



Does Industry Type Moderate the Relationship Between Energy Efficiency and Financial Performance of Firms Listed on the Johannesburg Stock Exchange?

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Abstract: The current study investigated the effect of energy efficiency on financial performance using industry type as a moderating variable. It has been discovered that there is an inconclusiveness of findings in existing literature regarding the link between energy efficiency and financial performance. The study adopted a quantitative research method using secondary data. Panel data was collected for 8 years from 16 firms listed on the FTSE/JSE. The panel regression model was used to run the panel data. Specifically, the Feasible Generalized Least Squares was used. The findings showed that attaining energy efficiency significantly and negatively influence financial performance (EPS) of the firms considered in this study. Interestingly, the link between energy efficiency and financial performance (EPS) improved from negative to positive when the moderation effect of industry type was introduced. Practically, the findings of this study should assist managers of listed companies to invest in energy efficiency initiatives beyond just compliance but as a strategy to enhance operational efficiency and drive positive financial performance. The novelty of this study is that it further tested the moderating effect of industry type on the energy efficiency and financial performance nexus which generated new empirical findings which were lacking in South Africa.

Keywords: Earnings Per Share; Energy Efficiency; Financial Performance; Johannesburg Stock Exchange; Strategy; Sustainable Development

JEL Classification: M1

1. Introduction

Understanding energy generation and consumption issues have become common phrases in high agenda in discussion panels in South Africa. This is driven by the desire to solve the energy crisis which has resulted in unprecedented load shedding in South Africa (Mail & Guardian, 2021). Singh (2016) asserts that the historical low

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cost of energy in South Africa has resulted in firms consuming more energy through high energy intensive machines. South Africa is a high energy intensity country as it surpasses the world average (Singh, 2016). This is worrying since the high energy intensity is not matched with the current electricity generation capacity. South Africa's energy demand is high since the country is pursuing a rapid economic growth plan (Singh, 2016). Alas, a major portion of electricity generation in South Africa comes from coal (Girmay & Chikobvu, 2017). Relying on coal and other fossil fuels does not only pose an environmental threat but also an energy supply threat to South Africa because such fossils are close to extinction. Analysts agree that South Africa is experiencing an energy crisis (Mail & Guardian, 2021).

Given the energy crisis in South Africa, households, firms and government departments are encouraged to use energy parsimoniously. On that note Salvarli and Salvarli (2017) advise nations to shift from powering their energy sectors with fossils and resort to cleaner energy, which include; solar power, wind, biomass and nuclear power. Salvarli and Salvarli's (2017) study further alludes that the use of fossil fuels is costly, yet it also pollutes the environment. Proponents of the green revolution argue that adopting renewable energy has many benefits in the long run such as cost saving and environmental protection (Whelan & Fink, 2016). The use of cleaner sources of energy plays a critical role in decarbonising the atmosphere (Cantore et. al., 2017). Carabin, Wehrle and Vidoni (2017) allude that due to environmental sustainability calls together with an increase in energy cost, there is a need for innovative technologies that can make it possible to attain energy efficiency while meeting the demand for energy. Another important barometer to control and help firms attain energy efficiency is an ongoing energy consumption audit to evaluate improvements or any discrepancies (Rokhmawati et. al., 2017).

It has been discovered that there is an inconclusiveness of findings in existing literature. Some scholars found that attaining energy efficiency can enhance financial performance (Fan et. al., 2017; Martí-Ballester, 2017) while another strand of literature advance the argument that attaining energy efficiency may increase the cost of doing business resulting in losses (Friedman, 1984; Qian 2012; Delmas et. al., 2015). One of the weaknesses of existing studies is that they have overlooked the conditions or circumstances which affect the relationship between energy efficiency and financial performance (Tang, Walsh, Lerner, Fitza & Li, 2018). It is crucial to uncover such underlying factors to resolve the inconclusiveness of findings (Mazzi, Toniolo, Manzardo, Ren & Scipioni, 2016). Factors such as organisational capabilities, proactive environmental strategies, regional context and the industry context may influence the strength of the relationship between environmental sustainability variables such as energy efficiency and financial performance (Endrikat, Guenther & Hoppe, 2014; Lu & Taylor, 2016). Hence, it is advisable for researchers to incorporate one of these factors as possible moderating variables on the relationship between energy efficiency and financial performance. To that effect,

the current study is one of its kind to take into consideration industry context and treat it as a moderator variable in the relationship between energy efficiency and financial performance which nuance this study from the rest of papers which only tested a linear relationship between these two variables. A study of this nature has been lacking in existing literature.

2. Literature Review

2.1. Stakeholder Theory

The stakeholder theory propounded by Freeman (1984) is a strategic management concept which argues that corporate managers should strive to respond and consider the interests of key stakeholders in their business network. On that note, it is argued that a business does not operate in a vacuum but rather in a network with different stakeholders all concerned on how the corporate conducts its business activities (Andriof & Waddock, 2017). According to Freeman (1984), a stakeholder is defined as an individual or group of people who can affect or be affected by the business' operations. Ganda (2016) identify corporate stakeholders as customers, suppliers, shareholders, the local community, the media, government, employees and the natural environment. These different stakeholders have a key role to play towards a business' success or demise (Rokhmawati et. al., 2017). To that effect, businesses are encouraged to critically conduct a stakeholder analysis that is unique to their industry. This can help to uncover and understand the needs of their stakeholders to avoid conflicts which may negatively impact on the profitability of the business or market value (Dodson, Azevedo, Mohiuddin, Defavari & Abrahão, 2015). On that account other scholars express the view that firms need to have solid stakeholder engagement plans to ensure that the key stakeholders of the business are updated on all the business developments which affect their stake in the business (Dzomonda, 2020). Recently, the natural environment has also become an important stakeholder as it supplies all the resources needed by firms (Mohiuddin, 2014). Hence, incorporating the environment into corporate policies and strategies helps a firm to integrate the interests of the rest of other stakeholders such as the government, employees, suppliers, customers and environmental pressure groups (Rokhmawati et. al., 2017).

The Stakeholder theory forms a crucial base theory for this study. It sets precedence to understanding energy efficiency and financial performance among listed firms by responding to stakeholder interests. More importantly, the financial performance model designed in this study is informed by the stakeholder theory. On that note, each financial ratio adopted in this study represent the interests of set of key stakeholders of the firm. It is therefore, inferred that each set of financial ratios reflects different stakeholders' attitudes towards a firm's approach towards

environmental sustainability commitment. Hence, the stakeholder theory can also make it relatively easy for researchers to construct effective financial performance measures that best reflect stakeholders' perception of the firm and attain sustainable competitive advantage (Selvam et. al., 2016; Haninun, Lindrianasari & Denziana, 2018).

2.2. Energy efficiency

According to International Energy Agency (2019), energy efficiency is defined as a strategy used by a firm or households to eliminate wasteful ways of using energy. Accordingly, Zhang (2016) defines energy efficiency as all strategies employed by a firm to reduce energy intensity in its processes. Reduction in energy intensity entails limiting the energy requirements in each unit of a firm's products. In this study, energy efficiency is defined as proactive approaches employed by a firm to attain sustainable energy use. Energy forms a crucial driver for the efficient functioning of all economies (Abosedra, Shahbaz & Sbia, 2015; Asongu, El Montasser & Toumi, 2016). The unsustainable use of energy results in the extinction of natural resources (Vasanth et al., 2015). On that note, the global consumption of energy is expected to increase rapidly between 2014 and 2035 (British Petroleum, 2016). This calls for serious measures to reduce energy consumption. Globally, fossil fuel powered energy amounted to approximately 81%-82% between 2008 - 2013 (IEA, 2015). This is worrying as it is linked to an estimated 60%-70% carbon emissions into the atmosphere. Energy inefficiency is a common phenomenon in the African continent, especially in Sub Saharan Africa, yet the continent is slow to invest in cleaner sources of energy (Asongu et. al., 2017). Therefore, energy consumption should be handled in a manner that increases efficiency. Issues of energy scarcity remain on record high, especially in SSA where on average, 5% of the population has access to energy which is way below the world average (Shurig, 2015). Given such a situation, the issue of energy security becomes critical to discuss and deal with (Akinyemi et. al., 2016). Since energy is the lifeblood of all economic activities, constant supply of energy at an affordable price should be prioritised in nations' key agendas (Akinyemi et. al., 2016). Energy efficiency is a prerequisite to energy security. This means that key strategies should be deployed around areas that can enable firms to attain energy efficiency. Energy efficiency can be attained by eliminating inefficiencies, which result in overconsumption of energy. Alternatively, as discussed in the next section, energy efficiency can be attained using renewable energy sources.

Attaining Energy Efficiency through Energy Saving

As indicated by Zhang (2016), firms can attain energy efficiency by reducing energy intensity (EI), which is defined as the amount of energy used by a firm to produce a certain product at a given time. Attaining EI entails that firms produce the same

volume of products or more with less units of energy. Another study by Kammen (2015) highlights the need for technologically savvy methods as well as policy refinement and alignment to attain energy efficiency. A plethora of researchers are of the view that firms can attain energy efficiency by investing in smart technology. Such smart technology enables firms to eliminate energy loss and wasteful consumption. To that effect, firms can save energy by approximately 20% if they can invest in technology and innovation. Smart technology serves as proactive measures to monitor wasteful activities and eliminate them at an early stage (Peura, 2013; Bergmann et. al., 2017; Solnørdal & Foss, 2018). The major energy consumption of firms emanates from purchasing electricity, office heating and powering machines and office appliances. Firms can save a lot of energy by switching off lights during the day, using fluorescent lights, switching off machines after use, and repairing faulty equipment. This stands as one of the cost-effective strategies that firms can use. It requires no capital investment but a stricter internal environmental policy, which is respected and implemented by all the firm's employees. This strategy is at the apex of the energy hierarchy and deemed the best amongst all as it eliminates energy wastage and overconsumption across the entire organisation. Essentially, it can also indirectly eliminate carbon emissions associated with electricity consumption.

Attaining Energy Efficiency through Use of Renewable Sources of Energy

Energy efficiency and sustainable development are intertwined (Dinç & Akdoğan, 2019). Failure to attain energy efficiency can compromise the attainment of sustainable development. This is because energy efficiency is correlated with environmental impact, which might negatively affect the wellbeing of the society (Dinç & Akdoğan, 2019). Therefore, attaining energy efficiency has a bearing on the future generations. A study by Martí-Ballester (2017) proposes energy rationing, use of renewable energy sources (RES), integration and sustainable management of energy sources. Investment in renewable energy sources can also be used to complement energy rationing technologies to give a firm sustainable and stable supply of energy (Owusu & Asumadu-Sarkodie, 2016). Renewable energy sources include; wind turbine technology, solar thermal technology and photovoltaic technology, among others.

2.3. Hypothesis Development

2.3.1. Relationship between Energy Efficiency and Financial Performance

Fan et al. (2017) analysed the effect of energy efficiency on the profitability of firms in China. The study used both accounting and market-based measures of financial performance. The study established a positive relationship between energy efficiency and most of the accounting-based ratios. Fan et al. (2017) urged firms to

fully invest in environment issues seriously as there are momentous benefits associated with such investments. On that note, firms are likely to avoid risks associated with increased energy prices and scarcity. A study by Martí-Ballester (2017) investigated whether investment in sustainable energy systems can improve a firm's financial performance. The study considered 574 companies from 36 countries over a period of 5 years. The results indicated that firms which highly invest in efficient sources of energy are likely to improve their profitability instantly. The author argues that in the short run after adopting sustainable energy systems, it improves efficiency in energy use and other systems which translates into improved firm financial performance. These results disagree with several studies (De Jong et al., 2014; Chen et al., 2018; Haninun et al., 2018) which argue that environmental sustainability investments are likely to improve firm financial performance in the long run where the new systems and technology improve productivity, corporate image and improved investor rating of the firm. Bergmann et al. (2017) established a positive relationship when energy efficiency was tested against financial performance. The argument from these findings was that attaining energy efficiency is beneficial to firms. This is because it can enable a business to meet its financial goals and operate on a going concern basis. Bergmann et al. (2017) further noted that firms can unlock indirect benefits such as reduction in carbon emissions and climate change mitigation by attaining energy efficiency.

Nevertheless, some scholars argue that efforts to attain energy efficiency may reduce the profitability of a business. For instance, Delmas et al. (2015) express that a significant number of firms are reluctant to invest in energy efficiency driven technologies due to lack of clear and tangible evidence on the financial gains of such investments. Qian (2012) investigated Australian firms' environmental performance behaviour. The findings revealed that energy efficiency reduced the financial prospects of the firms considered. It was deduced that some firms still benefit from unsustainable use of energy. Surprisingly, it was noted that listed firms which did not have environmental sustainability as one of their strategic goals reported higher financial performance. Nevertheless, poor environmental performance may expose a firm to serious external scrutiny, which can erode its profits significantly. This is because of the emergence of environmental pressure groups and whistleblowers, who are willing to use their resources to fight against environmental damage. Hence, profitability that is linked to environmental pollution is not sustainable.

Despite the divergence in empirical findings regarding the energy efficiency and financial performance nexus, the author of this study believes that firms can benefit immensely from energy efficiency initiatives. Attaining energy efficiency can enable a firm to reduce cost of production and energy costs which can enhance the profitability of the business. Furthermore, a firm can also unlock value from investors and other stakeholders interested in dealing with environmentally sensitive firms. This can enhance the image of the company leading to positive financial

outcomes. Also, investing in renewable sources of energy such as hydro, solar and biogas can help listed firms to attract green funding from green investors which enhances their financial performance. Having an understanding that this study is grounded on the stakeholder theory, the reaction off different stakeholders from the firm's energy efficiency initiatives will be noticeable in the different measures of financial performance. Hence, this study proposes that energy efficiency positively predicts the earnings per share of listed firms. Based on the above, the hypothesis is stated as;

***H_{a1}**: Energy efficiency positively and significantly predicts the EPS of firms listed on the JSE.*

Moderation Effect of Industry Type on the Relationship between Energy Efficiency and Financial Performance

According to Tang et al. (2018), it is crucial to understand the conditions or circumstances which may weaken or strengthen the relationship between energy efficiency and financial performance. This can go a long way in resolving the inconclusiveness of findings regarding this relationship (Mazzi et. al., 2016). A plethora of scholars have submitted that industry context is among one of the key factors which may help to explain the circumstances through which the relationship between environmental sustainability commitment and financial performance can be stronger or weaker (Endrik et. al., 2014; Lu & Taylor, 2016; Jha & Rangarajan, 2020). Gonenc and Scholtens (2019) emphasised the importance of understanding the industry context when trying to understand the effect of sustainability initiatives on corporate financial performance. The study found out that several studies use industry type either as a moderator or control variable which means it has significance in helping to understand the conditions which strengthens or weaken the environmental sustainability commitment and financial performance nexus. Other scholars are of the view that the effect of industry sector may differ across industries for example, between high polluting or energy intensive industries compared to less energy intensive industries (Albertini, 2013; Lu & Taylor, 2016; Rodrigo, Duran & Arenas, 2016). To help understand the mechanisms through which the relationship between energy efficiency and financial performance may vary, this study used industry type as a moderating variable. This approach was adopted following other studies such as Jha and Rangarajan (2020) for consistency. Based on the above evidence, this study hypothesises that;

***H_{a2}**: Industry type moderates the relationship between energy efficiency and the EPS of firms listed on the JSE.*

3. Materials and Methods

The researcher opted for a quantitative research approach and used a case study research design. The longitudinal design was adopted where the researcher collected panel data from 2011-2018. All firms listed on the JSE were considered as the population of this study. A sample of 16 firms listed on the FTSE/JSE was considered. These are considered Environmentally Sensitive Industries because they consume excessive energy and cause serious environmental damage. These firms were from sectors such as mining, energy, manufacturing as well as health and pharmaceuticals. This list was considered because these firms excel in terms of Environmental Social and Governance (JSE, 2020). Hence, this assisted the researcher to access all the data required to test the hypotheses of the study. The purposive sampling technique was adopted in this study. Purposive sampling is defined as the discretion by the researcher to select participants who possess certain characteristics considered useful to obtain the objectives of the study (Etikan, Musa & Alkassim, 2016). Panel data was collected from the firms' websites and sustainability reports. Particularly, secondary data was used. Data related to EPS was obtained from IRESS database. Due to inconsistencies regarding the reporting of energy efficiency on the sample firms' sustainability reports, the researcher opted to use content analysis to collect the data. To that effect, a dichotomous scale ranging from between 0 and 1 was used following recommendations by Cooke (1989). Hence, 0 was allocated when the firm did not record or performed badly on material efficiency on that particular year. On the other hand, 1 was allocated when the firm recorded and performed well on any given material efficiency strategy.

Measures

Independent Variables

The independent variable of the study was energy efficiency. It was measured by assessing the extent to which the firm reduced its energy consumption, invested in renewable energy, saved fuel and evidence of electricity savings. Data related to energy efficiency was sourced from sustainability reports of the firms considered in this study.

Dependent Variables

The dependent variable of the study was financial performance. Financial performance is defined as an assessment of the extent to which a firm has attained its economic goals (Gentry & Shen, 2010). In this case Earnings per share (EPS) was used to measure financial performance.

Control Variables

It is crucial to find factors which may influence the dependent variable besides the independent variable being investigated (Bacon-Shone, 2013). According to

Marashdeh (2014), firm size and liquidity can also influence financial performance of listed firms. To that effect, it is crucial to control the effect of these variables in order to clearly understand the relationship being investigated. In this study, market capitalization was used to measure the size of the firm. The size of the firm has an effect on the profitability of a firm (Al Shahrani & Tu, 2016). Liquidity was measured by compiling values from the current ratio of firms which were evaluated. These were compiled for the 8-year period considered in the study. These were obtained in the firm's annual financial statements and from the IRESS database. Existing studies assert that liquidity should be controlled because it also has an effect on profitability (Warra & Oqdeh, 2018).

Dependent variable; Y: Financial performance

Dependent variable 1; Y: Earnings per share

Independent variable; X: Energy efficiency

Independent variable 1; X1: Energy efficiency

Panel Regression Model

$$Y_{it} = \alpha + X_{1it} + X_{2it} + X_{3it} + \varepsilon$$

Where y=financial performance; i denotes the firm; t denotes the time; x₁= energy efficiency (ef); x₂=firm size; x₃=liquidity; + ε = error term; α= constant

4. Results

Descriptive statistics

Table 1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Energy efficiency	128	2.945313	1.399208	0	4
EPS	128	1181.074	1385.127	-1764.32	12044.82
Liquidity	128	1.425118	0.9830142	0	6.8176
Firm size	128	929723	47711.28	0	428668

Table 1 presents the descriptive statistics for the key variables considered in the study. The total number of observations was 128 derived from 16 Environmentally Sensitive firms observed for 8 years. The mean for energy efficiency was 2.945313 and the standard deviation was 1.399208, with a minimum value of 0 and a maximum value of 4. In terms of reporting, this variable was well reported by majority of the firms except only one firm. In terms of EPS, the mean score was 1181.074 and the standard deviation was 1385.127, while the minimum value was -1764.32 and the maximum was 12044.82. The findings show that the mean for liquidity was 1.425118 and the standard deviation was 0.9830142. The minimum

value for liquidity was 0 and the maximum value was 6.8176. Considering firm size, the mean score was 929723 and the standard deviation was 47711.28. The minimum value was 0 and the maximum value was 428668.

Correlation Analysis

Table 2. Correlation Analysis

Variables	EPS	Energy efficiency	Liquidity	Firm size
EPS	1			
Energy efficiency	-0.065	1		
Liquidity	0.3213	0.4363	1	
Firm size	0.1567	0.2134	0.0222	1

Table 2 shows correlation analysis results among variables. The results showed that energy efficiency was negatively correlated with EPS (-0.065). Conversely, the results showed a positive correlation between energy efficiency and control variables such as liquidity (0.4363) and firm size (0.2134) respectively.

Table 3. Model 1 Feasible Generalized Least Squares Regression -EPS

.eststo: xtglm EPS c. Energy##c. IndustryType Liquidity Firmsize						
Cross sectional time series FGLS regression						
Coefficients: generalized least squares						
Panels:	homoskedastic					
Correlation: no autocorrelation						
Estimated covariances	=	1			Number of obs =	128
Estimated autocorrelation	=	0			Number of groups=	16
Estimated coefficients	=	6			Time periods =	8
Log likelihood	=	-1099			Wald chi2 (10) =	11.79
					Prob >chi2 =	0.0378
EPS	Coef.	Std.Err.	z	P> z	[95% confi.	Interval]
Energy	-650.4135	290.037	-2.24	0.025	-1218.875	-81.95245
industryType	-396.5374	121.165	-3.27	0.001	-634.0154	-159.0593
c.Energy#c.IndustryType	85.82573	37.636	2.28	0.023	12.05998	159.5915
Liquidity	-166.2648	116.328	-1.43	0.153	-394.2632	61.73365
Firm size	-0.000669	0.0018	-0.38	0.702	-0.0040997	0.0027608
_cons	4364.01	999.899	4.36	0.000	2404.244	6323.777

Table 3 present the findings on the link between energy efficiency and financial performance (earnings per share) with the moderating effect of industry type. Before introducing industry type as a moderating variable, the findings showed that attaining energy efficiency significantly and negatively influence financial performance (EPS) of the firms considered in this study. In this case, the link was negative at -650.4135 at 5% significance level. This shows that attaining energy efficiency among the firms investigated reduces their profitability. It is interesting to note that, the link between energy efficiency and financial performance (EPS) improved from negative to positive when the moderation effect of industry type was introduced. In this case, the link became positive at 85.82573 at 5% significance level. This implies that indeed industry type strengthens the relationship between energy efficiency and financial performance.

Discussion of Findings

Before introducing industry type as a moderating variable, the findings showed that attaining energy efficiency significantly and negatively influences financial performance (EPS) of the firms considered in this study. This implies that the firms concerned incurred losses by investing in energy efficiency initiatives. The negative effect of energy efficiency on financial performance found in this study may be attributed to the cost of investing in energy efficiency technology. It was noted during data collection that the evaluated firms were actively involved in investing in green technology as a strategy to address the energy conundrum in South Africa. This technology comes at a higher cost which may negatively impact the firms' profitability. The author of this study would also like to further argue that the negative link established between energy efficiency and financial performance in this study could be that the concerned firms are not being innovative regarding establishing the energy efficiency combinations which can trigger efficiency, cutting costs whilst enhancing the financial performance of the business. They could be just investing in energy efficiency initiatives to meet compliance requirements not as a strategy to drive business efficiency. Hence, such investments may reduce the profitability of a business as measured by EPS. The findings of this study are supported by similar empirical findings. Qian (2012) investigated the relationship between environmental sustainability performance and financial performance. The study was conducted among Australian firms. The study found a negative relationship between energy efficiency and financial performance. The study found that some firms still benefit from unsustainable use of energy. For instance, the study rather found that publicly listed firms which do not have environmental sustainability as one of their strategic goals reported higher financial performance. The above findings are also supported by the Tradeoff hypothesis which advances the argument that environmental sustainability initiatives may reduce the profitability of a business. According to Friedman (1984), a firm only exists to make profit and to enhance value for its shareholders. Hence, any other obligation such as

environmental sustainability commitment comes with extra cost that erodes the profits of the firm and reduces the returns for shareholders. To that effect, environmental considerations are a burden to the firm and should be considered in the firm's strategy. Rather, managers may only consider it after the profitability goals of the firm have been attained and only if the owners of the firm give managers permission to use the firm's resources to participate in environmental protection initiatives. The most compelling argument advanced by the Tradeoff hypothesis is that other obligations such as environment sustainability initiatives use up the resources of the firm which are supposed to be used for more value creation within the firm. Nevertheless, this view may expose a firm to lawsuits and penalties from the government and other environmental pressure groups due to the rising concerns over environmental damage by firms.

Moderation Effect of Industry Type on the Relationship between Energy Efficiency and Financial Performance

It is interesting to note that, the link between energy efficiency and financial performance (EPS) improved from negative to positive when the moderation effect of industry type was introduced. In this case, the link became positive at 5% significance level. This implies that indeed industry type strengthens the relationship between energy efficiency and financial performance. This entails that managers in listed companies should understand the context of the industry they operate in. For instance, the firms which operate in energy intensive industries such as mining, energy, manufacturing as well as health and pharmaceuticals may need to carefully handle the energy efficiency initiatives because such investments form a significant part of their costs. Hence, investing only for compliance's sake may not benefit them as the cost of energy may continue to deplete their profits. Nevertheless, if they are to understand their industry and adopt the energy efficiency initiative as a strategy to drive efficiency in the business, then, they may record favourable financial returns in the long run. The findings of the study are supported by the work of other existing scholars. For example, Tang et al. (2018) express that it is crucial to understand the conditions or circumstances which may weaken or strengthen the relationship between energy efficiency and financial performance. This can go a long way in resolving the inconclusiveness of findings regarding this relationship (Mazzi. et al., 2016). A plethora of scholars have submitted that industry context is among one of the key factors which may help to explain the circumstances through which the relationship between environmental sustainability commitment and financial performance can be stronger or weaker (Endrik et. al., 2014; Lu & Taylor, 2016; Jha & Rangarajan, 2020). Gonenc and Scholtens (2019) emphasised the importance of understanding the industry context when trying to understand the effect of sustainability initiatives on corporate financial performance. The study found out

that several studies use industry type either as a moderator or control variable which means it has significance in helping to understand the conditions which strengthens or weakens the environmental sustainability commitment and financial performance nexus. Other scholars are of the view that the effect of industry sector may differ across industries for example, between high polluting or energy intensive industries compared to less energy intensive industries (Lu & Taylor, 2016; Rodrigo, Duran & Arenas, 2016).

5. Conclusion

The current study investigated the effect of energy efficiency on financial performance (EPS) using industry type as a moderating variable. To achieve that, the study adopted a quantitative research method where secondary data was considered. Longitudinal data was collected for 8 years and it was analysed using the Feasible Generalized Least Squares. Before introducing industry type as a moderating variable, the findings showed that attaining energy efficiency significantly and negatively influences financial performance (EPS) of the firms considered in this study. Interestingly, the link between energy efficiency and financial performance (EPS) improved from negative to positive when the moderation effect of industry type was introduced. This means that the moderation effect of industry type made the relationship between energy efficiency and financial performance stronger. This entails that managers in listed companies should understand the context of the industry they operate in. For instance, the firms which operate in energy intensive industries such as mining, energy, manufacturing as well as health and pharmaceuticals may need to carefully handle the energy efficiency initiatives because such investments form a significant part of their costs. Hence, investing only for compliance's sake may not benefit them as the cost of energy may continue to deplete their profits. Nevertheless, if they are to understand their industry and adopt the energy efficiency initiative as a strategy to drive efficiency in the business, then, they may record favourable financial returns in the long run. Essentially, environmental variables such as energy efficiency are at the core of the debate on attaining sustainable development goals by transitioning from energy powered by fossil fuels towards renewable energy which is considered environmentally friendly and sustainable. Hence, investing beyond just compliance and attaining energy efficiency may enable listed firms to enjoy financial benefits while also helping to mitigate climate change which can enhance their green image. The findings of this study contribute new empirical findings on variables that have never been tested before in South Africa. Essentially, the study went beyond testing linear relationships by testing the moderating effect of industry type on the energy efficiency and financial performance nexus which generated new empirical findings which were lacking in South Africa. The limitation of this study is that it only

focused on firms from the Environmental Sensitive Industries which may be a small sample to generalize the findings about environmental behaviour of all firms listed on the JSE. All in all, the study contributed immensely towards resolving the existing inconclusiveness of findings regarding the link between energy efficiency and financial performance. Recommendations are made for managers in listed firms to understand the context of the industry they operate in if they are to realize the gains from energy efficiency initiatives.

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