



IMPACT OF ENVIRONMENTAL PERFORMANCE OF AUTOMOBILE COMPANIES ON THEIR SUSTAINABLE FINANCIAL PERFORMANCE

NISAR AHMAD¹, MUHAMMAD TAYYEB KHALIL², JAMSHAD UR REHMAN³

ABSTRACT

Academics are currently emphasizing the sustainable financial growth of business firms through the preservation of the environment. Environmentally conscious firms would have more growth prospects in the future. These firms would be able to get more relief in taxes, financing, and technical support from the government. Therefore, to achieve long-term sustainability in financial performance, firms need to pay more attention to their environmental performance. Thus, the current study aims to investigate the effect of the environmental performance of automobile firms on their sustainable financial performance. For analysis, the data of 11 automobile firms listed on PSX were collected from their annual reports for the period from 2010 to 2022. Results of regression analysis show the environmental performance of firms has a significant and positive effect on their sustainable financial performance. It implies that firms' efforts to adopt eco-friendly technologies are paying them well and are also contributing to their sustainable financial performance. Thus, environmentally conscious firms can attract more business and save more on taxes, and penalties. However, to achieve sustainability through finance, the financial system must be rebuilt and modified to consider the unique requirements of sustainable development. The findings of the study suggest that policymakers should facilitate firms in adopting eco-friendly technologies by providing various incentives like tax rebates, easy access to subsidized finance, and technical support.

KEYWORDS: Environmental performance, Sustainable financial performance, Automobile companies,

1. INTRODUCTION

Environment preservation has become a universal concern. Some commercial activities produce waste that pollutes the natural environment as well as causes the depletion of natural resources available to society. Organizations must invent and adopt eco-friendly technologies and business practices. To preserve the purity of the natural environment and to control the wastage of scarce natural resources firms are bound to improve their environmental performance. Climate change, global warming, and air and water pollution caused by production processes necessitate the modification of manufacturing technologies. (Basuki, 2015).

Further, firms need to prevent or minimize the environmental impact by adopting environment-friendly corporate practices that are cost-effective. To go eco-friendly, firms need to invest more in technology and equipment which would cause an increase in the overhead cost of firms. For sustainable environmental performance, the adoption of eco-friendly technologies does cause a reduction in production or operation costs or would result in an increase in revenues. Wisuttisak and Wisuttisak, (2016) stressed that business units exhaust natural resources and pollute the environment through their operations and products, so they should behave socially responsibly and compensate the community for the environmental damages. However, it is a big challenge for today's business firms to comply with high environmental standards and to ensure their sustainable financial performance (Gizelak, 2016).

To be socially responsible, and environmentally friendly, firms need to alter their design and system which causes an increase in their cost of production (Zhao *et al.*, 2018; Imran *et al.*, 2023). Similarly, the expenses of complying with environmental standards will increase the company's financial burden and it would be incompatible with the shareholders' wealth maximization goal of firms (Holtbrügge & Dögl, 2012; Imran *et al.*, 2021). Yet failure to comply with environmental standards could result in harsh environmental penalties (Li & Wu, 2017). On the contrary, customers give more value to green products and regulatory bodies also encourage the adoption of green business practices. As a result, green and eco-friendly practices are likely to cause an increase in the sustainable financial performance of firms (Lako, 2015). Thus, in order to align environmental protection strategies with shareholders' value, firms should focus on the implementation of profitable environmental initiatives (Reinhardt, 2000).

There has been much debate among researchers and the business community about whether or not environmental performance is related to financial performance. Empirical evidence of the linkage between environmental

¹ Corresponding Author, Associate Professor, Hailey College of Commerce, University of the Punjab, Lahore, Pakistan, nisar@hcc.edu.pk

² Research Scholar, Hailey College of Commerce, University of the Punjab, Lahore, Pakistan

³ Assistant Professor, Department of Economics, Government College University, Lahore, Pakistan

performance and financial performance is scarce and yet vague. This could be due to a lack of well-recognized metrics or instruments for the measurement of environmental performance. Further, there is a problem with the precision and reliability of these instruments. Therefore, most of the earlier studies were conducted in the context of technically advanced countries like the USA and Europe, etc. It might be due to the serious concern of the community about environmental protection and stringent regulatory frameworks in these developed countries.

On the contrary, in most developing countries environmental protection regulations are weak and relaxed. Further, due to a lack of resources in terms of capital, a lack of cost-effective eco-friendly technology, and a lack of awareness of the masses about environmental deterrents, little effort was made to establish the relationship between environmental performance and the financial performance of business units in developing countries. Recently, environmental concern has started to gain popularity among the masses and is also being considered an important agenda on the table of policymakers.

As climate change grows more prominent, the business community is urged to actively participate in reducing environmental costs and promoting environmental sustainability (Hoffman, 2005; Imran et al., 2022). As a signatory to several conventions, including the United Nations Framework Convention on Climate Change (UNFCCC), Pakistan, like other developing countries, must absorb all of the convention's commitments, including its objectives and protocols. The Ministry of Climate Change (MOCC) provided realistic scenarios pertaining to greenhouse gases and an inventory viewpoint connected to emissions. In Pakistan, 310 million tons of CO₂ were released as greenhouse gas emissions in 2008. In the [National Climate Change Policy (NCCP), 2012] report, the MOCC of Pakistan emphasized that the root causes of air pollution include, among other things, an astounding increase in the number of automobile products combined with the use of unsuitable automotive production equipment (Mumtaz, 2018).

In December 2021, 6,628,063 vehicles were reported to be registered in Pakistan. Pakistan has created climate change interventions and is working to fulfill its obligations under the UNFCCC's clean development mechanism (CDM), which the United Nations' Kyoto Protocol established in 1998. One of CDM's main objectives is to find strategically advantageous ways to lessen the negative effects of the climate change issue.

It should be manifest that it is one of the most strategically essential proposals to offer developing nations a vital source for achieving the goals of green management. The national operational plan for the clean development mechanism in Pakistan catalyzes the formulation of policy guidelines for the efficient implementation of the CDM. The research literature is insufficient to convey an accurate picture of green management strategy and its implementation in the automotive industry. According to the MOCC of Pakistan, the primary cause of air pollution is automobiles, and the situation has worsened since Pakistan's automotive industry lacks access to current technologies. Ironically, major multinational corporations like Honda, Toyota, and Suzuki are experiencing quality problems.

The Securities and Exchange Commission of Pakistan (SECP) has established voluntary standards for corporate social responsibility practices and their disclosure by firms. (Securities and Exchange Commission of Pakistan 2013). CSR guidelines are offered to integrate ethical behaviors into business operations and decision-making (Rahman, & Khatun, 2017). According to the CSR 2017 rule, the CEO of publicly traded firms must address issues relating to the adoption of environmental, social, health, and safety standards. In addition to coordinating health and safety issues with corporate objectives, he should support sustainability and the legislation on social, environmental, and governance issues (Khan *et al.*, 2018). Despite the creation of the code and corresponding CSR standards, market forces in Pakistan do not yet appear to discourage unethical behavior or reward good governance (Tahir *et al.*, 2012).

In the past, environmental policy-makers, scholars, and industrialists did not pay much attention to the environment because they thought that the products produced by their companies did not have a significant impact on the environment. The destruction of the environment is becoming a global issue. However, today's industrial practitioners, environmental policy-makers, entrepreneurs, and researchers all agree that climate change, air emissions, rising water, air pollution, resource depletion, and hazardous materials are the leading causes of environmental degradation and decline.

Stakeholders put a lot of pressure on businesses to reduce the environmental impact of their production activities (Yu *et al.*, 2017). Companies must concentrate on environmental and natural resource conservation responsibilities due to a variety of documented environmental challenges. Over the past few decades, industrial practitioners and academics have had a strong interest in "green" challenges (Melay *et al.*, 2017; Vallaster *et al.*, 2019). Due to contradictory findings of earlier studies, the debate is still ongoing. Some research studies have shown that there is no significant relationship between sustainable financial growth and the environmental performance of firms (Zaid *et al.*, 2018). Due to the insignificant direct effect of environmental performance on financial stability, some studies have suggested the use of mediating variables. In particular, a majority of policies and ideas have been introduced to promote sustainable economic growth and environmental management. In order to examine the relationship between sustainable financial growth and environmental management, this study is focused on investigating "whether it pays to be green" in the case of the automobile sector. Thus, the study bridges the research gap and provides empirical evidence of the relationship between environmental performance and the sustainable financial performance of automobile firms in Pakistan.

After elucidating the motivation for the study in the introduction, a review of existing literature and hypotheses are stated in section 2. The methodology used to investigate the effect of environmental performance on sustainable financial performance is illustrated in section 3. Results and discussion are reported in section 4. Section 5 concludes the findings of the study.

2. LITERATURE REVIEW AND HYPOTHESES

According to earlier studies, participating in CSR improves businesses' capacity to perform better over the short and long term (Yu & Choi, 2014). According to (Gregory-Smith *et al.*, 2017), consumers are prepared to pay more for environmentally friendly products. The lobbying efforts of independent environmental groups and the support of numerous governmental and nonprofit organizations are also responsible for the emergence of corporate environmentalism. Corporate environmentalism is, therefore, far more prevalent.

From an academic perspective, academics gradually shift their focus from general debate to constructs like green HRM practices, green supply chain competitiveness, green bonds, and green innovation (Singh *et al.*, 2020; Wu & Kung, 2020). Additionally, Singh *et al.*, (2020) used several strategies to look into the correlation between environmental performance and economic performance. Lassala *et al.*, (2017) stated that although the connection between a company's financial performance and its social and environmental performance is still inconclusive. To investigate the impact of environmental performance on the sustainable financial performance of firms, the following hypotheses are developed.

2.1. THE RELATIONSHIP BETWEEN ENVIRONMENTAL PERFORMANCE AND SUSTAINABLE FINANCIAL PERFORMANCE

Shehu, (2014) revealed that environmental spending considerably impacted the performance of publicly traded oil corporations. Further, companies that are proactive in promoting accountability and social and environmental sustainability are demonstrating higher financial performance (DiSegni *et al.*, 2015). Similarly, Obara *et al.*, (2017) demonstrated that waste management helps enhance the profitability of firms. At the same time, Zhang & Chen (2017) reported a positive impact of environmental performance on the economic performance of firms in China. Similarly, Lassala *et al.*, (2017) established that environmental performance improves the firm's long-term economic performance. Recently, Nwaiwu and Oluka (2018) emphasized that by making adequate disclosure of environmental costs and ensuring compliance with environmental legislation, firms can improve their financial performance. Firms can avoid restrictions/ bans on their operations and can save penalties by demonstrating strict compliance with environmental legislation and standards. Therefore, environmental performance may improve economic performance. Based on the above discussion, the following hypothesis statement is developed.

H_{a1}: *There is a positive relationship between environmental performance and Sustainable financial performance.*

Opposing the above hypothesis, Balatbat *et al.*, (2012) stated that a weak positive association between economic performance and environmental performance is observed in a few studies. So, it is too early or juvenile to recognize the positive association between the environmental and economic performance of firms. At the same time, Salim and Yadav (2012) and Tyagi, (2012) reported a negative impact of environmental performance on economic performance. shed a negative relationship between environmental performance and the financial performance of Malaysian companies listed on the Bursa Malaysia Stock Exchange. Nyirenda *et al.*, (2013) stated that environmental management techniques such as carbon reduction, energy efficiency, and reduction in the deterrent of water and air cause an increase in the operating cost of firms. Later an empirical study conducted by Wei-Lun and Yan-Kai (2019) established environmental performance of firms has a significant negative impact on the financial performance of the industries. Ezejiofor *et al.*, (2016) established that the cost and fee of compliance with environmental standards increase the operating cost of firms and thus have an unfavorable impact on the profitability of companies. The above discussion suggests the establishment of the following hypotheses.

H_{a2}: *There is a negative relationship between environmental performance and sustainable financial performance.*

3. METHODOLOGY

For measuring the impact of the environmental performance of automobile firms on their sustainable financial performance, we collected data from the financial statements of 11 automobile firms listed on PSX for the time period 2010 to 2022. To measure the sustainable financial performance of firms we used two proxies i.e., return on assets and sustainable growth rate. Consistent with earlier studies e.g., Maharjan, (2019; Sathyamoorthi *et al.*, (2017) return on assets (ROA) is used as a measure of profitability. ROA can be used to measure management's ability to manage the company's assets. It is calculated by dividing a company's net income (before interest expense) for the fiscal period by its total assets for the same period.

Return on Assets = Net Income / Total Assets

For measuring sustainable growth rate (SGR) we used the following model.

SGR= (1-Dividend Payout Ratio) × Return on Equity

The sustainable growth model is primarily used to assess an organization's overall management of its activities (Chang 2012). The SGR ascertains a company's long-term competitiveness and profitability (Huang *et al.* 2019). We

followed Higgins, (1977) to determine the SGR of automobile firms working in Pakistan. The study is primarily focused on investigating the effect of the environmental performance of automobile firms on their sustainable financial performance. For measuring, the environmental performance of firms existing literature suggests various approaches.

For instance, Salama (2004) and Toms (2002) used the corporate reputation index of Britain's MAC, which was published in Management Today, to measure a firm's environmental performance. Some other researchers e.g., Ingram and Katherine (1980), Freedman & Bikki (1992), Hughes et al., (2001), and Gupta & Goldar (2003) used the environmental rating as a proxy for the environmental performance of firms. Also utilizing environmental disclosure Schneider and Terje (2011) measured the environmental performance of firms based on environmental disclosure in the annual reports. On the other hand, Schaltegger and Roger, (2000) reported that eco-efficiency is more frequently used to assess the impact of environmental performance on the financial performance of firms. Due to the non-availability of data on the environmental performance index of firms listed on PSX, we measured the environmental performance of the automobile firms based on 30 global reporting initiatives (GRI). Consistent with Chang, (2015) we employed a 5-point Likert scale (0 to 5) to measure the environmental performance of the sampled firms against 30 GRI indicators.

A score equal to zero indicates that the company does not adhere to standards, a score of 3 means that the company meets the requirements of environmental standards on a moderate level, and a score of 5 means that the company meets environmental standards as required by GRI. Finally, we divided the sum of the actual score of a firm against 30 GRI indicators by the average score for environmental performance. Some earlier studies, (For example Chang, 2015; Zhang & Chen, 2017, and Zhang *et al.*, 2021) reported that the sustainable financial performance of firms is significantly influenced by debt financing, operational liquidity, cash flows from operations, internal equity financing, and depreciation tax shield. So, in addition to environmental performance, we used these financial characteristics of firms as control variables. We operationalized these variables as follows.

Debt financing used by automobile companies is measured by taking the ratio of total debt to total assets. Internal financing used by firms is measured by the retention ratio i.e., the proportion of net income that stays inside the business rather than being paid out as dividends. For measuring the potential of a firm to generate operational liquidity we calculated the ratio of cash flows generated from operating activities to total assets. For the depreciation tax shield, the ratio of depreciation to total assets is computed. For capturing the effect of unobservable firm-specific factors, fixed effect, and random effect estimators were applied. To estimate the effect of environmental performance and control variables on the sustainable financial performance of firms, the following regression models were estimated by applying pooled OLS, fixed effect, and random effect estimators.

$$PROF_{it} = \alpha_i + \beta_1 EP_{it} + \beta_2 DF_{it} + \beta_3 IEF_{it} + \beta_4 OLQ_{it} + \beta_5 DTS_{it} + \mu_{it} \quad Eq.1$$

$$SGR_{it} = \alpha_i + \beta_1 EP_{it} + \beta_2 DF_{it} + \beta_3 IEF_{it} + \beta_4 OLQ_{it} + \beta_5 DTS_{it} + \mu_{it} \quad Eq.2$$

Where α_i is a firm-specific intercept, i is for a firm, and t is for its year observation.

$PROF_{it}$: Profitability of a firm i for the year t and measured by return on total assets.

SGR_{it} : Sustainable growth rate is used as a proxy of sustainable financial performance of firm i during year t .

EP_{it} : Environmental performance of a firm i during year t .

DF_{it} : Debt financing used by a firm i during year t . It is measured by the debt to total-assets ratio.

IEF_{it} : Internal equity financing used by a firm i during year t from its retained earnings.

OLQ_{it} : Operational Liquidity position of a firm i at time t . and measured by taking the ratio of cash flows generated from operating activities to assets.

DTS_{it} : Depreciation tax shield availed by a firm i during year t .

μ_{it} : Error term for firm i , and year t .

4. RESULTS AND DISCUSSION

To find the impact of environmental performance on the sustainable financial growth of automobile firms in Pakistan, the following data analyses were performed.

4.1. DESCRIPTIVE STATISTICS OF VARIABLES

Descriptive statistics help to explain the nature and characteristics of data. In more depth, the median value denotes the center of the data, whereas the mean depicts the average of the values or exhibits the central tendency. The maximum and minimum numbers can be used to identify outliers, and the standard deviation measures the volatility or degree of variation of observed values of a variable from its mean value. Descriptive statistics of all variables used in the study are reported in Table 1. The number of total observations is 143 which consists of 11 firms' data for 13 years. Descriptive statistics depict all variables used for analysis have the appropriate degree of variation around their mean. The mean value of return on assets and sustainable growth rate shows that automobile firms on average have positive returns on assets and positive sustainable growth. Furthermore, the mean value of the environmental performance of firms is 3.325. It indicates that on average all sampled firms are considerably emphasizing eco-friendly practices and have better environmental performance.

4.2. CORRELATION AND VARIANCE INFLATION FACTOR

In order to check the association of environmental performance, degree of leverage, internal equity financing, depreciation tax shield and cash flows from operating activities with financial performance and financial sustainable growth rate. Pearson correlation coefficient is computed and its results are reported in Table 2 and Table 3. The coefficients of correlation reported in Table 2 and Table 3 show the linear relationship of independent variables with the dependent variables. Further, the coefficient of pairwise correlation between independent variables is less than 0.70 which indicates the absence of severe collinearity between independent variables. So, the variables selected for Eq_1 and Eq_2 can be used collectively in the respective estimation model.

The variance inflation (VIF) test is performed to check the degree of multicollinearity between independent variables. VIF values for independent variables reported in Table 2 are less than 3 which indicates the absence of severe multicollinearity between independent variables. Thus, these variables can be estimated jointly in one regression model. According to the results, the range of VIF is 1.086 to 1.355 as it's less than 5 so; there is no multi-collinearity among the explanatory variables.

Table 1 Descriptive Statistics

Variables	Obs.	Mean	Std. Dev.	Min	Max
Profitability (PROF)	143	11.114	-21.730	-21.730	53.102
Sustainable Growth Rate (SGR)	143	8.558	-26.280	-26.280	65.171
Debt Financing (DF)	143	25.845	21.0345	6.3456	86.901
Internal Equity Financing (IF)	143	13.408	-209.427	-209.427	198.716
Environmental Performance (EP)	143	3.352	0.205	0.205	24.460
Operational Liquidity (OLIQ)	143	2.804	0.101	0.101	4.200
Depreciation Tax Shield (DTS)	143	9.645	-71.791	-71.791	69.752

4.3. REGRESSION ANALYSIS

To investigate the effect of environmental performance on the sustainable financial performance of automobile firms we used two facets of economic performance i.e., profitability and sustainable growth rate. We estimated Eq_1 for profitability (a short-term measure of economic performance) and Eq_2 for sustainable growth rate (a long-term measure of economic performance) by employing Pooled OLS. Then to test the presence of the panel effect we performed the Breusch-Pagan / Cook-Weisberg Test. Where H_0 states that there is no panel effect and variance across firms is zero. The alternative hypothesis shows that there is a panel effect and variance across entities is not equal to zero. In case, variances of residual are not constant then the problem of heteroscedasticity exists. Due to this issue regression, results will be misleading and unreliable. Results of the Breusch-Pagan test for both Eq_1 and Eq_2 are reported in Table 4.

For Eq_1 Chai-Square statistics reported in Table is 1.68 and the p -value is 0.1955, which implies that H_0 is not rejected i.e., the absence of cross-section effect. Whereas for Eq_2 chi-square reported in Table is 17.40 and the p -value is 0.076. Findings support H_a i.e., presence of the cross-section effect. Later we applied the Hausman test to select whether the FE estimator or the RE estimator is better for treating the endogeneity. The null hypothesis assumes that there is no correlation between explanatory variables and cross-section-specific error terms whereas the alternative hypothesis conjectured the existence of a correlation between explanatory variables and cross-section specific error terms.

Results of the Hausman test for Eq_1 and Eq_2 are reported in Table 4. For Eq_1 , where the coefficient of the Chi-square test is 2.647 and its p -value is 0.923, which evidences the absence of correlation between explanatory variables and cross-section random error. Results of the Hausman test suggest Random Effect estimator is more suitable for estimating Eq_1 and its results are reported in column 5 of Table 4. For Eq_2 , the coefficient of the Chi-square test is 20.735, and its p -value of 0.000 which indicates that explanatory variables are correlated with a cross-section-specific error term. Thus, results support the alternative hypothesis for Eq_2 and suggest that FE estimation is more appropriate to capture endogeneity. The results of FE estimation for Eq_2 are reported in Column 7 of Table 4. RE estimation results for profitability reported in column 5 and FE estimation results for sustainable growth rate reported in column 7 of Table 4 are discussed in the lines ahead.

Table 2: Correlation Matrix and Variance Inflation Factor Analysis for the Profitability

Variables	PROF	TF	IEF	EP	OLIQ	DTS	VIF	I/VIF
(1) PROF	1.000							
(2) DF	-0.424*	1.000					1.285	0.778
(5) IEF	0.008	0.278**	1.000				1.355	0.738
(6) EP	0.220**	-0.022	-0.110	1.000			1.217	0.822
(7) OLIQ	0.420**	-0.077	-0.147	0.168	1.000		1.207	0.828
(8) DTS	-0.115	0.206*	-0.062	-0.050	0.030	1.000	1.086	0.92
Mean VIF							1.237	

*** Significant at level 1%, ** Significant at level 5%, *Significant at level 10%

PROF, Profitability (Return on Assets used as a proxy for profitability); DF, Debt financing. IEF, Internal equity financing; EP, Environmental performance. OLIQ, Operational liquidity generated from operations, and DTS, Depreciation tax shield.

Table 3: Correlation Matrix and Variance Inflation Factor Analysis for the Determinants of Sustainable Growth Rate

Variables	SGR	DF	IEF	EP	OLIQ	DTS	VIF	I/VIF
SGR	1.000							
DF	0.188*	1.000					1.355	0.738
IEF	-0.164	0.278**	1.000				1.285	0.778
EP	0.076	-0.022	-0.110	1.000			1.207	0.828
OLIQ	0.072	-0.077	-0.147	0.168	1.000		1.255	0.797
DTS	-0.168	0.206*	-0.062	-0.050	0.030	1.000	1.086	0.92
Mean VIF							1.237	

*** Significant at level of 1%, ** Significant at level of 5%, *Significant at level of 10%

SGR, Sustainable growth rate; DF, Debt financing, IEF, Internal equity financing, EP, Environmental performance. OLIQ, Operational liquidity created from operations, DTS, Depreciation tax shield.

Table 4: Regression Analysis Results

Dependent Variables		Determinants of Profitability i.e., Return on Assets (ROA)			Determinants of Sustainable Growth Rate (SGR)			Comments
1	2	3	4	5	6	7	8	
Independent Variables		Pooled OLS.	Fixed Effect	Random Effect	Pooled OLS.	Fixed Effect	Random Effect	
EP	Coefficient	1.647	-3.924	1.639**	1.234	-9.577**	10.577**	H_{1a} is
	Standard Error	(1.091)	(3.694)	(1.773)	(1.56)	(5.191)	(8.877)	
DF	Coefficient	0.067	-0.21	-0.041**	-0.96**	-0.95**	-0.105**	Accepted
	Standard Error	(0.051)	(0.052)	(0.045)	(0.072)	(0.073)	(0.077)	
IEF	Coefficient	-0.077***	-0.054**	0.074***	0.078 **	0.021**	0.024**	
	Standard Error	(0.026)	(0.024)	(0.02)	(.037)	(0.034)	(0.018)	
OLIQ	Coefficient	0.148***	0.037**	0.101**	0.081	0.092*	0.095***	
	Standard Error	(0.05)	(0.04)	(0.061)	(0.072)	(0.056)	(0.056)	
DTS	Coefficient	-0.147	0.287	-0.058	-0.822**	0.022	0.022	
	Standard Error	(0.252)	(0.284)	(0.208)	(0.36)	(0.399)	(0.123)	
Constant	Coefficient	5.528*	20.496**	5.726	10.117**	33.261**	33.261	
	Standard Error	(3.195)	(10.151)	(5.343)	(4.571)	(14.265)	(24.186)	
R-Sq (Overall)		0.801	0.819	0.820	0.621	0.623	0.642	
R-Sq (Within)			0.890	0.900		0.650	0.665	
R- Sq (Between)			0.865	0.877		0.66	0.69	
F- value		0.006		0.05	0.00	0.00	0.01	
Breusch-Pagan / Cook-Weisberg Test		Chi-Square Prob.	1.68 (0.1955)			17.40 (0.076)		
Hausman Test		Chi-Square Prob.	2.547 (0.923)			20.735 (0.000)		
Observations (N)		143						

*** Significant at level 1%, ** Significant at level 5%, *Significant at level 10%

EP, Environmental performance; DF, Debt financing. IEF, Internal equity financing, OLIQ, Operational liquidity generated from operations. DTS, Depreciation Tax Shield.

The coefficient of environmental performance for profitability is 1.691 and it is significant at 0.05 level. The results indicate that an increase in the environmental performance of one unit will result in an increase of 1.639 units increase in profitability. It implies a positive relationship between environmental performance and short-term economic performance. This might be due to easier access of eco-friendly firms to government subsidies and tax rebates. with stakeholders will improve and transaction costs will be decreased as EP is improved.

The adoption of advanced environment-friendly practices can strengthen a company's competitive advantage relationships. Therefore, environmental responsibility will improve a company's reputation and ensure sustainability over the long term. As a result, the firm's economic performance benefits from its environmental performance. This finding partially supports the Hypothesis. Similar findings were reported by Nyirenda *et al.*, (2013). The short-term economic performance may be harmed by additional costs associated with improving EP and raising the environmental burden. EP, therefore, has a negative association with short-term performance.

The coefficient of environmental performance for SGR is 10.577 and significant at 0.041 level. Results infer that an increase in the environmental performance of one unit will result in an increase of 10.577 units in the long-run economic performance of automobile firms. in a favorable direction. These findings suggest that firms' emphasis on eco-friendly practices is helpful in achieving their long-term economic performance and financial stability. beneficial impact on the long-term Economic Performance of companies. The results support the hypothesis. The findings are consistent with the findings of prior studies. For instance, Zhang and Chen (2017); and Angelia *et al.*, (2015) reported a positive impact of environment-friendly practices of firms on their long-term financial goals. They argued that emphasizing eco-friendly business practices increases the reputation and public image of firms. Thus, firms

Results reported in Table 4 indicate that debt financing has a negative impact on both the profitability and sustainable growth rate of automobile firms. This might be due to the slowdown of the economy during the period of study and excessive use of debt financing beyond the optimal debt level. More specifically, having a high debt load during slow-down economic conditions in the country reduces the financial performance of firms. According to Barry & Mihov (2015), companies with more debt have worse long-term performance. Similar findings were also reported by previous studies (For example, Barry & Mihov, 2015; Yazdanfar & Ahman, 2015). Maina & Ishmail, 2014; Akhtar *et al.* 2012; Samo Asif & Murad (2019).

The coefficient of internal financing for both short-term and long-term economic performance is positive and significant which implies that the use of internal funds causes an increase in the profitability of firms. Further, firms using internal funds have relatively lower total costs giving them competitive advantages in selling their product at cheaper rates. It increases their sales and long-term financial stability. Moreover, the firms are cheaper and do not require compulsory payments. Moreover, unlike debt financing, internal financing does not require compulsory payments and also does not cause an increase in financial burden for firms during poor economic conditions. This is consistent with the findings of Strebulaev, (2007), Eriotis *et al.* (2011); Almeida *et al.* (2004). They established that the risks associated with internal financing are lower. The findings of this study also support the pecking order theory. Liquidity generated from operations has a significant and positive effect on both profitability and long-term sustainable growth. These findings imply that for a company to move closer to its Profitability objectives, it must create an economic performance that is favorable to its needs. Results are consistent with the findings of Zhang *et al.*, (2021); Zhang & Chen, (2017). We found a significant and positive impact of depreciation tax shield on both profitability and sustainable growth of firms. Similar findings were reported by Zhang *et al.*, (2021); Zhang and Chen, (2017).

5. CONCLUSION

The study adopted the positivist research philosophy and applied quantitative data to examine the impact of environmental performance on the short-term and long-term economic performance of automobile firms in Pakistan. Data for this study was compiled from annual reports of auto manufacturing companies listed on the Pakistan Stock Exchange for the time period from 2013 to 2022. The results of regression analysis reveal that the environmental performance of auto companies has a significant and positive impact on both profitability and sustainable growth rate. The findings of the study support the hypotheses. It implies that emphasis on environmentally friendly practices is supportive of firms in increasing their financial sustainability. The results are in line with the findings of earlier studies. Governments, policymakers, and academic researchers face great difficulty in dissociating economic activity from greenhouse gas emissions. Lack of public awareness and apprehension about the polluted environment, absence of legal framework for environmental protection and inadequate monitoring systems to regulate pollution levels are the perpetrators of environmental deterioration in many developing countries. This problem is more severe in developing countries like Pakistan.

The results suggest that policymakers should encourage firms by providing various incentives for adopting eco-friendly business practices. Further, the government should give due consideration to developing the legal frame for environmental protection and designing an effective monitoring system to regulate the air quality index. The government should encourage the growth of renewable energy across the country by implementing enticing incentives and subsidies. To monitor the environmental performance, the government should implement a rating system.

Additionally, the government needs to implement harsh penalties for organizations that do not perform well. The implementation of eco-innovation in industrial technologies can assist in reducing growth-driven environment pollution by attaining improved eco-efficiency and productivity at the same time. Moreover, indigenous eco-innovation research projects for developing eco-efficient technology should be encouraged by providing scholarships to researchers. The management must have a strong commitment to environmental reform. Along with environmental training programs, various types of practices, including team building, interaction skills, brainstorming, benchmarking, and consensus building, should be encouraged to build an environment where employees are free to participate in environmental improvement projects. Finally, improving environmental performance may be achieved through the efficient application and compliance with internationally recognized environmental management systems ISO 14001.

The findings of the study are subject to certain limitations and could be considered with due care. First, information is gathered through openly accessible sources like the PSX Website and published annual reports. The validity of the results will be questioned if there are any manipulations or deficiencies in data disclosures or implementation of accounting standards. Second, the generalization of the findings of the study is not free from reservations as the study focused only on the automobile firms practicing eco-friendly practices which is a very small proportion of the industrial firm working in Pakistan. Future studies might include other industrial sectors that significantly impact the environment through their operating activities.

References

- Akhtar, S., Javed, B., Maryam, A., & Sadia, H. (2012). Relationship between financial leverage and financial performance: Evidence from fuel & energy sector of Pakistan. *European Journal of Business and Management*, 4, 7-17.
- Almeida, H., Campello, M., & Weisbach, M. S. (2004). The cash flow sensitivity of cash. *The Journal of Finance*, 59(4), 1777-1804.
- Angelia, D., & Suryaningsih, R. (2015). The effect of environmental performance and corporate social responsibility disclosure towards financial performance (case research to manufacture, infrastructure, and service companies that are listed at the Indonesia Stock Exchange). *Procedia - Social and Behavioral Sciences*, 211, 348-355.
- Balatbat, M., Siew, R., & Carmichael, D. (2012). ESG scores and its influence on firm performance: Australian evidence. *Australian School of Accounting Seminar Series Semester*, 2, 1-30.
- Barry, C. B., & Mihov, V. T. (2015). Debt financing, venture capital, and the performance of initial public offerings. *Journal of Banking & Finance*, 58(144-165), 144-165.
- Basuki, B. (2015). Eco-efficiency and sustainable development as efforts to produce environmentally friendly product: An exploratory case study. *Issues in social and environmental accounting*, 9(3), 199.
- Chang Y-C (2012) Strategy formulation implications from using a sustainable growth model. *J Air Trans Manag* 20:1-3.
- Chang, K. (2015). The effect of environmental performance and preference disclosure on financial performance: Empirical evidence from unbalanced panel data of heavy-pollution industries in China. *Journal of Industrial Engineering and Management*, 8(1), 21-36.
- DiSegni, D. M., Huly, M., & Akron, S. (2015). Corporate social responsibility, environmental leadership and financial performance. *Social Responsibility Journal*, 11(1), 131-148.
- Eriotis, N. P., Frangouli, Z., & Ventoura-Neokosmides, Z. (2011). Profit margin and capital structure: An empirical relationship. *Journal of Applied Business Research (JABR)*, 18(2), 85-88.
- Ezejiofor, R. A., Nwakoby, N. P., & Okoye, J. F. (2016). Impact of forensic accounting on combating fraud in Nigerian banking industry. *International Journal of Academic Research in Management and Business*, 1(1), 1-19.
- Freedman, M., & Jaggi, B. (1992). An investigation of the long-run relationship between pollution performance and economic performance: The case of pulp and paper firms. *Critical Perspectives on Accounting*, 3, 315-336.
- Gizelak, A. (2016). Evaluation of the reproduction processes in farms in Poland in context of the environmental and economic sustainability. *International Journal Economic Policy in Emerging Economies*, 9(2), 159-181.
- Gregory-Smith, D., Manika, D., & Demirel, P. (2017). Green intentions under the blue flag: Exploring differences in EU consumers' willingness to pay more for environmentally-friendly products. *Business Ethics, A European Review*, 26(3), 205-222.
- Gupta, S., & Goldar, B. (2003). Do stock markets penalize environmental-unfriendly behavior? Evidence from India. *Social Science Research Network*. 52(1), 81-95.
- Higgins RC (1977) How much growth can a firm afford? *Financial Management*, 6(3), 7-16.
- Hoffman, A. J. (2005). Climate Change Strategy: The Business Logic behind Voluntary Greenhouse Gas Reductions. *California Management Review*, 47(3), 21-46.
- Holtbrügge, D., & Dögl, C. (2012). How international is corporate environmental responsibility? A literature review. *Journal of International Management*, 18(2), 180-195.

- Huang L, Ying Q, Yang S, Hassan H (2019) Trade credit financing and sustainable growth of firms: empirical evidence from China. *Sustainability* 11(4), 1-20.
- Hughes, S., Anderson, A., & Golden, S. (2001). Corporate environmental disclosures: Are they useful in determining environmental performance? *Journal of Accounting and Public Policy*, 20(3), 217-240.
- Imran, C. A. B., Shakir, M. K., & Qureshi, M. A. B. (2021). Regulatory Perspectives on AI in Autonomous Vehicles Global Approaches and Challenges. *The Asian Bulletin of Green Management and Circular Economy*, 1(1), 62–74.
- Imran, C. A. B., Shakir, M. K., & Qureshi, M. A. B. (2022). Applications of Artificial Intelligence in Enhancing Construction Safety and Productivity. *The Asian Bulletin of Big Data Management*, 2(1), 63-74.
- Imran, C. A. B., Shakir, M. K., Umer, M., Imran, Z., & Khalid, H. B. (2023). Construction Materials and Technologies: A Review of New Trends in Sustainable Development. *The Asian Bulletin of Green Management and Circular Economy*, 3(1), 10–21.
- Ingram, R. W., & Frazier, K. B. (1980). Environmental performance and corporate disclosure. *Journal of Accounting Research*, 18(2), 614-622.
- Khan, M., Lockhart, J. C., & Bathurst, R. J. (2018). Institutional impacts on corporate social responsibility: a comparative analysis of New Zealand and Pakistan. *International Journal of Corporate Social Responsibility*, 3(1), 1-13.
- Lako, A. (2015) Blessings CSR Not Fiction, LATOFI Publisher, Indonesia.
- Lassala, C., Apetrei, A., & Sapena, J. (2017). Sustainability matters and the financial performance of companies. *Sustainability*, 9(9), 1-16.
- Li, B., & Wu, K. (2017). Environmental management system: Adoption and the operational performance of the firm in the textile and apparel industry of China. *Sustainability*, 9(6), 1-11.
- Maharjan, R. (2019). Corporate Governance and Financial Performance of Insurance Companies in Nepal. *International Research Journal of Management Science*, 4, 99-117.
- Maina, L., & Ishmail, M. (2014). Capital structure and financial performance in Kenya: Evidence from firms listed at the Nairobi Securities Exchange. *International Journal of Social Science and Entrepreneurship*, 1, 209–223.
- Melay, I., O', M., Dwyer, N. A., Kraus, S., & Gast, J. (2017). Green entrepreneurship in SMEs: a configuration approach. *International Journal of Entrepreneurial Venturing*, 9(1), 1-17.
- Mumtaz, M. (2018) The National Climate Change Policy of Pakistan: An evaluation of its impact on institutional change. *Earth Systems and Environment*, 2(3), 525-535.
- Nwaiwu, N. J., & Oluka, N. O. (2018). Environmental cost disclosure and financial performance of oil and gas in Nigeria. *International Journal of Advanced Academic Research*, 4(2), 1–23.
- Nyirenda, G., Ngwakwe, C. C., & Ambe, C. M. (2013). Environmental management practices and firm performance in a South African mining firm. *Managing Global Transitions*, 11(3), 243-260.
- Obara, L. C., Ohaka, J., Nangih, E., & Odinakachukwu, I. O. (2017). The effect of accounting for waste management expenditure on the profitability of oil and gas companies in Nigeria. *International Journal of Economics, Commerce, and Management*. V (3), 68-81.
- Rahman, M. M., & Khatun, N. (2017). Quality of corporate governance: A review from the literature. *The Journal of Asian Finance, Economics and Business*, 4(1), 59-66.
- Reinhardt, F. L. (2000). Down to Earth: Applying business principles to environmental management. Harvard Business Press.
- Responsibility Voluntary Guideline 2013.
- Salama, A. (2005). A note on the impact of environmental performance on financial performance. *Structural Change and Economic Dynamics*, 16(3), 413-421.
- Salim, M., & Yadav, R. (2012). Capital Structure and Firm Performance: Evidence from Malaysian Listed Companies. *Procedia - Social and Behavioral Sciences*, 65, 156–166.
- Samo Asif H, Murad H (2019) Impact of liquidity and financial leverage on firm's profitability—an empirical analysis of the textile industry of Pakistan. *Research Journal Textile Apparel*, 23:291–305.
- Sathyamoorthi, C. R., Baliyan, P., Dzimiri, M., & Wally-Dima, L. (2017). The impact of corporate governance on financial performance: The case of listed companies in the consumer services sector in Botswana. *Advances in Social Sciences Research Journal*, 4(22), 220-233.
- Schaltegger, S., & Burritt, R. (2000). Contemporary environmental accounting: Issues, concepts and practice. Greenleaf Publishing.
- Schneider, T. E. (2011). Is environmental performance a determinant of bond pricing? Evidence from the US pulp and paper and chemical industries. Working Paper. Social Science Research Network.
- SECP. (2013). Securities and Exchange Commission of Pakistan, 2013. *Corporate Social*
- Shehu, U. H. (2014). Environmental costs and firm performance: evidence from quoted oil and gas companies in Nigeria. Shell Petroleum Development Company (SPDC), (1995). Shell and the Nigerian Environment. Public Affairs Department.

- Singh, S. K., Giudice, M. D., Chierici, R., & Graziano, D. (2020). Green innovation and environmental performance: The role of green transformational leadership and green human resource management. *Technological Forecasting and Social Change*, 150.
- Strebulaev, I. A. (2007). Do tests of capital structure theory mean what they say? *Journal of Finance*, 62(4), 1747–1787.
- Tahir, S. H., Muhammad, H. M. S. A. A., & ul Haq, A. (2012). Two-tier corporate governance model for Pakistan. *European Journal of Business and Management*, 4(6), 38–48.
- Toms, J. S. (2002). Firm resources, quality signals and the determinants of corporate environmental reputation: Some UK evidence. *British Accounting Review*, 34, 257-282.
- Tyagi, R. (2012). Impact of corporate social responsibility on financial performance and competitiveness of business: A study of Indian firms. *Social Science Research Network*. Retrieved September 25, 2019.
- Vallaster, C., Kraus, S., Kailer, N., & Baldwin, B. (2019). Responsible entrepreneurship: outlining the contingencies. *International Journal of Entrepreneurial Behavior & Research*, 25(3), 538–553.
- Wei-Lun, H., & Yan-Kai, F. (2019). The study on the relationship between the environmental and financial performances of corporations that have adopted the system of environmental accounting in Taiwan. in E3S Web of Conferences (Vol. 81). EDP Sciences.
- Wisuttisak, P., & Wisuttisak, C. (2016). Comparative study on regulatory requirements on corporate social responsibility in Australia and Thailand. *International Journal of Economic Policy in Emerging Economies*, 9(2), 158-168.
- Wu, T., & Kung, C.-C. (2020). Carbon emissions, technology upgradation and financing risk of the green supply chain competition. *Technological Forecasting and Social Change*, 152.
- Yazdanfar, D., & Öhman, P. (2015). Debt financing and firm performance: an empirical study based on Swedish data. *The Journal of Risk Finance*, 16(1), 102–118.
- Yu, W., Ramanathan, R., & Nath, P. (2017). Environmental pressures and performance: An analysis of the roles of environmental innovation strategy and marketing capability. *Technological Forecasting and Social Change*, 117, 160–169.
- Yu, Y., & Choi, Y. (2014). Corporate social responsibility and firm performance through the mediating effect of organizational trust in Chinese firms. *Chinese Management Studies*, 8(4), 577–592.
- Zaid, A. A., Jaaron, A. A. M., & Talib Bon, A. (2018). The impact of green human resource management and green supply chain management practices on sustainable performance: An empirical study. *Journal of Cleaner Production*, 204(1), 965–979.
- Zhang, K. Q., & Chen, H. H. (2017). Environmental performance and financing decisions impact on sustainable financial development of Chinese environmental protection enterprises. *Sustainability*, 9(12), 2260.
- Zhang, K. Q., Tang, L. Z., & Chen, H. H. (2021). The impacts of environmental performance and development of financing decisions on economic sustainable performance: from the view of the renewable and clean energy industry. *Clean Technologies and Environmental Policy*, 1.