32, O13, O16

1. INTRODUCTION

Green finance is a manifestation that associates the biosphere of finance and business with environmentally friendly behavior. It is a stadium for many participants, encompassing individual and business clients, producers, investors, and monetary creditors. Green finance can be communicated differently dependent on the partaker, and it may be led by financial inducement, an intention to maintain the world, or a mixture of both (Chien et al., 2021a; Lan et al., 2021). In expansion to illustrating aggressive, environment-friendly behavior, such as facilitating quantity transit or the redeeming of used goods. Green finance is rough to prevent the approval of any business or movements that could be abused to the environment presently or for forthcoming generations (Chien et al., 2021b; Li, Ren et al., 2020). An approach proposed specially to shape impetus in the capital markets, in the COVID-19 situation, is that of the COVID-19 regaining transition bonds; these are green bonds personalized and organized to the desires of the time period obstructed by COVID-19, maintained by the government and MDB funds as long as risk assurance. They will carry the same level of rigor regarding green classification to clear off any green washing, but with significant attention on recovery.

Creativity is the capability of the individuals in an organization to think about some topic, task, matter, or problem in a new manner, the ability to use their imaginations to present new ideas about

This Journal is licensed under a Creative Commons Attribution 4.0 International License

the subject under consideration (Cerisola, 2019; Chae and Choi, 2018; Cheba et al., 2020; P. Li et al., 2021). The creative skills enable the individuals to find the solution to complex problems or surprising ways to deal with the tasks (Petrakis et al., 2021; Wei et al., 2021). When individuals are creative, they look at things from a unique perspective (Ahmad et al., 2021; Baloch et al., 2021; Kubenka, 2020). Creativity is the tendency to produce or recognize new ideas, generate alternatives or possibilities which may be helpful in solving problems (Faggian et al., 2017; Suyitno and Suyitno, 2018; Zhao et al., 2021). Nowadays, when the world population is strengthening, industrialization is at the peak, and transportation has become the need of the hour; creativity is an effective tool to cope with environmental issues as it gives the way to overcome the polluting factors (Li et al., 2021; Mohsin et al., 2021). The business processes like the use of technology, infrastructure, logistics, energy usage, and production processes are the major source of emitting harmful gases or smoke, toxic chemical, or harmful wastes which could pollute the air, water, and land when they are not disposed of properly, the creative skills in the business personnel may provide safeguard (Apostoaie and Bilan, 2020; Chien et al., 2021d; Nawaz et al., 2021). Creativity enables the organizational personnel to bring change in the techniques, processes, technologies, or other resources which may add value to products and services, keeping the environment safe (Nawaz et al., 2021). Thus, the paper aims to explore the influences of green finance and creativity along with population increase and economic growth on CO_2 emission.

With the constant CO_2 emission, the global warming has been accelerating rapidly. Global warming is considered to be one of the most substantial fears in all aspects that it cannot be neglected more in current times. The major reason that why Global warming is becoming threat to universe is because of higher rate of carbon emissions along with the other environmental issues such as floods, higher sea levels etc. (He et al., 2021; Shair et al., 2021). It is observed in recent times that earth's average temperature has increase with 0.6 degrees and the forecast says that it will increase more with the passage of time. Meteorological organizations claim that 2015 was the year when the extreme global temperature has been witnessed. Moreover, in the period of 2011 to 2015, EL Nino streams and changes in climate due to human action also messes the environment, hence highest global temperature was recorded in this time span. Experts and environmentalists highly advised the global community to evaluate the consequences and address this major problem. In this regard, COP21 conference which has been held in Paris could represent the sense of unity and accountability regarding these critical issues. The main motto of COP21 is to mark full stop of the further increase in temperature at global level. Most of the established countries especially EU members specifically developed intelligible strategies related to renewable energy solutions and vowed to focus on low carbon emission technologies to make the societies free from harmful emissions (Sun et al., 2020; Lu et al., 2020). However, third world countries especially Iran has not yet proposed any solid encounter action to combat these climate changes. As the country is not able to put forward action strategies to address the challenges, thereby, Iran has not yet reached to the desired outcomes which are demanded in these growth policies (Bilan et al., 2020).

The precise appraisal of CO_2 emanations in nations that are in charge of the biggest piece of this emission is a flat-out need as far as the advancement of strategy to ensure evaporating species, weakening ecological quality further natural corruption (Chien et al., 2021e; Vveinhardt and Sroka, 2021; Zhuang et al., 2021). Along these lines, it is presently time for the sincere activity for ozone-depleting substance (GHGs) decrease approaches to relieve the effects of a dangerous atmospheric devotion and environmental change. This activity requires the correct aptitude, capacities, and duty so as to build up a reasonable arrangement course that sets out relentless focuses on that guarantee evidential energy execution in regard to Nitrous Oxide emissions (Chien et al., 2021c; Sharma, 2020). It is anything but difficult to allude to various investigations such as Ehsanullah et al. (2021) and Hsu et al. (2021), which as a rule accentuation on the expectation of CO_2 or SO_2, yet the proposed method measures the groupings of CO_2 emanations with gauging execution. Besides, the investigations in this line of research come up short on the anticipating of CO_2 emissions, particularly in the top six emanating nations. Consequently, so as to address the previously mentioned hole, we proposed the accompanying examination.

Subsequently, these are improving most extreme contamination to higher populace apportions as for open consumption proportion. This new model will give an exact expectation of CO_2 emissions for the year 2030 by considering provincial qualities, including energy consumption, nearby the segment explicit econometric different connection figures models which need entangled exertion, period, and energy, and which induce vulnerability both regarding verbal vagueness and numerical reaches. Subsequently, another forecast model will give new bits of data into vulnerability decrease with respect to CO_2 emission and, in this manner, increment the comprehension of conceivable expected CO_2 emissions in the investigation nations. Likewise, the examination explored the future patterns in the degree of N_2O emissions with the goal that approach creators could make choices dependent on future anticipated results. In this way, the proposed development arithmetic procedures specifically vague models through great adaptability and high precision of anticipating to foresee the significant contamination CO_2 for green energy economy.

The other part of the paper is sorted out as pursues. Segment 2 blueprints the foundation of past writing on anticipating CO_2 emissions, including a concise report reason. The procedure used to anticipate future CO_2 emissions patterns is depicted in Segment 3, and Segment 4 displays the appropriate outcomes. At long last, Segment 5 contains the investigation's decisions and arrangement suggestions, alongside impediments and impending research bearings.

2. LITERATURE REVIEW

Carbon emissions coming from the copying of petroleum products and the accumulation of bonds are the responsibility of essentially 60% of GHGs. Additionally, according to the Intergovernmental Board on Environmental Change (IPCC), CO_2 emission from fossil ignition and current measures take part in about 78% of the overall development of GHG emanations for the time of

1970–2010, with comparable to the part commitment from 2000 to 2010. So as to accomplish natural manageability globally as far as GHGs, in 1997, the Kyoto convention was considered by various government officials of formed nations just as producing and least formed states. As per the IPCC, these states characterized about 76.7% of absolute anthropogenic GHG emissions in 2004. The Convention checked required outflow decrease purposes for developed states.

Despite the fact that the decrease commitments of CO_2 emissions alluded to created nations, in view of the way that they are the fundamental supporters of worldwide CO_2 emission, there have been approaches creating economies to take a functioning part in worldwide emanations decrease. CO_2 emanations share from creating economies was almost half of the world's all-out CO_2 emissions in 2003 (Huang et al., 2020). On the off chance that the present degree of energy consumption proceeds, the present CO_2 pattern is required to develop. Nonetheless, on account of the contrasts among created and creating nations and even dissimilarities between various nations inside a similar gathering, those arrangement estimates will for the most part not be indistinguishable and ought to be researched for individual nations. A few investigations have attempted to estimate CO_2 emissions utilizing delicate figuring methodologies, for example, an improvement model to conjecture CO_2 emanations in China. Sadly, a developmental calculation causes the issue of untimely intermingling while nearby fanaticism esteems may outcomes from unfavorable setup and doesn't produce an opinion close to the normal radicalism (Al Mamun et al., 2021; Li et al., 2021; Liu et al., 2021; Kot et al., 2021). In pattern investigation, it is difficult to choose the base year, and it's difficult to keep up the predictable bookkeeping standard and it requires a piece of long-haul information to lead the examination. Correspondingly, with overviews, it is frequently hard to arrive at all the important respondents, respondents probably won't be completely mindful of the topic of the study, and basic yes/no inquiry choices may prompt imperfect outcomes. In addition, the consistency, genuineness, and understanding of the studies can be undermined. Four principal reasons drove us to choose this nation. Third, the connection between monetary development and CO_2 emission has been read for various nations in writing (Hussain et al., 2021b; Othman et al., 2020). Be that as it may, just a couple of board researches have encompassed Azerbaijan in their CO_2 examination, and, as far as we could possibly know, there is no time arrangement study exploring this matter for Azerbaijan. Fourth, exploring the association on account of Azerbaijan, an asset-rich creating nation, would be a model for other comparative nations and, in this way, may give a few understandings which are normal crosswise over such sort of economies.

Widespread mental health diseases impact approximately 300 million people, and a majority (70%) of these communities are assigned. Extensively mental diseases are favorable or acceptable in their degree of injury and clinical stringency, which motivates most of these communities to labor. This summarizes about 15% of the total workforce who have a delicate aspect of mental disease and an additional 5% who have a more severe cognitive or psychiatric disease. Epidemiological information from several progressive countries on the majority ratios in community implies that about 1 in each five working adults have cognitive health diseases and material misuse dilemmas. These ratios rise to more than 1 in 3 people around an achievement who will improve behavioral health diseases. In addition, these diseases co-occur as a society can have more than one disease or dangerous characteristic at the same period (called identical diseases or clinical announcement)**.** Suspicion disease affects nearly 7% of adults. As an organization, they encompass circumstances such as generalized uncertainty disease, post-traumatic anxiety disorder, shock disease, public aversions, and injury. Successive greatly prevalent, approximately 5% of adults, are the several forms of attitude disease. The mild and moderate depressive disease can donate to a personal injury as well as needy productivity and work absence, yet crucial recession can be injuring and raise suicide risk. Stirring anxiety and correlated conditions, nearly 1 in 10 employees have a mental health disease (Bierwiaczonek et al., 2020; Sadiq et al., 2021).

With the increase in worldwide population, the demand of food has also been rising but agriculture productivity in many countries is slower than expected. As the estimation of more than 9 billion population by 2050, global agriculture appears to be in crisis due to high demand of resources (land and water) which are scarcer (Zhangwei and Xungang, 2011). It is argued that there exists a need to develop new crop species and build effective technologies to maximize agricultural production without damaging agro eco system which is possible when increase the usage of modern bio and physical science. As evidences indicate that agriculture shares a significant and positive connection with CO_2 emissions, hence adoption of modern technologies along with low carbon agriculture seems to be appropriate to make the globe free from carbon (Singh and Sisodia, 2022).

According to Rehman et al. (2019), agricultural productivity and CO_2 emissions shares positive correlation as long-run estimation confirms that factors such as cropped area, fertilizers, availability of water and energy consumption increases carbon dioxide emissions. However, factors such as improved seed qualities as well as food grains help in reducing the carbon emissions. This shows that agriculture economics plays a crucial role in mitigating emission where resources are allocated and utilized efficiently (Ullah et al., 2021). At present, there is no such concept regarding the unified definition of low carbon agriculture. The reason is the scholars hold different views regarding the subject. It is argued by researchers that low carbon agricultural economy indicates that the energy consumption, pollution and GHG emissions should be low, hence making the agricultural development economical, safe and efficient (Wang, 2008). Yun et al. (2014) pointed out agriculture economics must highlight the role of low-carbon agricultural economy which is only possible when resources are being used efficiently, country focuses on green product development and there is an increase in technological progress. Hence, integrating prior evidences, it can be concluded that agriculture economics beholds the reflection of low-carbon economy in the production of agriculture and is aimed to improve the trend of traditional agriculture practices (Xiong et al., 2015). The concept provides the idea of low carbon as its main principle which focuses on energy

conservation as well as reducing carbon footprints to restructure agricultural production practices and ultimately achieve the goal which is ecological and sustainable agriculture (Li, 2012).

The industrial revolution enhances the role of financial sector, as it is believed that the sector has a great potential to increase human growth. The primary objective of financial institutions is to make effective use of savings so that life of human beings can be improved.

Green finance plays a significant role in anthropogenic (human influence on environmental quality) and controlling the negative impact of human activities on the environment. According to Sadiq, Nonthapot, Mohamad, Ehsanullah, and Iqbal (2021), green financial instruments help achieve a green environment by giving an opportunity to control CO_2 emissions. Under green finance, the financial markets or intermediaries design financial instruments like a green home mortgage, green bonds, green loans for commercial buildings, "go green" auto loans, ecological home equity programs, small business management loans, and climate credit cards. The issuance of these loans boosts investment in ecological friendly programs that mitigate CO_2 emission and help protect the natural environment. In the words of Wu et al. (2021), green finance is the integration of environmental behavior with the financial and business world. The effective application of green finance helps the business enterprises to carry their operational, production, and marketing processes in such a way as there us minimum emission of greenhouse gases, chemicals, and harmful wastes. Thus, as a result of green finance implementation, the amount of CO_2 emission causing global warming can be controlled. Regions, where financial entities such as banks offer loans for green agenda with less requirements, firms there are rich in financial resources as they are able to spend more on eco-friendly resources and raw materials. This way green finance helps business organizations to overcome CO_2 emissions and environmental degradation.

At present, firms are operating in highly competitive environment, hence it is crucial to have creative traits in order to compete at international level. Creativity is the skills to generate big ideas, challenge a conservative way of thinking, find innovative solutions and open the door to new opportunities out of problems. Creative skills like curiosity, open-mindedness, quick analysis, imagination, problem-solving, and the generation of new opportunities are helpful to cope with the problem of CO_2 and environmental degradation. The study conducted by Mohsin et al. (2019) suggests that creative employees do not rely on the conservative ways of production. They analyze the deficiencies in the old ways of production which could cause pollutants like CO_2 emission and damage the environment and try to improve the production methods which could cause the least amount of CO_2 emission. Thus, the creativity in employees can control environmental degradation. The creative employees can easily overcome the environmental problems, as they have the capacity to find out the energy deficiency in technology applied for business operations which can increase CO_2 and SO_2 emission and disturb the climate balance. The creative employees not only fin out the energy deficiency of the technology but also have the awareness how to bring eco-friendly change in technology so that the amount of CO_2 emission can be reduced (Al-Ghazali and Afsar, 2021; Hussain et al., 2020). The organizations where the employees have creative skills and the opportunity to share their ideas with the management and make those innovative ideas implemented are found to have reduced the amount of CO_2 emission and other pollutants. In these organizations, the process of novelty, innovation, and value addition is common, and problems that affect the business reputation are found and tried to be solved on a regular basis. Thus, alteration is made in raw materials, technologies, human resources quality, and production techniques. Such alteration improves the environmental performance of the firm (Bhutto et al., 2021; Tabeikyna et al., 2021; Hussain et al., 2021a).

Green finance and creative both are two effective tool which provides the platform to cope up with environmental issues. A study was conducted by Wang and Su (2020), explored the association of economic growth with quality of environment. The reason to evaluate the association between them is that economic growth enhances the economic activities by creating more job opportunities and increasing transportation facilities. However, with the increased improvement in such areas also increase the usage of energy which ultimately be the reason of harmful emissions such as CO_2. Moreover, the literary workout of Dong et al. (2018) explores how the increase in population growth rate causes environmental degradation. The increase in the population causes CO_2 emission directly through respiration and indirectly through increased domestic and economic activities is which energy have to be used.

3. METHODOLOGY

The Paper aims to explore the effectiveness of green finance, agriculture growth and creativity on the carbon emissions in six states including Japan, Russia, India, China, United States and Indonesia. The study also included economic and population growth in the model to evaluate their effectiveness towards carbon emission. The reason to consider these states as they are accounted for 61% of carbon emissions at global level. The data was extracted from WDI from 2006 to 2020 from the selected countries. The equation with the help of understudy constructs is given as below:

$$CO2_t = \alpha_0 + \beta_1 GF_t + \beta_2 CR_t + \beta_3 EG_t + \beta_4 PG_t + \beta_4 AG_t + e_t \quad (1)$$

Where;
CO_2 = Carbon Emission
t = Time Period
GF = Green Finance
CR = Creativity
EG = Economic Growth
PG = Population Growth
AG= Agriculture Growth

This research has taken three predictors named green finance, creativity and agriculture growth. In addition, the current study has taken two control variables such as economic growth measured as the GDP growth (annual %) and population growth measured as the population growth (annual %). Finally, the current study has also used the predictive variable named as carbon emission

measured as the carbon dioxide damages (% of GNI). The details of constructs is given in detailed in Table 1.

The present research analyzed the descriptive statistics that exposed the properties and normality of data. In addition, the present study also examines the correlation between the constructs with the help of a correlation matrix. Moreover, multicollinearity has been checked by using variance inflation factor (VIF). The equations for VIF are given as below:

$$R^2_Y \rightarrow Y_{it} = \alpha_0 + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_5 X_{6it} + e_{it} \quad (2)$$

$$j = R^2_Y, R^2_{X1}, R^2_{X2,} R^2_{X3,} R^2_{X4,} R^2_{X5,} R^2_{X6,} \quad (3)$$

$$Tolrance = 1 - R^2_j \; VIF = \frac{1}{Tolerance} \quad (4)$$

The appropriate model among fixed and random models has been selected with the help of the Hausman test. As the value of probability is greater than 5%, hence the Hausman test suggest to Fixed model is appropriate for the study. The equation of FEM is given as under:

$$Y_{it} = \beta_{1i} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_5 X_{6it} + u_{it} \quad (5)$$

The subscript (i) represented in the above equation is the individual country and made the different countries according to their characteristics. The FEM equation is given as under:

$$CO2_{it} = \beta_{1i} + \beta_2 GF_{it} + \beta_3 CR_{it} + \beta_4 EG_{it} + \beta_5 PG_{it} + \beta_5 AG_{it} + u_{it} \quad (6)$$

The study also executed the robust standard error to check the relationships among the variables because it "adjusts the model's heterogeneity issues" that generally exist. The equation for robust standard error is given as under:

$$CO2_{it} = \beta_1 GF_{it} + \beta_2 CR_{it} + \beta_3 EG_{it} + \beta_4 PG_{it} + \beta_5 AG_{it} \; \varepsilon_{it} \quad (7)$$

4. RESEARCH FINDINGS AND DISCUSSION

The present research analyzed the descriptive statistics that exposed the mean and standard deviation with minimum and maximum values. The results indicated that the CO_2 emission average value is 1.797% of GNI, and the green finance average value is 1.113 percent of GDP. Moreover, the mean value of creativity is 8.619%, while the average value of economic growth is 5.660, and the mean value of population growth is 20.85%. Table 2 exhibits the descriptives in detail.

In addition, the present study also examines the correlation between the constructs with the help of a correlation matrix. Findings exhibited that green finance and creativity have a negative association with CO_2 while economic growth and population growth share positive correlation with CO_2. Table 3 shows the correlation matrix.

Moreover, multicollinearity has been checked by using VIF, and results indicated that multicollinearity does not exist in the model as values of VIF fulfilling the benchmark criteria. Table 4 shows the VIF values.

With the help of Hausman test, the model has been selected according to the appropriateness. The reason is that the p-value of Hausman test suggests which model is suitable to conduct the analysis. As Table 5 indicates the p is greater than 5%, this is why, fixed effect model is suitable, hence selected to conduct analysis.

From the Table 6, It is gauged that green finance, agriculture growth and creativity shares a negative correlation with CO_2 in the chosen sample. While economic growth and population growth are positively correlated with carbon emission. In addition, 50.90% of variations in the carbon emission are due to the selected variables. Table 6 shows the FEM.

Table 1: Measurements of variables

S. No.	Variables	Measurements
01	Carbon Emission	Carbon dioxide damages (% of GNI)
02	Green Finance	Green credit provided by the financial sector (% of GDP)
03	Creativity	Research and development expenditures (% of GDP)
04	Economic Growth	GDP growth (annual %)
05	Population Growth	Population growth (annual %)
06	Agriculture Growth	Agricultural added value growth index

Table 2: Descriptive analysis

Constructs	Obs	Mean	Std. Dev.	Min	Max
CO_2	90	1.797	0.405	1.028	2.733
GF	90	1.113	0.091	0.905	1.344
CR	90	8.619	0.363	7.808	9.128
EG	90	5.660	0.311	4.961	6.399
PG	90	20.85	10.876	11.94	25.89
AG	90	2.97	0.578	0.870	1.546

Table 3: Matrix of correlations

Constructs	CO_2	GF	CR	EG	PG	AE
CO_2	1.000					
GF	−0.194	1.000				
CR	−0.010	0.270	1.000			
EG	0.098	0.580	0.155	1.000		
PG	0.337	0.291	−0.064	−0.123	1.000	
AG	−0.234	0.134	0.123	0.345	0.276	1.000

Table 4: Variance Inflation Factor

	VIF	1/VIF
GF	2.036	0.491
EG	1.758	0.569
PG	1.307	0.765
CR	1.110	0.901
AG	1.768	0.565
Mean VIF	1.5958	

Table 5: Hausman (1978) Specification Test

	Coef.
Chi-square test value	9.356
p-value	0.990

The results revealed that green finance, agriculture economics and creativity have a negative association with the carbon emission of selected countries. In contrast, economic growth and population growth have a positive association with carbon emission. Table 7 shows the robust standard error.

It's been indicated by the study findings that green finance has a negative association with CO_2 emission. The study implies that the effective integration of green concepts into the financial policies like the issuance of green credits, green securities, and green investment encourages such economic activities as do not put negative impacts on the environment. Thus, there is less emission of CO_2. These results are supported by the literary work out of Le et al. (2020), which analyzes the role of green finance in coping with CO_2 emission. The study examines that the issuance of finance, especially for green purposes, enables the business enterprises to apply eco-friendly resources like green technology, eco-friendly energy resources, green material, and green logistics. The application of such resources minimizes the emission of harmful gases like CO_2 emission. These results are also in line with the previous study of Ren et al. (2020), which elaborates the negative impacts of green finance on CO_2 emission. According to the results of this study, the areas where the business organizations have the facility to acquire finances in sufficient amounts on easy condition to make an investment in the ecological friendly projects, there is a low amount of CO_2 emission into the air which could spoil the environmental balance. These results are in line with the previous study of Yao and Tang (2021), which states that when the financial institutions like banks have the policies to grant green credits on easy requirements of securities, guarantee, returning period or low rate of interest, the business organizations operating in that area have the ability to acquire sufficient funds for applying in the eco-friendly production and marketing. In such a situation, the amount of CO_2 emission into the air is minimum.

Findings also exposed that creativity has negative impacts on CO_2 emission. The study posits that the ability of the employees (both upper and lower-level employees) to think about some issue or task in a new or different manner, to use imagination in generating new ideas, and to implement those ideas in practical, enhances their tendency and capability to solve environmental problems like the emission of contaminating gases like CO_2 emission. These results are in line with the past study of Rebolledo-Chávez et al. (2021), which defines business creativity as the tendency to bring newness or innovation in the business processes, products, and services in the form of value addition, improvement, or invention of entirely new things or techniques. This study declares that creativity in the firms' personal enables them to cope with the problems of CO_2 emission during the undertaking of business processes like manufacturing or delivery of products. The study findings are also in line with those of Usman et al. (2021) which also elaborates the significance of the element of business creativity in controlling the negative impacts of business processes on environmental quality. This study clarifies that the cognitive, emotional, and physical creative skills in the employees are helpful in recognizing the causes of CO_2 emission and finding out the solutions to this environmental problem as creativity brings eco-friendly improvement in the business processes, products, and services. The findings are also improved by the recent study of Mehmood and Mansoor (2021), which shows that creativity works as a pollution control factor in economic activities. Creativity encourages research, investigation, development, and innovation in the best interest of the business organization, economic progress, and society's well-being; thus, the atmosphere can be protected against harmful gases like CO_2 emissions.

Table 6: Fixed Effect Model

CO_2	Beta	S.D.	T-value	p-value	L.L	U.L.	Sig
GF	−2.653	0.689	−3.851	0.001	−2.025	−0.719	***
CR	−1.915	0.164	−11.677	0.000	−1.327	−0.326	***
EG	0.639	0.223	2.87	0.005	0.195	1.082	***
PG	0.013	0.005	2.83	0.006	0.004	0.023	***
AG	−2.354	0.589	−2.981	0.002	−2.045	−0.617	***
Constant	3.375	1.408	2.397	0.009	0.987	1.427	***
R-squared	0.509		Number of obs.			90	
F-test	5.140		Prob. > F			0.000	

Table 7: Robust standard error

CO_2	Beta	SD	T	p >t	L.L.	U.L.
GF	−2.653	0.799	−3.320	0.010	−0.708	−1.402
CR	−1.905	0.128	14.883	0.000	−1.330	−0.330
EG	0.639	0.250	2.556	0.023	0.260	1.537
PG	0.013	0.003	4.280	0.008	0.005	0.021
AG	−2.543	0.789	−3.102	0.002	−0.799	−1.419
_cons	1.375	0.290	4.741	0.003	3.147	6.397

The study revealed the negative and significant relationship between CO_2 emissions and agriculture growth. The results show consistency with Xiong et al. (2016) as it implies that with the efficient resource management system and low carbon agriculture economics, the damage to natural resources can be minimized which ultimately improve the environmental sustainability. With the help of agriculture economics, the income of farmers, economic development at rural areas can also be promoted, hence a sustainable agricultural development can be maintained which eventually impact the economic growth of country.

Findings exposed that economic growth and CO_2 emission shares positive connection. These results are consistent with Mikayilov et al. (2018), which states that when a country has high economic growth, there is more productivity, more use of technology, logistics, and raw materials, which may have direct or indirect impacts on the environmental quality and cause an increase in the emission of greenhouse gases like CO_2 dioxide. These results are supported by the past study of Cai et al. (2018). This study shows that when there is high economic growth, the economic activities like communication practices, transportation, manufacturing of products, and rendering of services are at a high rate. In undertaking all these activities, the energy resources are consumed, toxic material may be used, such techniques or technologies are applied, which could affect the environmental quality increasing the amount of CO_2 emission into the air. The study findings show that population growth has a positive relationship with CO_2 emission. These results are supported by the previous study of Dong et al. (2018), which throws light on the negative environmental impacts of an increase in population growth. This study elaborates that the increase in the population causes an

increase in the amount of CO_2 emission in two ways. First human beings are a natural source of CO_2 emission like respiration is the major cause of CO_2 emission. Second, the increase in the economic activities to meet the needs of the increased population cause more CO_2 emission. The past study of Gbatu, Wang, Wesseh, and Sesay (2019) also approves these study findings. This study posits that the increase in population growth arises the need for enhanced communication networks, transportation practices, production of basic needs, and employment rate. These all cause excessive carbon emissions which damages the environment.

The conduct of the present study proves to be a significant addition to the literature. This paper deals with the factor of CO_2 emission, which is the construct of environmental quality. Our study throws light on three factors like green finance, agriculture growth and creativity in detail and elaborates connection with carbon emissions which are responsible to damage the environment. Past researchers also explored these factors and their association with carbon emissions but in separate workouts.

The altogether impact of these factors on CO_2 emission is a significant contribution of the current study. In the past, mostly the studies have discussed the CO_2 emission and the factors causing or controlling its amount in one or two countries only. As our study analyzes the influences of green finance, creativity, economic growth, and population increase on CO_2 emission in six countries like China, Japan, India, Indonesia, Russia, and the United States, it is a great extension to literature. The current study also has great importance to policymakers, economists, and environmental regulators of the six aforementioned countries, particularly and other countries in general, as it provides guidance on how to control CO_2 emission into the atmosphere and save the country. This study suggests that CO_2 emission can be controlled with the integration of the green concept in financial policies and effective implementation of green finance, and encouragement of creative skills. Similarly, the study guides that CO_2 emission can be reduced by controlling economic growth and population problems.

5. CONCLUSION

China, Japan, India, Indonesia, Russia, and the United States are the six countries that produce CO_2 emissions in large amounts. The increasing amount of CO_2 in these countries are aggressively emitting harmful substances, hence, the quality of natural resources and human being is being compromised. That's why there must be given attention to this issue. The objective of the current study was to elaborate on the effects of green finance, creativity, economic growth, and increase in population on CO_2 emission. The analysis about the influences of green finance, creativity, economic growth, and increase in population on CO_2 emission was made in the six chosen countries (China, Japan, India, Indonesia, Russia, and the United States). This empirical analysis helped in extracting findings. These findings showed that the effective integration of green concepts into the financial policies about the issuance of green credits, green securities, and green investment encourages eco-friendly projects which remove the negative impacts of economic activities on the environment. Thus, there is less emission of CO_2. The findings indicated that if the organizational personnel have the ability to think about some issue or task in a new or different manner, to use imagination in generating new ideas, and to implement those ideas in practical, it enhances their tendency and capability to solve environmental problems like the emission of contaminating gases like CO_2 emission. The increased economic growth and high population growth cause an increase in CO_2 emission it leads to increased use of technology, energy consumption, transportation, and material use.

Though the current study is of great theoretical and empirical importance, it still has certain limitations, and there is a need for the authors or researchers to pay attention to it while conducting a study on the same topic. First of all, this study is not as comprehensive as it should be because it deals with only limited factors like green finance, creativity, economic growth, and an increase in population while analyzing the amount of CO_2 emission. Whereas, there are many other factors like energy consumption or forestation, etc. which can cause or can be helpful to control carbon emission. But these factors have been utterly ignored here, which have made the study less comprehensive. The upcoming authors are recommended to explore more number of factors that have an impact on CO_2 emission. Secondly, the quantitative data to support the concepts of the study authors have collected quantitative data from the six chosen countries like China, Japan, India, Indonesia, Russia, and the United States for the period of 2006-2020. The data collected is limited in both quantity and validity. The authors who want to discuss influences of green finance, creativity, economic growth, and increase in population on CO_2 emission in future must choose more number of countries and extended-time period for data collection.

REFERENCES

Ahmad, I., Ullah, K., Khan, A. (2021), The impact of green HRM on green creativity: Mediating role of pro-environmental behaviors and moderating role of ethical leadership style. The International Journal of Human Resource Management, 13, 1-33.

Al Mamun, A., Muniady, R., Nasir, N.A.B. (2021), Effect of participation in development initiatives on competitive advantages, performance, and sustainability of micro-enterprises in Malaysia. Contemporary Economics, 15(2), 122-138.

Al-Ghazali, B.M., Afsar, B. (2021), Retracted: Green human resource management and employees' green creativity: The roles of green behavioral intention and individual green values. Corporate Social Responsibility and Environmental Management, 28(1), 536-536.

Apostoaie, C.M., Bilan, I. (2020), Macro determinants of shadow banking in Central and Eastern European countries. Economic Research-Ekonomska Istraživanja, 33(1), 1146-1171.

Baloch, Z.A., Tan, Q., Kamran, H.W., Nawaz, M.A., Albashar, G., Hameed, J. (2021), A multi-perspective assessment approach of renewable energy production: Policy perspective analysis. Environment, Development and Sustainability, 24, 2164-2192.

Bhutto, T.A., Farooq, R., Talwar, S., Awan, U., Dhir, A. (2021), Green inclusive leadership and green creativity in the tourism and hospitality sector: Serial mediation of green psychological climate and work engagement. Journal of Sustainable Tourism, 29(10), 1716-1737.

Bierwiaczonek, K., Gawron, G., Pyka, R., Suchacka, M. (2020), Innovation places: Theoretical and methodological remarks for analysing metropolitan creativity and innovations. Creativity Studies, 13(2), 532-551.

Bilan, Y., Hussain, H.I., Haseeb, M., Kot, S. (2020), Sustainability and economic performance: Role of organizational learning and innovation. Engineering Economics, 31(1), 93-103.

Cai, Y., Sam, C.Y., Chang, T. (2018), Nexus between clean energy consumption, economic growth and CO2 emissions. Journal of Cleaner Production, 182, 1001-1011.

Cerisola, S. (2019), A new perspective on the cultural heritage-development nexus: The role of creativity. Journal of Cultural Economics, 43(1), 21-56.

Chae, H., Choi, J.N. (2018), Contextualizing the effects of job complexity on creativity and task performance: Extending job design theory with social and contextual contingencies. Journal of Occupational and Organizational Psychology, 91(2), 316-339.

Cheba, K., Bąk, I., Szopik-Depczyńska, K. (2020), Sustainable competitiveness as a new economic category-definition and measurement assessment. Technological and Economic Development of Economy, 26(6), 1399-1421.

Chien, F., Kamran, H.W., Nawaz, M.A., Thach, N.N., Long, P.D., Baloch, Z.A. (2022), Assessing the prioritization of barriers toward green innovation: Small and medium enterprises Nexus. Environment, Development and Sustainability, 24(2), 1897-1927

Chien, F., Ngo, Q.T., Hsu, C.C., Chau, K.Y., Iram, R. (2021b), Assessing the mechanism of barriers towards green finance and public spending in small and medium enterprises from developed countries. Environmental Science and Pollution Research, 28, 60495-60510.

Chien, F., Sadiq, M., Kamran, H.W., Nawaz, M.A., Hussain, M.S., Raza, M. (2021c), Co-movement of energy prices and stock market return: Environmental wavelet nexus of COVID-19 pandemic from the USA, Europe, and China. Environmental Science and Pollution Research, 28, 32359-32373.

Chien, F., Sadiq, M., Nawaz, M.A., Hussain, M.S., Tran, T.D., Le Thanh, T. (2021d), A step toward reducing air pollution in top Asian economies: The role of green energy, eco-innovation, and environmental taxes. Journal of Environmental Management, 297, 113420.

Chien, F., Zhang, Y., Sadiq, M., Hsu, C.C. (2021e), Financing for energy efficiency solutions to mitigate opportunity cost of coal consumption: An empirical analysis of Chinese industries. Environmental Science and Pollution Research, 29, 2448-2465.

Dong, K., Hochman, G., Zhang, Y., Sun, R., Li, H., Liao, H. (2018), CO2 emissions, economic and population growth, and renewable energy: Empirical evidence across regions. Energy Economics, 75, 180-192.

Ehsanullah, S., Tran, Q.H., Sadiq, M., Bashir, S., Mohsin, M., Iram, R. (2021), How energy insecurity leads to energy poverty? Do environmental consideration and climate change concerns matters. Environmental Science and Pollution Research, 28, 55041-55052.

Faggian, A., Partridge, M., Malecki, E.J. (2017), Creating an environment for economic growth: Creativity, entrepreneurship or human capital? International Journal of Urban and Regional Research, 41(6), 997-1009.

Gbatu, A.P., Wang, Z., Wesseh, P.K., Sesay, V.A. (2019), How do energy consumption, output, energy price, and population growth correlate with CO2 emissions in Liberia? International Journal of Global Environmental Issues, 18(3), 209-235.

He, L., Meng, P., Chen, D., Yan, M., Vasa, L. (2021), Analysis of socio-economic spatial structure of urban agglomeration in China based on spatial gradient and clustering. Oeconomia Copernicana, 12(3), 789-819.

Hsu, C.C., Quang-Thanh, N., Chien, F., Li, L., Mohsin, M. (2021), Evaluating green innovation and performance of financial development: Mediating concerns of environmental regulation. Environmental Science and Pollution Research, 28, 57386-57397.

Huang, S.Z., Chau, K.Y., Chien, F., Shen, H. (2020), The impact of startups' dual learning on their green innovation capability: The effects of business executives' environmental awareness and environmental regulations. Sustainability, 12(16), 6526.

Hussain, H.I., Kamarudin, F., Mohamad Anwar, N.A., Nassir, A.M., Sufian, F., Mang Tan, K. (2020), Impact of country's governance dimensions on bank revenue efficiency: Overview on Middle East, Southeast Asia, and South Asia Countries. Transformations in Business and Economics, 19(1), 191-228.

Hussain, H.I., Kot, S., Kamarudin, F., Yee, L.H. (2021a), Impact of rule of law and government size to the microfinance efficiency. Economic Research, 34(1), 1870-1895.

Hussain, H.I., Szczepańska-Woszczyna, K., Kamarudin, F., Anwar, N.A.M., Saudi, M.H.M. (2021b), Unboxing the black box on the dimensions of social globalisation and the efficiency of microfinance institutions in Asia. Oeconomia Copernicana, 12(3), 557-592.

Kot, S., Hussain, H.I., Bilan, S., Haseeb, M., Mihardjo, L.W. (2021), The role of artificial intelligence recruitment and quality to explain the phenomenon of employer reputation. Journal of Business Economics and Management, 22(4), 867-883.

Kubenka, M. (2020), The evaluation of methodology influence on the WACC value: The case of the Czech republic. Transformations in Business and Economics, 19(3), 274-290.

Lan, T., Chen, Y., Li, H., Guo, L., Huang, J. (2021), From driver to enabler: The moderating effect of corporate social responsibility on firm performance. Economic Research Ekonomska Istraživanja, 34(1), 2240-2262.

Le, T.H., Le, H.C., Taghizadeh-Hesary, F. (2020), Does financial inclusion impact CO2 emissions? Evidence from Asia. Finance Research Letters, 34, 14-29.

Li, B. (2012), Empirical study on relationship between economic growth and agricultural carbon emissions. Ecology and Environmental Sciences, 21(2), 220.

Li, J., Ren, L., Yao, S., Qiao, J., Mikalauskiene, A., Streimikis, J. (2020), Exploring the relationship between corporate social responsibility and firm competitiveness. Economic Research Ekonomska Istraživanja, 33(1), 1621-1646.

Li, P., Zhang, Z.S., Zhang, Y., Zhang, J., Nunez, M., Shi, J. (2021), From implicit theories to creative achievements: The mediating role of creativity motivation in the relationship between stereotypes, growth mindset, and creative achievement. The Journal of Creative Behavior, 55(1), 199-214.

Li, W., Chien, F., Hsu, C.C., Zhang, Y., Nawaz, M.A., Iqbal, S., Mohsin, M. (2021), Nexus between energy poverty and energy efficiency: Estimating the long-run dynamics. Resources Policy, 72, 102063.

Li, W., Chien, F., Kamran, H.W., Aldeehani, T.M., Sadiq, M., Nguyen, V.C., Taghizadeh-Hesary, F. (2022), The nexus between COVID-19 fear and stock market volatility. Economic Research Ekonomska Istraživanja, 35(1), 1765-1785.

Liu, Z., Tang, Y. M., Chau, K.Y., Chien, F., Iqbal, W., Sadiq, M. (2021), Incorporating strategic petroleum reserve and welfare losses: A way forward for the policy development of crude oil resources in South Asia. Resources Policy, 74, 102309.

Lu, J., Ren, L., Zhang, C., Wang, C., Petkeviciute, N., Streimikis, J. (2020), Gender difference in corporate social responsibility implementation in Lithuanian SMEs. Oeconomia Copernicana, 11(3), 549-569.

Mehmood, U., Mansoor, A. (2021), CO2 emissions and the role of urbanization in East Asian and Pacific countries. Environmental Science and Pollution Research, 28, 58549-58557.

Mikayilov, J.I., Galeotti, M., Hasanov, F.J. (2018), The impact of economic growth on CO2 emissions in Azerbaijan. Journal of Cleaner Production, 197, 1558-1572.

Mohsin, M., Abbas, Q., Zhang, J., Ikram, M., Iqbal, N. (2019), Integrated effect of energy consumption, economic development, and population growth on CO 2 based environmental degradation: A case of transport

sector. Environmental Science and Pollution Research, 26(32), 32824-32835.

Mohsin, M., Kamran, H.W., Nawaz, M.A., Hussain, M.S., Dahri, A.S. (2021), Assessing the impact of transition from nonrenewable to renewable energy consumption on economic growth-environmental nexus from developing Asian economies. Journal of Environmental Management, 284, 111999.

Nawaz, M.A., Hussain, M.S., Kamran, H.W., Ehsanullah, S., Maheen, R., Shair, F. (2021), Trilemma association of energy consumption, carbon emission, and economic growth of BRICS and OECD regions: Quantile regression estimation. Environmental Science and Pollution Research, 28(13), 16014-16028.

Nawaz, M.A., Seshadri, U., Kumar, P., Aqdas, R., Patwary, A.K., Riaz, M. (2021), Nexus between green finance and climate change mitigation in N-11 and BRICS countries: Empirical estimation through difference in differences (DID) approach. Environmental Science and Pollution Research, 28(6), 6504-6519.

Othman, Z., Nordin, M.F.F., Sadiq, M. (2020), GST fraud prevention to ensure business sustainability: A Malaysian case study. Journal of Asian Business and Economic Studies, 27(3), 245-265.

Petrakis, P.E., Kafka, K.I., Kostis, P.C., Valsamis, D.G. (2021), Creativity, Incentives and Attitudes to Life Greek Culture After the Financial Crisis and the Covid-19 Crisis. Germany: Springer, p103-126.

Rebolledo-Chávez, J.P.F., Toral, G.T., Ramírez-Delgado, V., Reyes-Vidal, Y., Jiménez-González, M.L., Cruz-Ramírez, M., Ortiz-Frade, L. (2021), The role of redox potential and molecular structure of Co (II)-Polypyridine complexes on the molecular catalysis of CO2 Reduction. Catalysts, 11(8), 858-948.

Rehman, A., Ozturk, I., Zhang, D. (2019), The causal connection between CO2 emissions and agricultural productivity in Pakistan: Empirical evidence from an autoregressive distributed lag bounds testing approach. Applied Sciences, 9(8), 1692.

Ren, X., Shao, Q., Zhong, R. (2020), Nexus between green finance, non-fossil energy use, and carbon intensity: Empirical evidence from China based on a vector error correction model. Journal of Cleaner Production, 277, 122-139.

Sadiq, M., Hsu, C.C., Zhang, Y., Chien, F. (2021), COVID-19 fear and volatility index movements: Empirical insights from ASEAN stock markets. Environmental Science and Pollution Research, 28, 67167-67184.

Sadiq, M., Nonthapot, S., Mohamad, S., Ehsanullah, S., Iqbal, N. (2021), Does green finance matter for sustainable entrepreneurship and environmental corporate social responsibility during COVID-19? China Finance Review International, 12(2), 317-333.

Shair, F., Shaorong, S., Kamran, H.W., Hussain, M.S., Nawaz, M.A. (2021), Assessing the efficiency and total factor productivity growth of the banking industry: Do environmental concerns matters? Environmental Science and Pollution Research, 28(16), 20822-20838.

Sharma, S.K. (2020), Financial development and economic growth in selected Asian economies: A dynamic panel ARDL test. Contemporary Economics, 14(2), 201-219.

Singh, S.B., Sisodia, P.S. (2022), Madhya Pradesh: Agriculture economics and extension in new era. The Pharma Innovation Journal, 11, 1300-1302.

Sun, H., Awan, R.U., Nawaz, M.A., Mohsin, M., Rasheed, A.K., Iqbal, N. (2020), Assessing the socio-economic viability of solar commercialization and electrification in south Asian countries. Environment, Development and Sustainability, 23, 9875-9897.

Suyitno, A., Suyitno, H. (2018), Use of open-ended problems as the basis for the mathematical creativity growth disclosure of student. Journal of Physics Conference Series, 983, 012110.

Tabeikyna, E.K., Kamalova, G.T., Hasanov, E.L., Dzhumagaliyeva, K.V., Demeuova, N.K. (2021), The place of intelligentsia in socio-economic development of society: The creative perspective. Creativity Studies, 14(1), 235-250.

Ullah, S., Ahmad, W., Majeed, M.T., Sohail, S. (2021), Asymmetric effects of premature deagriculturalization on economic growth and CO2 emissions: Fresh evidence from Pakistan. Environmental Science and Pollution Research, 28(47), 66772-66786.

Usman, A., Ozturk, I., Ullah, S., Hassan, A. (2021), Does ICT have symmetric or asymmetric effects on CO2 emissions? Evidence from selected Asian economies. Technology in Society, 67, 101-125.

Vveinhardt, J., Sroka, W. (2021), Independent variables affecting employee behaviour in socially responsible organisations: Working environment in Lithuania and Poland. Engineering Economics, 32(3), 266-277.

Wang, Q., Su, M. (2020), Drivers of decoupling economic growth from carbon emission-an empirical analysis of 192 countries using decoupling model and decomposition method. Environmental Impact Assessment Review, 81, 106356.

Wang, Q., Zhou, P., Ge, S., Zhao, Z. (2014), An international comparison of carbon dioxide emission performance using the nonparametric metafrontier approach. Polish Journal of Environmental Studies, 23(3), 923-931.

Wei, C., Wu, J., Guo, Y., Wei, G. (2021), Green supplier selection based on CODAS method in probabilistic uncertain linguistic environment. Technological and Economic Development of Economy, 27(3), 530-549.

Wu, X., Sadiq, M., Chien, F., Ngo, Q.T., Nguyen, A.T, Trinh, T.T. (2021), Testing role of green financing on climate change mitigation: Evidences from G7 and E7 countries. Environmental Science and Pollution Research International, 28, 66736-66750.

Xiong, C., Yang, D., Huo, J., Zhao, Y. (2015), The relationship between energy consumption and economic growth and the development strategy of a low-carbon economy in Kazakhstan. Journal of Arid Land, 7(5), 706-715.

Xiong, C., Yang, D., Huo, J., Zhao, Y. (2016), The relationship between agricultural carbon emissions and agricultural economic growth and policy recommendations of a low-carbon agriculture economy. Polish Journal of Environmental Studies, 25(5), 2187-2195.

Yao, X., Tang, X. (2021), Does financial structure affect CO2 emissions? Evidence from G20 countries. Finance Research Letters, 41, 101791.

Yun, T.I.A., Zhang, J.B., He, Y.Y. (2014), Research on spatial-temporal characteristics and driving factor of agricultural carbon emissions in China. Journal of Integrative Agriculture, 13(6), 1393-1403.

Zhangwei, L., Xungangb, Z. (2011), Study on relationship between Sichuan agricultural carbon dioxide emissions and agricultural economic growth. Energy Procedia, 5, 1073-1077.

Zhao, L., Zhang, D., Zhu, T., Zhang, T., Wu, F. (2021), Influences of venture capital on enterprise financing constraints and sustainable growth abilities from the perspective of lifecycle. Transformations in Business and Economics, 20(1), 69-92.

Zhuang, Y., Yang, S., Chupradit, S., Nawaz, M.A., Xiong, R., Koksal, C. (2021), A nexus between macroeconomic dynamics and trade openness: Moderating role of institutional quality. Business Process Management Journal, 27, 1703-1719.