



## **Green Human Resource Management, Financial Markets and Pollution Nexus in Saudi Arabia**

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### **ABSTRACT**

Financial markets play an important role in accelerating the economic activities in any country but it may also harm environment if financial funds are invested in the project which are environment friendly. Further, green human resource management (GHRM) may help in reducing CO<sub>2</sub> emissions. This paper examines the influences of Financial Market Development (FMD) and GHRM on the pollution of Saudi Arabia. We explore this by using cointegration on time-series of 1971–2016. Results of this study corroborate that FMD and economic growth (EG) are positively contributing in CO<sub>2</sub> emissions and GHRM is helping in reducing. We recommend the financial sector to provide concessional loans to the projects which are using clean energy technology and GHRM needs attention to support clean environment.

**Keywords:** Financial Market Development, CO<sub>2</sub> Emissions, Economic Growth

**JEL Classifications:** D53, Q53, O47

### **1. INTRODUCTION**

Green human resource management (GHRM) is a process of involvement of employees of a business to support the green environment objectives of central management of organizations. For this purpose, organizations may enhance the financial and non-financial motivations for the employee to support a concept of GHRM to enhance the positive environmental effects of the organizations and also to improve the companies' brand image. For example, job description would be designed to convey a message of GHRM and social responsibilities of employees for the activities which would support green environment. Further, corporates also involve in green planning while hiring new employees by mentioning the specific skills and quality of an employee being hired after targeting the specific environmental friendly tasks to support the phenomena of GHRM. Furthermore, the corporates are also engaged in the training programs to support the GHRM practices in their existing employees for a purpose of enhancing GHRM awareness among employees. Lastly, organizations are also recording the employees' performance according the targeted

GHRM standards and may also established the green rewards for green practices followed by employees (Arulrajah et al., 2015). Considering above mentioned GHRM practices, an organization would help in reducing pollution emissions by reducing lesser energy consumption at whole or by promoting green energy consumption practices.

Energy consumption in industrial growth cannot be overlooked since "Second Industrial Revolution" of the last quarter of the 19<sup>th</sup> century and the beginning of the 20<sup>th</sup>. The energy consumption-growth nexus has been attracted a great interest of researchers due to mass production technology. The same substantiates the persistent effect of energy consumption on "industrial economies" since 20<sup>th</sup> century. In the same manner, energy consumption- financial development nexus (Senen et al., 2018) is emerging as a matter of concern due to CO<sub>2</sub> emissions because it is a major threat to climate distorting natural composition of environment.

The notion that energy causes increase in production and income which further expands financial sector ultimately leading to

economic growth (EG) can be challenged with a counter argument that what if the economic activities degenerates social and human capital by pollution. The effect of that growth on environment locally and globally has remained a point of discussion in environment literature. The modern literature invokes this concern about environment with continuous rise in global development. Environment literature is extensively using the Environmental Kuznet Curve (EKC) explaining non-linear association because it elaborates that at very initial stage of development pollution may increase but it may reduce by adopting environmental friendly technologies afterwards at later stage of development.

After discussion of EKC, financial market would have effects on the pollution emissions through direct effect of increasing economic activities as energy demand increase with rising income level and pollution would also rise in turn. Secondly, Financial Market Development (FMD) may bring growth which is responsible for higher pollution through higher energy consumption. Further, there are two views on financial development that it may either stimulate the increase of carbon emissions or control it. At one side, FMD propagates wealth and scale impacts. The expansion of FMD may enable consumers to take more loans which may utilize in buying products that may contribute in pollution due to energy consumption and this explanation might be termed as wealth effect. On the other hand, scale effect might be generating in producing pollution by expansion of large business entities with large scale of production due to higher financing of financial institutes. In this perspective, no economy is an exception at least in terms of cataclysm due to environmental degradation.

However, the other side of financial development, which helps in reduction of carbon emission, may be claimed due to usage of clean technology in large business entities. Because higher FMD also attracts more foreign investments which may have an ability to develop better environmental friendly technologies through spending on R and D activity. In turn, FMD may have pleasant influence on environment. Further, business entities with higher investment level prefer the clean technology to support, promote and tagged their product with clean energy label. The groomed financial markets also prefer to put their funds in the environmental friendly projects. Therefore, FMD could also be helpful in reduction of pollution emissions.

This paper hypothesizes that since Saudi Arabia uses oil in her electricity production, other energy usage and total exports which may trigger economic activities because of expansion of financial markets and industrial production but may contribute the pollution if clean technology is not used. Due to increase in economic activities and industrial production, financial markets may extend loans to consumers that further adds to their income level. Resultantly, demand of more energy for expansion of industries and good-living may increase the demand of products which may ultimately add to the pollution emission. In contrast, GHRM may help in reducing pollution emissions as educated and well-informed people are always preferring and promoting the clean energy products. After achieving the objectives of this paper, this present study is of great importance to policy makers of Saudi Arabia to play effective role in owning social responsibility

by educated people and organizations which can bring potential EG with healthy effects on environment through designing green policies for this nation.

## 2. LITERATURE REVIEW

There is a mass studies on CO<sub>2</sub> emissions' model. We are discussing some of these to support our hypothesis. For example, Keho (2017) explores the income and pollution emissions relationship in five-panels of fifty-nine countries using quantile regression analysis. In the most of panels, he corroborates the positive impact of income on pollution emissions in all quantiles. For the rest of panels, this relationship is at least proved at lower quantiles of pollution. Shahbaz et al. (2015) utilize a period 1971–2008 of Portugal to test this relationship. They find a positive contribution of income in pollution emissions. In addition, they also report a positive relation in urbanization and pollution. Al-Mulali et al. (2015) inspect a relation of income and pollution in Vietnam using a period 1981–2011 and find a positive relationship. They also report a positive effect of capital and trade in the pollution emissions. But, labor has been found helpful in reducing pollution in Vietnam which may be considered as an effort of GHRM.

Akpan and Akpan (2012) utilize a period of 1970–2008 for Nigeria. They find that EG and electricity are found responsible for higher pollution emissions. Further, they do not find any relationship in electricity and EG and declare the neutrality hypothesis. Al-Mulali and Ozturk (2015) conduct a study for MENA region using a period of 1996–2012 and applying panel cointegration. Their findings suggest that urbanization and EG are impacting the environmental pollution positively. Further, feedback effect is found in energy consumption and urbanization. Ozturk and Acaravci (2013) investigate a model using a period 1960–2007 for Turkey and corroborate positive influences of trade openness and EG on pollution but influence of FMD is noted insignificant. Shahbaz et al. (2014) investigate this issue for UAE using a period 1975–2011. They find that pollution and electricity consumption are affecting each another and electricity and trade are reducing the pollution. But, EG and urbanization have been positively affecting the pollution. Al-Mulali et al. (2016) investigate the EKC hypothesis in Kenya using the time period of 1980–2012. The results revealed that fossil fuel energy consumption, GDP, urbanization, and trade openness increase air pollution mutually in the long run and short run. However, renewable energy consumption mitigates air pollution in the long run and the short run. Moreover, financial development also reduces air pollution, but only in the long run. Based on the results, the EKC hypothesis does exist in Kenya.

In case of Saudi Arabia, Alkhateeb and Mahmood (2017) find that trade variable supports the clean environment argument. Further, income increases the pollution emissions. However, oil sector of Saudi Arabia contributes positively in the employment generation reported by Alkhateeb et al. (2017a) and Alkhateeb et al. (2017b). Further, Maalel and Mahmood (2018) find that oil-income dependency has positive influence on EG of GCC countries and exports-oil dependency has a negative influence. Senen et al. (2018) find a positive effect of FMD on the electricity consumption in Saudi Arabia which may affect the pollutions in turn. In a panel setting, Salahuddin

et al. (2015) investigate influence of FMD on the CO<sub>2</sub> emissions in GCC region using a period 1980–2012. They find that FMD is found helpful in reducing pollution in this panel. Further, income and energy usage have been positively affected the pollution emissions but FMD has negative effect. In causality analysis, they also find a bi-directional relationship in income and pollution emissions and electricity usage is stimulating the pollution in the causality analysis.

Literature signifies positive, negative or neutral influence of FMD on pollution. Therefore, it is an empirical question for any economy. Therefore, this paper is highly motivated to test the effect of FMD on Saudi pollution level in a single country analysis. The estimated model of this paper would highlight the exact effect of FMD on pollution emissions in Saudi Arabia. Further, there is no single study which could quantify the effect of GHRM practices on pollution emissions.

### 3. METHODOLOGY

FMD helps in raising economic activities and it can have also bad impact on the environment by producing pollution emissions because of rising economic activities. Further, EG also results in rising economic activities which may accelerate the pollution emissions if clean energy has not been used. On the other hand, educated people may help in reducing pollution. Therefore, income and FMD may contribute in the pollution emissions like carbon dioxide emissions and GHRM may help in reducing. In the macroeconomic setting, GHRM is a challenge to capture as a variable. Therefore, we are considering Human Resource Development (HRD) as a proxy for GHRM and are modeling the following equation in log-linear form:

$$ICO_{2t} = f(IFMD_t, IGHRM_t, IY_t) \quad (1)$$

It shows logarithm and  $t$  carries period of 1971–2016. CO<sub>2</sub> is showing carbon dioxide emissions, FMD and GHRM are for FMD and HRD (a proxy for GHRM at macro level) and  $Y$  is showing income level using proxy of income per capita. Financial markets are providing loans to support the consumption and production process in any country. Energy is required for any economic activity and pollution emissions can be resulted from the energy consumption. Therefore, we can hypothesize a direct relationship in FMD and CO<sub>2</sub>. Further, EG may also accelerate energy consumption which may be responsible for pollution emissions in return. Therefore, EG is also expected to be positively contributed in the pollution emissions. But, GHRM, in terms of educated people, may help in reducing pollution as mentioned above in introduction section.

For data analyses, we are utilizing ADF test for stationarity issues. Once an order of integration is established through ADF test then we can proceed for cointegration analysis. We are using Auto-regressive distributive lag (ARDL) on equation 1 in following way:

$$\begin{aligned} \Delta ICO_{2t} = & \alpha_0 + \alpha_1 ICO_{2t-1} + \alpha_2 IFMD_{t-1} + \alpha_3 IY_{t-1} + \alpha_4 IGHRM_{t-1} \\ & + \sum_{j=1}^p \mu_{1j} \Delta ICO_{2t-j} + \sum_{j=0}^q \mu_{2j} \Delta IFMD_{t-j} \\ & + \sum_{j=0}^q \mu_{3j} \Delta IY_{t-j} + \sum_{j=0}^q \mu_{4j} \Delta IGHRM_{t-j} + \psi_t \end{aligned} \quad (2)$$

Equation 2 can provide us long run effects of income, GHRM and FMD on the CO<sub>2</sub> after confirming the cointegration in the equation 2 by the rejecting the  $H_0: \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0$ . Further, we can proceed for short run analyses through the error correction mechanism.

### 4. DATA ANALYSES

The precondition for cointegration is unit root analysis. Table 1 shows that  $ICO_{2t}$  and  $IFMD_t$  are showing unit root at levels but are stationary after first difference. Further,  $IY_t$  and  $IGHRM_t$  are stationary at level. ADF test shows a mix order of integration and we are moving for cointegration analysis by using ARDL.

F-value from bound test is 5.9769 which is larger enough, in Table 1, and we can reject the  $H_0: \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0$ . Therefore, we can claim for the cointegration in our CO<sub>2</sub> emission model. Further, diagnostic tests are showing our model suitability for interpretation. From long run results,  $IFMD_t$  is positively influencing the  $ICO_{2t}$  with elasticity equal to 0.6068. So, 1% increase in FMD could be responsible for 0.6068% increase in CO<sub>2</sub> emissions. Financial markets are blessing in terms of providing the finance to economic activities but it may harm the environment if loans are provided without checking the usage of funds which can be utilized in the environmentally harmful consumption. Our results corroborate that FMD is found harmful in environmental degradation by increasing CO<sub>2</sub> emission. Further,  $IY_t$  is positively affecting the  $ICO_{2t}$  with elasticity equal to 0.2409. It means that EG is also harming the environment by producing more of CO<sub>2</sub> emission in the long run. Pleasantly,  $IGHRM_t$  has negative effect on the CO<sub>2</sub> emissions. This result corroborates the theoretical predictions that educated people are supporting the environmental friendly product. Thus, GHRM is found helpful in reducing pollution in our model.

Short run results are also reported in Table 2 and coefficient of  $\Psi_{t-1}$  is negative and significant. So, we can claim short run relation in our model. The coefficient of  $\Psi_{t-1}$  is showing a speed of convergence at 33.59% in 1 year. FMD is positively determined the CO<sub>2</sub> emissions in short run as well with relatively low elasticity 0.2039 in comparison of long run elasticity. This is confirming the theoretical predictions of a low elasticity in short run as compare to long run. 1% increase in FMD is responsible for 0.2039% increase in the CO<sub>2</sub> emissions. Furthermore, income is also responsible for higher pollution with elasticity = 0.3068 in short run. Both independent variables are positively impacting the pollution in whole. This result may be due a reason that GHRM needs a long time to mature the work force being environmental friendly and therefore it could have a positive contributing effect only in long run.

### 5. CONCLUSIONS

Financial markets are supposed to be contributed positively in the economic activities but FMD and EG may have negative effects in terms of environmental degradation. Further, GHRM may have pleasant effect on pollution due to more-aware mature educated people in organizations. This research probes influence of FMD, GHRM and income on the CO<sub>2</sub> emissions. This research utilizes a period 1971–2016 of Saudi Arabia by using ARDL cointegration. We have

**Table 1: ADF test**

Variable	C	C and T
$ICO_{2t}$	1.5847 (2)	-2.1645 (1)
$IFMD_t$	-0.3145 (0)	-2.5478 (0)
$IY_t$	-3.2547 (1)**	-3.5418 (1)***
$IGHRM_t$	-4.2514 (1)***	-5.2145 (0)***
$\Delta ICO_{2t}$	-4.5874 (2)***	-5.1547 (1)***
$\Delta IFMD_t$	-6.5417 (0)***	-5.6541 (0)***

\*\*\* and \*\* for stationarity at 10%, 5% and 1%

**Table 2: CO<sub>2</sub> emission model**

Predictors	Effects	S.E.	t-Stat	P
Long-run estimates				
$IFMD_t$	0.6068	0.0775	7.8307	0.0000
$IY_t$	0.2409	0.0963	2.5009	0.0166
$IGHRM_t$	-0.1457	0.0244	-5.9713	0.0000
C	3.7004	0.3543	10.4441	0.0000
Short-run estimates				
$\Delta IFMD_t$	0.2039	0.0700	2.9111	0.0059
$\Delta IY_t$	0.3068	0.1089	2.8177	0.0075
$\Delta IGHRM_t$	-0.0746	0.0641	-1.1638	0.4521
$\Psi_{t-1}$	-0.3359	0.1094	-3.0713	0.0038
<b>Diagnostic tests</b>				
	<b>F-value</b>	<b>P-value</b>		
Heteroscedasticity	1.4539	0.2343		
Serial correlation	0.3947	0.6766		
Normality	1.4205	0.4915		
Functional form	1.5330	0.1333		
Bound test	Estimated F-value=5.9769			
<b>Critical bound</b>				
	<b>Lower</b>	<b>Upper</b>		
<b>F-value</b>				
5%	3.23	4.35		
1%	4.29	5.61		

found the cointegration and short run relation in our hypothesized model. Further, FMD is positively contributing in the CO<sub>2</sub> emissions. Along with the expected positive contribution of FMD in the income level of this economy, FMD is also harming the environment by producing CO<sub>2</sub> emissions. Further, EG is also directly contributing in the CO<sub>2</sub> emissions but the role of GHRM is found favorable in reducing CO<sub>2</sub> emissions. Based on the results, our research recommends the financial sector to provide the loans by ensuring the clean use of loans. For example, concessional loans should be provided if these are invested in green/clean energy projects. Secondly, financial sector should invest in those projects which are using clean energy technology in production to support a clean environment. Lastly, we recommend the promotion of educational activities and GHRM practices in the organizations to reduce pollution at micro and aggregate level of the Kingdom in following way:

1. The financial and non-financial benefits may be announced to motivate the employee for promotion of GHRM activities in the organizations.
2. Job description for recruitment process should clear a need for GHRM practices which may aware the employees about the GHRM activities for a support of clean environment in the business.
3. Green planning should be initiated to perform the business activities using minimum energy resources and to protect the green environment as well.

4. Training programs should be initiated for existing employees of a business for the GHRM practices.
5. Employees' performances should be evaluated based on GHRM practices and employees should be financially rewarded for the best practices of GHRM.

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