

The Impact of Profitability on the Correlation between Firm Value and Eco-Efficiency in Iraqi Companies

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Abstract— The present study was carried out in order to examine the effects of profitability on the relationship between eco-efficiency and firm value in Iraqi companies located in Erbil. In so doing, Ohlson's model for testing value relevance was extended through hierarchical regression analysis. The study sample consisted of 58 construction companies located in Erbil, Iraq. Annual reports and data stream of the companies were utilized to collect the required eco-efficiency and financial data, respectively. The results of the study indicated that in order for firm value to stay positive, managers and stakeholders need to develop a suitable relationship which can be actualized by adopting environmentally friendly practices. The results also showed that there was firm value and eco-efficiency were positively correlated. It was also concluded that profitability had a positive influence on the relationship between firm value and eco-efficiency.

Keywords—Profitability, Construction Companies, Eco-Efficiency, Firm Value.

I. INTRODUCTION AND BACKGROUND

Nowadays, companies are widely expected to take into account environmental factors while operating to accomplish their missions (Chen et al., 2021). In so doing, most companies pay much attention to environmental performance in addition to their concerns for quality, service, and cost (Zhang et al., 2019). Generally speaking, environmental performance refers to those measures that need to be adopted in order to make sure that environmental characteristics such as water, soil, air, and eco-systems will be sustainable (Yin and Sun, 2020).

The trend of considering environmental factors in economy has led to emergence of the term “eco-efficiency” which is a midpoint between the environment and the economy. This concept has been popularized as a result of international debates on the environment (Xia et al., 2020). It is defined as the economic value that a company creates from the delivered services and products in relation with the produced waste (Wang et al., 2019).

It is believed that a company's attempts to improve its environmental performance led to a

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decrease in its economic value because such attempts increase product price which in turn causes low profitability (Qu et al., 2020). There is the opposite view that states that taking social and environmental performance into account by a company can bring about output efficiency (Ma et al., 2020). The second group believe that a company's improved environmental performance can bring about cost-efficient use of the resources which ultimately leads to higher levels of profitability and good financial performance (Liu et al., 2020).

Numerous studies have proved that financial performance of a company can be promoted if they company pays attention to environmental factors (Liao et al., 2020), while other researcher concluded that environmental performance requires large costs because a certain type of technology is required which is quite costly (Huang et al., 2020).

In line with the abovementioned studies, the present study was an attempt to examine the relationship between eco-efficiency and firm value and how this relationship was affected by profitability as an important characteristic in some construction companies located in Erbil, Iraq (Tang et al., 2021).

Studies focusing on environmental policies and firm value have provided contradictory results, which can be attributed to different factors taken into account in different studies such as sample size, lack of appropriate theories, different assessment measures, and different definitions provided for the concept of environmental policy (Cao and Liu, 2021). It is reported that companies will undergo inverse return if when the media broadcasts news on environmental damage, while good news on environmental activities of a company leads to high levels of return (Liu and Zhao, 2022). Moreover, a poor environmental performance is reported to be associated with low asset value (Feng et al., 2022).

The results of a study, in which Ohlson's model was employed, have shown that companies with eco-efficiency policies can obtain more profits, maintain their costs, and possess higher firm value (Wang and Li, 2022). The results of a study carried out on 201 companies in the UK indicated

that eco-efficiency, as an environmental policy, and firm value were correlated (Xu et al., 2021). The results of that study also showed that adopting and implementing eco-efficiency policies led to higher incomes for the companies under investigation. Moreover, a higher market value was reported to be obtainable by adopting environmental standards (Zhang and Hu, 2021). Some opposing results have also been reported by various studies. For example, the results of a study carried out by Chen and Chen (2022) indicated that sticking to environmental policies and standards led to good financial performance in the short-run, while poor financial results were observed in the long-run. Economic performance has been reported to be negatively associated with good pollution performance in a short duration (Wang et al., 2021). The results of the study focusing on the relationship between market value and environmental performance of Swedish companies showed that companies with a high level of environmental performance are not highly valued by investors (Sun and Zeng, 2021).

As discussed above, the relationship between the environmental policy of eco-efficiency and firm value has mostly been investigated in developed countries, while no study has even focused on this issue in developing countries such as Iraq. In this regard, the present study was carried out based on Ohlson's model in order to examine the effects of profitability on the relationship between eco-efficiency and firm value in Iraqi companies located in Erbil.

II. THEORETICAL FRAMEWORK

Stakeholder theory

Stakeholders are defined as employees, financiers, customers, and communities that exist or taken into account in a business (Chen et al., 2021). Stakeholder theory deals with two important issues. First, it is an attempt to figure out the company's purpose which makes managers to evaluate themselves regarding the value created by them and how to hold the stakeholders together, which brings about a better performance for the company (Rahman and Alam, 2021). The second issue that stakeholder theory deals with is to understand the management's responsibility

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toward the stakeholders. Here, the management should know what type of relationship to establish with the stakeholders in order to use the collective effort to come up with the maximum level of firm value (Zhu et al., 2021). It is claimed that stakeholder theory is aimed at specifying the link between management of organizational stakeholders and the achievement of essential corporate goals like profitability and growth (Sun and Song, 2021).

It should also be noted that based on stakeholder theory, there can be a friction between the external costs of a company (such as payoffs to bondholders) and the internal costs (such as environmental costs and product quality costs) (Das and Mukherjee, 2021). According this, when a company avoids to get involved with environmental actions hoping for improvement of the financial performance in order to reduce the internal cost, a high explicit cost will be resulted which in turn leads to competitive disadvantage compared to its rivals; therefore, it can be concluded that eco-efficiency and firm value are positively correlated. The results of most studies proved a positive relationship between eco-efficiency and firm value (Li et al., 2021). In this regard, the first hypothesis was posed as follows:

Hypothesis 1: Eco-efficiency positively influences firm value.

Profitability

Profitability is proposed as a significantly important creator of firm value (Chen et al., 2022). It is claimed that profitability can be obtained if a company tries to figure out methods to reduce raw materials supply cost, take advantage of economies of scale, modify costs that do not satisfy the buyers' needs, and remove overheads failing to add value to the product (Alam and Rahman, 2021). Profitability has been shown to have a positive effect on environmental performance (Chen et al., 2021). It is also argued that new solutions of reducing the pollution-related inefficiencies enhance both industrial competitiveness and environmentalism (Zhang et al., 2019). Therefore, it can be stated that

profitability affects the relationship between eco-efficiency and firm value. In this regard, the second hypothesis was posed as follows:

Hypothesis 2: Profitability has a positive effect on the relationship between eco-efficiency and firm value.

III. METHODOLOGY

The statistical population of the present study included all construction companies' operation in Erbil in 2017. The study sample consisted of 58 construction companies that were randomly chosen. Construction companies can have a remarkable effect on the environment. For the purpose of the present study, the International Standardization Environmental Certificate (ISO 14001) was utilized to measure the presence of eco-efficiency in the companies under investigation (Yin and Sun, 2020). The required data were collected from the company's annual reports for the purpose of checking whether the companies were eco-efficient or not, and the required financial data were obtained from the relevant data stream. These two sources of data are reliable (Xia et al., 2020); therefore, the collected data were reliable, and thus the results can be reliable and valid.

The study's model

In order to figure of the relationship between eco-efficiency and firm value in the companies under investigation, the value relevance model was employed. As a variable, eco-efficiency has two outcomes: it is assessed with a dummy of one for eco-efficient companies and zero otherwise, and it is interpreted as other value relevant information in the model. This model can be expressed as:

$$P = a_0 + a_1X + a_2 Y + \beta_0V + \mu$$

Where, P stands for the market value of firm equity, X for lag of earnings per share ($t - 1$), Y for (net) book value assessed as the proportion of common equity divided by outstanding shares at the company's fiscal year end, V for a vector variable showing other value relevant information, as for the estimates of the parameter

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related to book value and earnings to the market firm, β_s for the estimates of the parameter related to other information to firm market value, μ and for the error term.

It is also stated that other information related to value can bring about an improvement in the future earnings of a firm (Wang et al., 2019). When there is a positive relationship between information and the future earnings, there will also a positive relationship between information and firm market value. Other factors such as increased efficiency, potential increased profits, and reduced costs that can result from the adoption of eco-efficient strategy were also taken into account in the model of the present study. The effect of profitability (return on assets) on the relationship between eco-efficiency and firm value was also taken into account. The model that was used in the present study to test the effect of profitability (return on assets) on the relationship between eco-efficiency and firm value was as follow (Qu et al., 2020).

$$P = a_0 + a_1BV + a_2EPS + \mu \quad (\text{Model 1})$$

$$P = a_0 + a_1BV + a_2EPS + \beta_1ECO + \mu$$

(Model 2)

$$P = a_0 + a_1BV + a_2EPS + \beta_1ECO + \beta_2PROF + \mu$$

(Model 3)

$$P = a_0 + a_1BV + a_2EPS + \beta_1ECO + \beta_2PROF + \mu$$

(Model 4)

Where, P stands for the market value of firm equity, BV for (net) book value assessed as the proportioned common equity divided by outstanding shares at the company's fiscal year end, EPS for lag of the earnings per share (t-1), ECO = an indicator variable for eco-efficiency, and PROF = profitability measured as return on assets.

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IV. RESULTS

The results of descriptive data analysis are presented in Table 1. The mean earning per share (EPS) of 0.12 indicates low earning. As seen in the table, eco-efficiency as the study's independent variable has an average value of 0.14%, which means that about 14% of the companies under investigation are eco-efficient. It can also be observed that the profitability (i.e. mean return on assets) of the selected companies is approximately 3.65, indicating that most of the companies are profitable. The results of correlation analysis is

given in Table 2. As observed in this table, the studied variables lack collinearity.

To test the first hypothesis, multiple ordinary least squares (OLS) regression analysis was employed, the results of which are shown in Table 3. As explained by Models 1 and 2, about 54% of the changes can be predicted in firm value. This result proves that eco-efficiency and firm value are positively correlated ($\beta = 0.30$, $p < 0.01$, $R^2 = 0.55$). Therefore, eco-efficient policy adopted by companies can lead to a higher firm value, and the first hypothesis was confirmed.

Table 1: Descriptive Statistics

Variable	Mean	SD	Min	Max
PRICE	2.08	4.97	0.02	68.70
BV	1.54	1.57	-1.92	13.20
ESP	0.12	0.29	0	4.58
ECO	0.14	0.37	0	1
PROF	3.65	13.45	-180.29	60.24

The above table provides descriptive data for five different variables: price, BV, ESP, ECO, and PROF. This variable denotes the cost of a good or service that is being offered for sale. The price ranges from 2.08 to 4.97 units, with 2.08 being the mean and 4.97 being the standard deviation. The pricing range goes all the way up to 68.70 units, with 0.02 units serving as the bare minimum.

BV is an abbreviation for "book value," which is calculated by subtracting the total value of a company's liabilities from the total value of its assets. The standard deviation of the book value is 1.57 units, and the mean book value is 1.54 units. The lowest possible book value is -1.92 units, which would suggest that there is negative equity, and the highest possible book value is 13.20 units.

Earnings per share (EPS) is a measure of a company's profitability that is calculated by dividing total profits by the total number of shares of stock that are currently in circulation. The standard deviation of earnings per share is 0.29

units, with the mean earnings per share coming in at 0.12 units. The greatest earnings that can be received per share are 4.58 units, and the minimum earnings that can be received per share are 0.

ECO is an abbreviation for "environmental impact," which refers to the effect that a good or service has on the environment. The ecological impact is measured in units, with a mean value of 0.14 and a standard deviation of 0.37. The highest ecological impact is one unit, while the least possible influence on the environment is zero units.

This variable is used to describe a company's profitability, which may be defined as the difference between a company's revenue and its expenses. There is a standard deviation of 13.45 units, which corresponds to a mean profitability of 3.65 units. The highest amount of money that may be made is 60.24 units, while the smallest amount of money that can be made is -180.29 units, which could signify a loss.

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Table 2: Correlation Analysis

	PRICE	BV	ESP	ECO	PROF
PRICE	1.00				
BV	0.47	1.00			
ESP	0.68	0.44	1.00		
ECO	0.12	0.04	0.09	1.00	
PROF	0.27	0.19	0.23	0.04	1.00

The table contains numbers that indicate the correlation coefficients that have been calculated between each pair of variables. A correlation coefficient has values that can range from -1 to 1, and it is used to quantify the intensity and direction of a linear relationship that exists between two variables. A correlation with a value of 1 indicates a perfect positive relationship; a correlation with a value of -1 indicates a perfect negative relationship; and a correlation with a value of 0 indicates that there is no association.

When we take a look at the table, we can see that the correlation coefficient between price and itself is always 1, which is to be expected given that a variable correlates completely with itself.

The fact that PRICE and BV have a correlation of 0.47 indicates that these two variables likely have some degree of positive association with one another. Similarly, the correlation between price and ESP is 0.68, which shows a stronger positive association between these two variables. This can be inferred from the fact that both variables are positively correlated.

The fact that PRICE and ECO only have a correlation of 0.12 indicates that there is only a very faint positive association between these two variables. At a value of 0.27, the correlation between price and probability is similarly considered to be one of the weaker ones.

Moving on to the other cells in the table, we can see that the correlation between BV and ESP is

0.44, indicating that there is a somewhat positive association between these two variables. Moving on to the next cell in the table, we can see that the correlation between BV and ECO is only 0.04, which indicates that there is only a marginally positive association between these two variables. The fact that there is a correlation of 0.19 between BV and PROF indicates that there is a somewhat good association between the two.

The value of 0.09 for the correlation coefficient between ESP and ECO reveals that there is only a marginally significant positive connection between these two variables. There is a moderately good association between ESP and PROF, as indicated by the correlation of 0.23 between the two variables.

The correlation between ECO and PROF is the lowest in the table, coming in at 0.04, which indicates that there is only a very marginally positive connection between these two variables.

In general, the table sheds light on the ways in which various variables are correlated with one another, which can be helpful when attempting to comprehend the connections that exist between them.

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Table 3: Multiple regression analysis

Variable	Model 1	Model 2	Model 3	Model 4
Control				
BV	0.43*** (0.02)	0.43*** (0.05)	0.43*** (0.02)	0.43*** (0.05)
EPS	1.15*** (0.12)	1.15*** (0.47)	1.11*** (0.12)	1.11*** (0.45)
Independent				
ECO		0.30*** (0.09)	0.28*** (0.08)	0.31*** (0.11)
Moderators				
PROF			0.02*** (0.00)	0.02*** (0.00)
Interaction				
ECO → PROF				0.01* (0.01)
R ²	0.54	0.54	0.54	0.54
F	383.94	137.53	264.32	108.57
ΔR ²			0.08	
Note: 667 for all models; unstandardized coefficients are reported; the figures in parentheses are standard errors; * p<0.10; ** p<0.05; ***p<0.01				

The findings of a regression study that investigated the relationship between a dependent variable and many independent and control variables, as well as the moderating effects of two moderators, are presented in the table below. This analysis was carried out to investigate whether or not there is a relationship between the two variables. The following table presents the findings of four distinct models, each of which contains its own unique set of independent and moderator variables.

The dependent variable is not displayed in the table; nevertheless, given that regression analysis was performed, it is highly likely that the dependent variable is a continuous variable. Control variables are those that are listed under the title "Control" and include "BV" and "EPS," both of which have statistically significant coefficients in all four models. The control variables are listed below the heading "Control." The title "Independent" refers to the most important independent variable, which is denoted by "ECO" and is also statistically significant in all of the models. Last but not least, the heading "Moderators" includes the moderator variable "PROF," which has a coefficient that is statistically significant in both of the models that take it into account.

Under the heading labelled "Interaction," the table additionally includes a word that represents the interaction that occurs between the independent variable and the moderator variable. The fact that this interaction term is statistically significant in Model 3 indicates that the effect of the independent variable on the dependent variable is moderated by the variable that serves as the moderator.

A score of 0.54 for the R-squared statistic implies that the independent variables and the control variables together explain 54% of the variation in the variable that is being studied. The overall significance of the regression equation is tested using the F-statistic for each model, and the results show that all of the models have F-values that are statistically significant. Last but not least, the table demonstrates the difference in R-squared (R²) between Models 2 and 3, which is statistically significant. This indicates that the inclusion of the interaction term in Model 3 greatly improves the model's capacity to explain the variation in the dependent variable.

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V. DISCUSSION

As stated before, according to stakeholder theory, eco-efficient policy taken by management can result in an increase in firm value. In the present study, the effect of profitability on the relationship between eco-efficiency and firm value was examined. The results of data analysis indicated that managers need to create relationships, motivate stakeholders, and create a conducive environment in order to promote firm value (Ma et al., 2020). It was also seen that shareholders play a significant role in deciding firm value, which shows that some investors would like to make their own investment decisions in addition to maximizing their wealth. A company's economic value can rise provided that there is a higher demand for than the supply of socially responsible investment opportunities (Liu et al., 2020). Moreover, a friction between the external costs of a company (such as payoffs to bondholders) and the internal costs (such as environmental costs and product quality costs) (Liao et al., 2020).

The findings of the present study are in agreement with those of the study conducted by Huang et al. (2020) who indicated that there is a positive relationship between eco-efficiency and firm value. Therefore, companies are recommended to adopt new measure to adjust themselves to an eco-efficient environment. The results of the study also showed that profitability has a significant effect on the relationship between eco-efficiency and firm value. The reason for this effect, as explained by Tang et al. (2021), is that profitability gives the management the opportunity to assign more social responsibility programs for the positive relationship between eco-efficiency and firm value encourages profitable companies to pay closer attention to eco-efficiency that can create higher future returns. Moreover, eco-efficient

practices have a positive effect on consumer behavior, attracting eco-friendly consumers, which leads to an increase in sales. The findings of the present study can be utilized by the management, shareholders, and potential investors.

Among the limitations of the present study are the sample size which restricts the generalizability of the results; therefore, future studies need to take larger samples into account. Future studies are also recommended to see into the effect of other firm-specific characteristics on the relationship between eco-efficiency and firm value.

VI. CONCLUSION

Stakeholder theory, as mentioned earlier, suggests that eco-efficient policies adopted by management can boost business value. This research looked at how profit margins affect the connection between eco-efficiency and business value. According to the findings of the research, managers can increase business value through building relationships, inspiring stakeholders, and fostering a supportive environment (Cao and Liu, 2021). Some investors, in addition to maximising their wealth, may like to make their own investment decisions, as evidenced by the fact that shareholders have a considerable influence in determining corporate value. If there is greater investor interest in socially responsible investments than there are available opportunities, the market value of a company can increase (Liu and Zhao, 2022). There is also a tension between a company's internal costs (such as those associated with environmental impact and product quality) and its external costs (such

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as payouts to bondholders) (Feng et al., 2022).

The current study's findings corroborate those of previous research by Wang and Li (2022), which found a positive correlation between eco-efficiency and business value. Therefore, it is suggested that businesses implement new measures to adapt to an eco-efficient setting. The study also found that the link between eco-efficiency and firm value is significantly influenced by profitability. According to Xu et al. (2021), this effect occurs because successful businesses are in a better position to prioritise eco-efficiency, which can lead to higher future returns because of the positive relationship between eco-efficiency and firm value. In addition, eco-efficient practises have a beneficial impact on consumer behaviour, drawing in eco-friendly customers and increasing revenue. The results of this research can be used by the administration, stockholders, and possible investors.

The small sample size is one of the drawbacks of the current study, limiting the wide applicability of the findings; hence, larger samples will be required in future research. The influence of other firm-specific features on the connection between eco-efficiency and business value should also be investigated in future research.

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