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Impact of Firm Specific Factors on Profitability: Evidence from the Engineering Industry of Bangladesh

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Abstract

The paper analyses the impact of the firm-specific factors on the profitability of the engineering industry of Bangladesh. This study used 22-year (2000-2021) panel data of a total of 13 companies of this industry. According to the findings of the study, the factors that have the most impact on a business's capacity to earn a profit are its age, asset turnover ratio, and operating profit margin. Size and operating profit margin are two of the factors that have a positive impact on a company's profitability. On the other hand, age and asset turnover ratio are factors that have a negative impact on a company's profitability. The findings could be of use to a wide variety of stakeholders in assisting them in making decisions pertaining to this industry.

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1. Introduction

Sustainable profitability is a key aspect of any company. Hence, the prime concern of the engineering industry is also to maintain sustainable profitability. A company's development can be commonly measured through profitability. Thus the study related to sustainable profitability is very important in business. A company's one of the main goal is to maximize its profit by minimizing the costs. Numerous studies in developed countries have been done based on profitability as researchers want to know the factors that have the most contribution in maximizing profit. Some argue that an aged company will have more profit whereas others support younger companies. Similarly, there has been a conflict of opinion regarding the size of the organization while measuring profit. According to some previous studies, some researchers support that size and profitability has positive relation (Pagano and Schivardi, 2003). But on the other hand, a few studies show that these two have a negative relationship. Some studies showed that the asset turnover ratio and operating profit margin have a positive impact on profitability. So the main intention of this study is to identify the relationship of profitability with other variables related to size, age and sales of the company. The Engineering Sector, which once had received the least attention from policymakers, has now emerged as a potential cost-cutting sector by manufacturing at least 50% of imported products in the country. This crucial sub-sector is now providing key support to the construction sector, industrial and agricultural sectors by manufacturing electrical goods such as light shed, switch, electrical fans, socket, channel, cables, and generator, which are manufactured by this sector, are now said to meet up 50 to 58 percent of the country's demand, which was previously met by import. Furthermore, as a developing country, duty-free access for RMG will be limited after 2025, as it is prudent to focus on other sectors that could participate in export as new sources, and the light engineering industry would be one of them. Backward and forward linkages are very important in an economy, and the engineering industry can build strong backward and forward linkages with different sectors. Now, approximately 10 million people work in this industry, but it has enormous potential to generate significantly more employment opportunities, thereby assisting our country in reducing poverty and improving labor market efficiency. Obviously, increased employment opportunities will directly boost our socioeconomic development. There are 42 listed companies in this industry. Some of the companies commenced their business 69 years ago and some of these have started recently. The paper intends to investigate the dependence of profitability of these companies on firm-specific factors. One dependent variable and four independent variables have been used in this paper. The effects of the independent variables which are age, size, total asset utilization, and operating profit margin on firm profitability yielded mixed empirical results. In the context of developing countries, there is insufficient empirical work on these factors. The effort of this study is to find the dependency of the profitability of a firm on firm-specific variables. The paper contains a literature review, description of the variables, model, and estimations in the later parts of the paper. The final part covers the details of the analysis and conclusion along with the references and appendix used in this paper.

2. Literature Review

In finance and accounting literature, the theory of learning by doing hypothesis is a topic of great interest. Much of the current empirical research on the relationship between various variables and profitability was motivated by the question of whether these variables also led to market dominance and industry profitability. Becker-Blease et al. (2010) carried out a study that focused on the manufacturing industries in the United States to investigate the factors that determine the profitability of businesses. It was determined that there was no correlation between the size of the company and the profitability of 52 of the 110 companies studied, while just 11 of the companies saw a positive correlation between the two variables. The rate at

which 47 different businesses are able to turn a profit has been shown to be dropping over time. After that Later Coad et al. (2015) published their findings from an investigation of the correlation between the age of a company and its rate of sales growth in 2015. From this investigation it was concluded that small/new firm has a positive relation with sales growth and an older firm has a negative correlation with sales growth. In addition, in 2016, a different study based on the examination of 302 non-financial enterprises indicated that there is a negative association between the age of the firm and the profitability of the firm. This finding was based on the findings of the first study. So the pattern of relationship is different from company to company. Again in 2013, Hui, Radzi, Jenatabadi, Kashim, and Radu also wanted to find out the determinants of profitability of the food industry by taking data from China, Malaysia and Taiwan. They found that size and firm age are the prominent variables affecting the performance of the industry. Kartikasari and Merianti (2016) also examined the relationship between different variables and profitability based on 100 manufacturing companies from Indonesia Stock Exchange over 2009-2014. They found that there is a significant relationship between the debt ratio and the ROA of the firm. On the other hand, firm's turnover doesn't have any significant relation with profitability. Ilaboya and Ohiokha (2016) analyzed the impact of a firm's size and age on the firm's profitability by taking panel data of 30 firms over the period of 2006-2012 from the Nigerian Stock Exchange. Here the dependent variable was the log of profit and the independent variables were size and age of the firm. After analyzing the data, it was found that these variables have a positive impact on profitability. Unal et al. (2017) conducted research into the relationship between the size of a company and its profitability in the year 2017, using 112 publicly traded manufacturing businesses in Turkey from the years 2005 to 2013. The estimation results indicated that firm size, as measured by assets, turnover, and the number of employees, has a positive influence on the profitability of the firm by the control variables growth opportunities, firm age, financial risks, unsystematic risk, and liquidity level. This was found by observing at the firm's assets, turnover, and the number of employees. However, Abeyrathna and Priyadarshana (2019) discovered that firm size has little impact on the profitability of Sri Lanka's listed manufacturing firms. Proper use of fixed assets is a prominent factor in increasing the firm's profitability. Again, Fareed, Ali, Shahzad, Nazir and Ullah also conducted a study to show the relationship between different variables to profitability of the power and energy sector of Pakistan by taking 16 listed firms for the period of 2000-2012. It was found from the study that size, electricity crisis and firm growth have significant positive relation with profitability. On the other hand, financial leverage and age have negative relation with profitability. Size and productivity are the most influential variable affecting profitability. In terms of its effect on a company's profitability, the use of fixed assets has been shown to have a number of different results. According to Okwo, Okelue, and Nweze (2012), the profitability of Nigerian brewery enterprises is not significantly impacted by investments in fixed assets. There is a paucity of empirical data regarding the relationship between sponsor shareholding and government shareholding and the profitability of a firm. Cho and Kim (2007) conducted research to determine whether or not managerial ownership of a company has a substantial moderating effect on the performance of Korean companies. From the above- cited literature, it can be concluded that the relationship between different variables and profitability is different. It varies from industry to industry. So, in this paper, we will see the relationship pattern from the perspective of the engineering industry in Bangladesh.

3. Sample and Data:

The study includes panel data spanning 22 years (2000-2021) from 13 publicly traded companies operating in the engineering industry in Bangladesh. The information used in the

analysis came from the annual reports of the respective companies. Table 1 contains a summary of the data that has been gathered.

Table 1: Descriptive Statistics

Variables	Obs.	Mean	Std. Dev.	Min	Max
ROA	286	3.815949	5.277634	-12.1187	20.16802
Age of the Firm	286	33.73427	11.29443	11	61
Size of the Firm	286	8.70202	1.310181	3.168203	12.61446
Asset Turnover	286	1.266092	4.133821	0.02694	67.26188
Operating Profit Margin	286	.0729178	.200415	-0.68314	2.276522

According to the descriptive statistics, there were a total of 286 observations, and the mean value of Return on Asset (ROA) is somewhere around 4 percent. The company has been in this industry for an average of 34 years. The log of the total asset is used to determine the magnitude of the average. To improve their operating profit margins, the firms should try to cut their operating cost.

4. Variables, Model, and Estimation:

In this analysis, firm-specific data were utilized. In order to determine the nature of the connection between the dependent and independent variables, a multiple regression analysis was carried out. The return on assets, the age of the company, the size of the company, the asset turnover ratio, and the operating profit margin are some of the variables. Return on asset (ROA) was the one that served as the dependent variable among these other factors. In this particular investigation, the Return on Asset (ROA) was chosen to serve as the dependent variable. The use of ROA as a method for determining a company's profitability is a highly prevalent business practice. It is a measurement of a company's profitability that is supported by the literature and is generally acknowledged. The variable is measured by dividing the net profit by the total asset of a firm. The age of the company, which is simply the number of years that have elapsed since the company's formation, is the first variable that is independent of the other variables. Another independent variable that was employed in the research was the size of the company, which was determined by taking the log of the total assets. The sign may be interpreted as either positive or negative.

Table 2: Description of the variables used in this study

Variables	Description	Expected Effect
Dependent Variable		
ROA	Net income over average total asset	
Independent Variables		
Age of the Firm	The year the business commenced	+/-
Size of the Firm	Log of total asset	+/-
Asset Turnover Ratio	Sales to Total Asset	+
Operating Profit Margin	Operating Profit to sales	+

Another independent variable that was included for this analysis was the asset turnover ratio. This metric determines how well the company's assets are able to create revenue for the business. Therefore, the ratio of sales to total asset was chosen as the measurement for this variable. It is assumed that there is a positive link between this variable and the total asset in this scenario. The last independent variable is the operating profit margin. The ratio is measured by taking the operating profit and dividing it by the total sales. For this variable, a positive sign represents what is anticipated to be the case. The econometric model used in this study is given below:

$ROA = \alpha + \beta1*\text{Age of the firm} + \beta2*\text{Size of the firm} + \beta3*\text{Asset turnover ratio} + \beta4*\text{Operating profit margin} + Ɛ$

Where,

α= Constant
β= slopes of the independent variables of the regression
Ɛ = Error
According to the initial estimation, the initial expected signs and descriptions of the independent variables are summarized and presented in table 2.

5. Results and Discussions

The regression has been estimated using the Stata software. The dataset contains only firm-specific variables. To find the regression, the fixed effect and random effect models were used. Then the Hausman test was run to choose the best fit model. Hausman test helps find out which test is appropriate and best fit to the dataset. The result of the Hausman test is shown in the table 3.

Table 3: Hausman Test

ROA	Fixed	Random	Difference
Age of the Firm	-0.1172065	-0.0817422	-0.0354643
Size of the Firm	0.2622227	0.3365555	-0.0743328
Asset Turnover Ratio	-0.1538514	-0.1202801	-0.0335713
Operating Profit Margin	6.176415	6.525392	-0.3489762
Prob		0.0270	

According to Hausman test, if the probability value is less than 0.05, the fixed-effect model is the best fit otherwise the random effect model should be used. As the analysis shows the probability value is 0.0270 which is less than 0.05, and the fixed-effect model is fit for the dataset. The fixed-effect model shows that the age of the firm has a negative impact on the profitability of the firm. This is also proven by literature. Akben-Selcuk (2016) supports these findings. But there are some other authors who have different views on this. The coefficient is significant at a 1% level of significance. So this result matches to initial assumption. The result is shown in table 4. The variable which measures the size of the firm shows a positive relationship with the profitability but in the case of significance level, it is not significant at 5% significance level. The asset turnover ratio shows a negative relationship with profitability and this coefficient is significant at a 5% significant level. But the sign of the coefficient doesn't match the initial hypothesis. The operating profit margin shows a positive relationship with the profitability. That means if the operating profit margin increases, the profitability of the firm also increases. The coefficient is significant at the 1% significance level. The expected sign also matches the hypothesis set previously.

Table 4: Fixed Effect Model

Dependent Variable: Return on Asset (ROA)	Coefficient	Standard Error
Independent Variables:		
Age of the Firm	-0.1172065***	0.0307202
Size of the Firm	0.2622227	0.2061462
Asset Turnover Ratio	-0.1538514**	0.0627964
Operating Profit Margin	6.176415***	1.243875
Prob.	0.0000	
F	15.65	
R^2	0.1155	
Adjusted R^2	0.1029	
No. of Observations	286	

Note: The table shows the regression output from the Fixed Effect (FE) estimation of the variables. Coefficients that are significantly different from zero at the 1% and 5% levels are marked with *** and ** respectively.

The test's F statistic result is 15.65, indicating a probability value of 0.000, indicating that the relationship between the dependent and independent variables is significantly linear. This also demonstrates that the relationship between the model and dependent variable correlation is

statistically significant. The dataset is free from any multicollinearity problem as Variance Inflation Factor (VIF) test has been conducted to test the problem. It is assumed to have a multicollinearity problem if the result is more than 10. But in this analysis, the test result shows less than 1.10 in each variable. The mean VIF is also very low and below 10. The result of the multicollinearity test is described below in table 5:

Table 5: VIF Test

Variable	VIF	1/VIF
Age of the Firm	1.03	0.966523
Size of the Firm	1.10	0.912720
Asset Turnover Ratio	1.10	0.912696
Operating Profit Margin	1.03	0.966523

To summarize the result, it can be said that other than the size of the firm, all the variables significantly affect the dependent variable. Coefficient signs of all the four variables except asset turnover ratio matched the signs with the initial assumed signs. Moreover, the analysis doesn't have any multicollinearity problem in the data set. So it can be said that the study shows a very reliable result.

6. Conclusion

This paper endeavored to investigate and present the impact of the firm-specific variables on the profitability of the engineering industry in Bangladesh. The result has been achieved using the 22-year panel data of 13 companies in the engineering industry. Four firm-specific factors were used to draw the relationship and it was found that three of the four variables matched the initial assumptions. The result suggests that the companies should work to narrow down the operating cost as that will have a larger impact on the profitability of a company. The results are also proven by the previous studies. Only a few studies have been done on this industry. But the previous studies didn't include all these variables in a single study to see the outcome but this study compiled and tried to portray the relationship with profitability. As this industry is full of future possibilities, this study will definitely help the stakeholders of this industry. The managers and other decision-makers may get a clear idea of enhancing the profitability of the business. Additionally, the managers of the firms may use this analysis for their future decision-making. The paper can also be used as a base for future research by other researchers.

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Appendix

Table A.1: List of the 13 Companies

Serial No.	Company Name
1	KAY&QUE (Kay and Que Ltd.)
2	NTLTUBES (National Tubes Limited)
3	NPOLYMAR (National Polymer Industries Ltd.)
4	AZIZPIPES (Aziz Pipes Ltd.)
5	BDTHAI (Bd.Thai Aluminium Ltd.)
6	RANFOUNDRY (Rangpur Foundry Ltd.)
7	QSMDRYCELL (Quasem Drycells Ltd.)
8	SINGERBD (Singer Bangladesh Limited)
9	MONNOSTAF (Monno Jute Stafflers Ltd.)
10	ECABLES (Eastern Cables Ltd.)
11	AFTABAUTO (Aftab Automobiles Limited)
12	ATLASBANG (Atlas Bangladesh Ltd.)
13	BDLAMPS (Bangladesh Lamps Limited)

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