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PERFORMANCE EVALUATION: THE IMPACT OF THE FINANCIAL RATIOS ON PROFITABILITY PERFORMANCE OF NATURAL GAS DISTRIBUTION COMPANIES IN BANGLADESH

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ABSTRACT

Purpose: The study examines the relationship between financial ratios and their impact on the profitability of Bangladeshi natural gas distribution companies. Design/methodology: Five natural gas distribution companies are purposively selected and considering 10 years of data. Liquidity, efficiency, and solvency ratios are considered as independent variables, size and age as control variables and profitability regarded as dependent variable. Findings: The crucial financial ratio receivable collection period and GPM have significant negative impact and insignificant negative impact respectively on NPM, ROE, and ROA. The association between financial ratios and profitability ratios; efficiency ratios are positively related to net profit margin. Liquidity ratios, total assets turnover ratios and solvency ratios negatively affect net profit. The study also concludes that age and size have no significant impact on profitability. The findings suggest that companies must improve their financial ratios to sustain in the competitive business market. Management should collect accounts receivable from customers by improving customer relationships, creating an easy payment system, automating software, and providing incentives for advance payment, paid accounts payable for smooth gas supply, improving assets turnover by maintaining optimum assets, effective asset utilization, inventory management, supply chain improvement, customer satisfaction, maintain transparency, employees motivation, and technology advancement.

Keywords: Financial Ratios, Profitability, Impact on Profit, Assets Utilization

1. INTRODUCTION

The most often utilized technique to assess performance is financial ratio analysis, which has direct or indirect implications for management, shareholders, the government, consumers, suppliers, and other stakeholders Kertapati et al. (2004). The performance and efficiency of the company mostly depend on the best utilization of funds and the implementation of the financial policy effectively Sheik and Scott (2013).

Ratios are an acceptable method worldwide for measuring performance and investors make decisions based on the result of analysis Alqam et al. (2021). Financial performance depends on the ability of the company to utilize its current resources Kanna et al. (2023), Schellhorn and Sharma (2013). Holding liquid assets lends to condense revenue due to the lower rates of return associated with liquid assets, which harms profitability Haque (2014). Management of liquidity and solvency ratios are crucial for the performances and reputations of the organization. Optimum liquidity leads to proper management of assets and ensures maximum profitability Huda et al. (2022), Palamalai and Britto (2017).

Profit is the main target of any business organization. Profitability measures the company's success or failure position over a period of time Kieso et al. (2018). Profitability is the ability of a company to generate income (profit) relative to revenue, assets on balance sheet, operating costs, and owners' equity during a specific period Ali (2021), Mohapatra (2012), Robinson et al. (2009). The users of the profitability ratios are management owners, lenders, potential investors, bidders, etc., to ensure a fair return on investment Mohapatra (2012) . The financial performance of the company is measured by four factors: profitability, liquidity, growth, and share market performance Hamann and Schiemann (2021). Return on assets (ROA), return on equity (ROE), gross profit margin (GPM), and net profit margin (NPM) are the most used tools to analyse the profitability of the company. Among them, ROA and ROE are the most representative indicators that are used the best for the performance measurement of a company Kang and Na (2024).

The profitability of the natural gas distribution companies in Bangladesh is not satisfactory at all Asaduzzaman et al. (2015), Chowdhury et al. (2022), Sufi (2024), and their performances are ups and down, and no standard is maintained like Malaysian oil and gas companies Amacha and Dastane (2017), Uddinu and Khan(2015). The shares of the market, utilization of assets and customers, reducing wastage, cost, and accidents, and ensuring a safe environment greatly impacted the financial, managerial, and operational performances of gas companies in Bangladesh Huda et al. (2022), Tasmin and Muazu (2017). Without taking growth and development initiatives and satisfactory financial performance, companies will be winding up Ucuncuu et al. (2018) . So, the undertaken study is taken to measure the financial ratios' impact on performance and identify the financial performance of natural gas distribution companies in Bangladesh

The net working capital ratio, return on assets (ROA), operating profit margin, total asset turnover, and sales to fixed asset ratio are used to find out financial performance using samples from the finance sector of Bursa Malaysia Kertapati et al. (2004). The oil and gas company's financial performance fluctuated from time to time and the company's soundness was not satisfactory at all in India Sheik and Scott (2013) . The financial performances of the pharmaceutical companies in India were assessed by taking gross profit margin as the dependent variable and the four inventory turnover, receivables turnover, creditor's turnover, and assets turnover as independent variables, resulting in receivable turnover performance was found at a satisfactory level. Still, asset turnover had a significant negative impact on its profitability Parveen and Mohideen (2014) . The financial performance of LPG Gas Ltd was evaluated after and before the restriction of installation of the new pipeline that govt. restricted new connection of gas in households due to a gas shortage in the country. Liquidity, profitability, activity, leverage and market growth (EPS) ratios were used to determine operational and financial performance where sales trends are not up to the mark Asaduzzaman et al. (2015) . To evaluate the business activity, liquidity, profitability, and liability position of Slovakian public limited companies, turnover ratios, profitability ratios, liquidity ratios, and indebtedness

were used Baran et al. (2016) . To introduce a widely applicable financial performance model for travel agencies in China, four indicators, like profitability, assets operating ability, solvency, and development ability, are used as comprehensive financial performance measurement tools Fu et al. (2015) .

Financial performances were analyzed based on before the global crisis and after the global crisis. A research model was introduced in the combination of profitability ratios, liquidity ratios, market ratios, which found a significant difference between profitability, return on assets, return on equity, liquidity ratio, and quick ratio, and market Putrap et al. (2014) . The operational, marketing and financial performances of TGTDCL are measured based on five years of data by the growth rate of sales, gross profit, operating profit and net profit, profitability (ROA, ROE), leverage (debt ratio, debt-equity ratio, interest coverage ratio) and valuation (price-earnings ratio, EPS, NAVPS), and was found leverage, system loss, revenue collection periods fluctuations of exchange rate affected profit Amacha and Dastane (2017), Uddinu and Khan(2015).

A research study at Borsa Istanbul found that financial ratios, including net profit margin, current ratio, earnings per share, leverage, and firm size, directly impact a company's financial performance, with current ratio and firm size positively affecting performance, while leverage negatively impacted Erdogan et al. (2015) . The performance of the real estate investment company in Jordan was assessed in terms of profit, asset utilization, and financial stability of capital mix on the financial performance. Return on sales and ROE were used as dependent variables, whereas current, quick, operating ratios, turnover of inventory, receivable and debt-equity ratios were considered independent variables. A significant positive relationship was found between financial ratios and financial performance Ahmad and Shah (2020), Dalayeen (2016), Nataraja et al. (2018), Palamalai and Britto (2017). It was found that crude oil prices have a positive and significant impact on the accounting returns of the firms, where accounting performance is measured by ROA, ROE, and EPS of the oil and gas companies listed worldwide Darko and Kruger (2017) .

The Indonesian oil and gas industry's financial performance showed a good position during the five years based on financial ratios, despite a decline in production, with significant differences in the current ratio and return on equity DaryaNto and Nurfadilah (2018) . Sales growth and firms' leverage were reflected in return on assets (ROA) which measured the financial performance of the oil and gas company in Nigeria. The sales growth and leverage had a significant adverse effect on Return on Assets. Leverage position must be leveled at the optimum position to enhance sales, resulting in increasing the return on assets Asikhia et al. (2023), Onyekwelu et al. (2017). The impact of the lease on Nigerian oil and gas companies' financial performance was examined and showed no significant effect on short-term and long-term debt-equity ratios but reversed for total debt-equity ratios Abubakar (2020) .

A study on energy companies in Saudi Arabia found that short-term and long-term liquidity significantly impacts gross profit and revenue. Current assets positively impact revenue but negatively affect gross profit margin. Current liabilities positively impact revenue and gross profit in the long run. Debt and equity moderately affect revenue and gross profit Ali (2021) . The ROA, ROE, assets turnover ratio (ATR), and net profit were correlated, but the debt-equity ratio had no relation with net profit margin of Omani oil and gas companies. ROA, ROE, assets turnover Ratio (ATR), and debt-equity ratio had no significant impact on the net profit margin Ahmed et al. (2021).

Firm size was utilized as a control variable, and profitability was used as a dependent variable. The dividend payout ratio, dividend yield ratio, current ratio, and debt-equity ratio were used as independent variables. The relationship between dividend policy and the performance of the company had a significant effect on performance Kanakriyah (2020) . The net profit margin was selected as the dependent variable, and cost of waste management, health and safety costs, and environment remediation costs were taken as independent variables whereas company size and leverage were indicated as control variables to measure the effect of environment costs on profitability of listed oil and gas companies in Nigeria. The findings of the study opined that there was a significant positive relation between the profitability of the company with all its independent variables Oshiole et al. (2020). Four financial performance indicators: profit margin, profit growth rate, ROA/ROE, and EVA were analyzed and found that current ratio affected ROE and EVA, profit growth rate increased profit but decreased ROA and EVA, and company size positively impacted these indicators Tudose et al. (2022) .

The ownership had a significant positive relation with performance, but no relation exists with company size Alabdullah (2016) . The stakeholders of concerned companies should give freedom of their work to the internal auditors and audit committees to enhance profitability Ayodele et al. (2016) . A strong and significant relationship existed between sustainability practices and better financial performance Amacha and Dastane (2017) . The relationship between ESG performance, financial performance, and company market values in Chinese listed companies is that ESG performance enhances operational performance and market value, but doesn't significantly impact profitability or growth capacity Zhou et al. (2022). The rank of financial performance of the paper manufacturing companies in Turkey is measured by financial ratios for decision-making. Without taking growth and development initiatives and satisfactory financial performance, companies will be winding up Ucuncuu et al. (2018) .

Most of the research work under review was performed by applying financial and statistical tools and techniques like ratio analysis, ANOVA, Pair t-test, multiple regression model, Pearson correlation, and Robustness test.

1.1. OBJECTIVES OF THE STUDY

The main objective of the study is to measure the effect of financial ratios on the profitability performance of natural gas distribution companies in Bangladesh. To achieve the main objective, the following specific objectives will be performed:

1) To find out the financial ratios that impacts the profitability performance of natural gas distribution companies in Bangladesh.
2) To assess the impact of the relationship between the financial ratios and profitability performance of the natural gas distribution companies in Bangladesh
3) To identify the problem hindering the profitability performance of the natural gas distribution companies in Bangladesh
4) To provide suggestions and recommendations to enhance the profitability performance of the natural gas distribution companies in Bangladesh.

1.2. HYPOTHESES OF THE STUDY

H_0: There are no significant differences among the selected natural gas distribution companies in Bangladesh regarding each of the profitability ratios, liquidity ratios, activity and efficiency ratios, and solvency ratios.

H_0: There are no significant relations between financial ratios and profitability among the selected natural gas distribution companies in Bangladesh.

H_0: There is no significant relationship between age size and profitability.

1.3. DEFINE CONTROL VARIABLES

1) Company size

Company size represents the company's total assets Endri et al. (2020), Hasanuddin et al. (2021), Tudoset et al. (2022), and a large number of assets indicates a large company and influences performance. Company size, a positive significant relation exists with ROE or ROA Nguyen et al. (2020) . As a control variable Company size has a substantial impact on performance (ROE) Dinh and Pham (2020) . The firm size has a significant impact on profit growth Endri et al. (2020).

2) Age of the company

The age of the company means the number of years a company is established. Typically, cumulative retained earnings depend on the company's age, and funds may be used to invest in profitable sectors to increase profitability Bandyopadhyay (2006) .

2. METHODS AND METHODOLOGY OF THE STUDY

2.1. SELECTION OF SAMPLE COMPANY

The five companies that have been purposively specified as a sample out of six natural gas distribution companies to measure performance and its impact on profitability are as follows:

Table 1

Table 1 Selected Companies

Name of the company	Establishment Year	Size (total assets) in Core BDT
TGTDCL	1964	15,424.35
JGTDSL	1986	2,672.56
PGCL	2000	791
KGDCL	2010	3,007.21
SGCL	2009	744.93

Source: *Petrobangla (2021); TGTDCL= Titas Gas Transmission and Distribution Company Ltd.; JGTDSL= Jalalabad Gas Transmission and Distribution System Ltd.; PGCL=Pashchimanchal Gas Company Ltd.; (KGDCL)=Karnaphuli Gas Distribution Company Ltd.; Sundarban Gas Company Ltd.(SGCL)*

2.2. SELECTION OF VARIABLES

For the measurement confirmation of the study, as recommendation of the variables selection from the strong references, four profitability ratios are return on assets (ROA) Abubakar (2020), Alabdullah (2016), Asaduzzaman et al. (2015);

Ayodele et al. (2016), Baran et l. (2016), Darko and Kruger (2017), DaryaNto and Nurfadilah (2018), Fu et al. (2015), Ilham et al. (2022), Kertapati et al. (2004), Nataraja et al. (2018), Onyekwelu et al. (2017), Palamalai and Britto (2017), Putrap et al. (2014), Ucuncuu et al. (2018), Yusuf et al. (2018), Zhou et al. (2022), return on equity (ROE) Abubakar (2020), Asaduzzaman et al. (2015), Ayodele et al. (2016), Baran et l. (2016), Dalayeen (2016), Darko and Kruger (2017), DaryaNto and Nurfadilah (2018), Kertapati et al. (2004), Nataraja et al. (2018), Palamalai and Britto (2017), Putrap et al. (2014), Ucuncuu et al. (2018), Vibhakar et al. (2023), Yusuf et al. (2018) , net profit margin (NPM) Asaduzzaman et al. (2015), Ayodele et al. (2016), Enekwe et al. (2023), Erdogan et al. (2015), Kertapati et al. (2004), Oshiole et al. (2020), Palamalai and Britto (2017), Zhou et al. (2022), and gross profit margin Asaduzzaman et al. (2015), Baran et l. (2016),Dalayeen (2016), Fu et al. (2015), Kertapati et al. (2004), Parveen and Mohideen (2014), Putrap et al. (2014), Vibhakar et al. (2023) are taken as dependent variables, whereas current ratio Asaduzzaman et al. (2015), Dalayeen (2016), DaryaNto and Nurfadilah (2018), Erdogan et al. (2015), Fu et al. (2015), Kertapati et al. (2004) , Palamalai and Britto (2017), Putrap et al. (2014) , Ucuncuu et al. (2018), Vibhakar et al. (2023) , quick ratio Asaduzzaman et al. (2015) , Dalayeen (2016), Fu et al. (2015) , Kertapati et al. (2004) , Palamalai and Britto (2017) , Putrap et al. (2014) , working capital ratio Asaduzzaman et al. (2015) , Kertapati et al. (2004) , inventory turnover Asaduzzaman et al. (2015) , Baran et l. (2016) , Dalayeen (2016), DaryaNto and Nurfadilah (2018), Parveen and Mohideen (2014), Putrap et al. (2014), Vibhakar et al. (2023) , accounts receivable turnover Asaduzzaman et al. (2015), Baran et l. (2016), Dalayeen (2016), DaryaNto and Nurfadilah (2018), Fu et al. (2015), Kertapati et al. (2004), Parveen and Mohideen (2014), Vibhakar et al. (2023) , Accounts payable turnover Parveen and Mohideen (2014) , total assets turnover Asaduzzaman et al. (2015), Baran et l. (2016), DaryaNto and Nurfadilah (2018), Fu et al. (2015), Kertapati et al. (2004), Palamalai and Britto (2017), Parveen and Mohideen (2014), Vibhakar et al. (2023), Zhou et al. (2022) debt-equity ratio (Leverage) Asaduzzaman et al. (2015), Dalayeen (2016), Enekwe et al. (2023); Erdogan et al. (2015), Kertapati et al. (2004), Nataraja et al. (2018), Onyekwelu et al. (2017), Putrap et al. (2014), Ucuncuu et al. (2018), Zhou et al. (2022) are treated as independent variables. Moreover, company size Alabdullah (2016), Bananuka et al. (2022), Bandyopadhyay (2006), Bari et al. (2021), Enekwe et al. (2023), Erdogan et al. (2015), Nataraja et al. (2018), Zhou et al. (2022) and age of company Bandyopadhyay (2006) are considered as control variables.

Both financial data (ratios and size) and non-financial data (age of the company) of 10 years are considered. The data are collected from annual reports, audit reports of natural gas companies in Bangladesh, ministry of power, Bangladesh economic review, etc. ANOVA single factors, Pearson correlation, Rank techniques are applied to analysis financial performance with the help of SPSS version 23, and Ms.-excel.

Figure 1

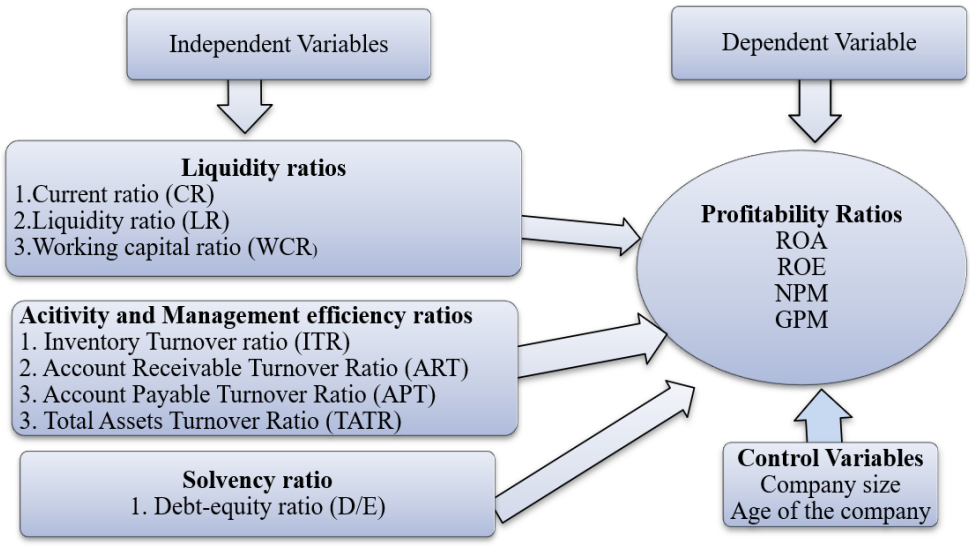

Figure 1 Financial Performance Measurement Model
Source Developed by researcher from Literature reviews

2.3. ANALYSIS AND INTERPRETATIONS OF DATA

Table 2

Table 2 Test of the Hypotheses of Financial Ratios

Particulars	Items	F-value	Decision	Particulars	Items	F-value	Decision
Profitability ratios	ROA	15.55	Rejected	Liquidity ratios	CR	3.02	Rejected
	ROE	8.89			LR	6.21	
	GPM	15.11			WCR	3.02	
	NPM	10.74		Solvency ratio	D/E	73.07	Rejected
Activity and efficiency ratios	ITR	8.91	Rejected	Activity and efficiency ratios	APT	5.43	Rejected
	ASP	36.73			PPP	6.94	
	ART	8.06			TATR	31.19	
	RCP	6.64					

Source: *The data compiled and collected from the annual reports and audit reports;, indicate consecutively statistically significant at the 5% and 1% levels, where table value =2.58. ASP=Average sales period, RCP= Receivable collection periods, PPP= Payable payments periods,*

Table 2 represents, at the 1% significance level, the null hypothesis [hypothesis -1] is rejected because the computed F-value of profitability ratio, i.e. ROA (15.55), ROE (8.89), GPM (15.11), and NPM (10.74) in the ANOVA single factor is higher than the table value (2.58). So, there is a significant difference in return on assets (ROA), return on equity (ROE), gross profit margin (GPM) and net profit margin (NPM) among the selected natural gas distribution companies and similar to those Palamalai and Britto (2017).

The computed F-value of the liquidity ratio (6.21) at a 1% significance level and the F value of CR (3.02) and WCR (3.02) at a 5% significance level is greater than the table value (2.58). So, the null hypotheses [hypotheses -01] are rejected. Thus, there is a significant difference in the current ratio (CR), liquidity ratio, and working capital ratio (WCR) among natural gas distribution companies. The position of the current ratio (CR), liquidity ratio, and working capital ratio indicates that the debt-paying ability of the selected gas distribution companies is weaker, inconsistent, and significantly different and similar to the result Ali (2021), Dalayeen (2016), Palamalai and Britto (2017).

At the 1% significance level, the null hypothesis [hypothesis 1)] is rejected because the computed F-value of ITR (8.91), ASP (36.73), ART (8.06), RCP (6.64), APT (5.43), PPP (6.94), and TATR (31.19) in the ANOVA single factor is higher than the table value (2.58). So, there is a significant difference in the inventory turnover ratio (ITR), the average sales period (Day), accounts receivable turnover (ART), the receivable collection periods (Days), accounts payable turnover (APT), payable payment periods and total assets turnover (TATR) among the selected natural gas distribution companies in Bangladesh, similar to the result (Palamalai and Britto (2017).

The results of the comparative study of the debt-equity for the selected natural gas distribution companies during the research period show that all the companies have low long-term paying ability or financial position except PGCL, which is similar to the result Chowdhury et al. (2022) . At the 1% significance level, the null hypothesis [hypothesis 1] is rejected because the computed F-value (73.07) in the ANOVA single factor is higher than the table value (2.58) So, there is a significant difference regarding the Debt-equity ratio (D/E), i.e. long-term payment ability among the selected natural gas distribution companies in Bangladesh is similar to the result Ali (2021), Palamalai and Britto (2017).

Table 3

Table 3 Summary and Rank of the Financial Performance of the Selected Natural Gas Distribution Companies in Bangladesh

Variables	TGTDCL		JGTDSL		PGCL		KGDCL		SGCL		Sample
	M	R	M	R	M	R	M	R	M	R	
ROA	0.04	4	0.05	3	0.08	2	0.14	1	0.04	4	0.07
ROE	0.08	5	0.14	4	0.16	3	0.32	1	0.21	2	0.18
GPM	0.06	5	0.12	4	0.15	3	0.24	1	0.21	2	0.16
NPM	0.05	5	0.06	4	0.07	3	0.15	1	0.09	2	0.08
CR	1.39	2	1.04	5	1.07	4	1.26	3	1.48	1	1.25
LR	1.04	3	0.57	5	0.84	4	1.20	2	1.23	1	0.98
WCR	0.39	2	0.04	5	0.07	4	0.26	3	0.48	1	0.25
ITR	75.93	2	65.87	3	24.37	5	48.04	4	150.45	1	72.93
ASP	5.36	2	6.28	3	15.44	5	7.88	4	3.84	1	7.76
ART	3.53	5	4.81	3	6.52	1	5.88	2	4.94	4	5.13
RCP	104.32	5	78.55	3	58.69	1	63.97	2	89.17	4	78.94
APT	2.11	4	3.53	3	8.88	1	4.16	2	2.36	5	4.21
PPP	347.08	4	108.88	3	71.76	1	91.82	2	475.12	5	218.93
TATR	1.00	3	0.90	4	1.14	1	1.06	2	0.39	5	0.90
D/E	1.30	3	1.93	4	1.08	1	1.23	2	5.42	5	2.19
Average Rank		3.60		3.73		2.60		2.13		2.87	26.26
Overall rank		4		5		2		1		3	

Source: *Data compiled and analyzed from secondary data, M= mean value, R= Rank.*

Table 3 represents the average value of the financial ratio and rank position among the selected natural gas distribution companies in Bangladesh under the review period. Based on average rank position, KGDCL stood in the first position, PGCL in the second position, SGCL in the third position, TGTDCL in the fourth position, and JGTDSL in the fifth position, respectively. TGTDCL and JGDCL need to improve their financial ratios to sustain in the market.

Table 4

Table 4 Summary of the Satisfactory and Dissatisfactory Position of Financial Performance of the Selected Natural Gas Distribution Companies in Bangladesh

Items	TGTDCL	JGTDSL	PGCL	KGDCL	SGCL
ROA	x	x	x	✓	x
ROE	x	x	✓	✓	✓
GPM	x	x	x	✓	✓
NPM	x	x	x	✓	✓
CR	x	x	x	x	x
LR	✓	x	x	✓	✓
WCR	x	x	x	x	x
ITR	✓	✓	x	✓	✓
ASP	✓	✓	x	✓	✓
ART	x	x	✓	✓	✓
RCP	x	✓	✓	✓	x
APT	x	x	✓	x	x
PPP	x	x	✓	x	x
TATR	✓	✓	✓	✓	x
D/E	✓	✓	✓	✓	x
Satisfied	5	5	7	11	7
Dissatisfied	10	10	8	4	8

Source: *Data compiled and analyzed from secondary data, where ✓= satisfactory performance, x=dissatisfactory performance;*

Table 4 represents the satisfactory and dissatisfactory levels of financial ratio positions among the selected natural gas distribution companies in Bangladesh under the review period. Based on 15 indicators of financial ratios, TGTDCL satisfied only five indicators (LR, ITR, ASP, and TART & D/E) and needs to improve in 10. JGTDSL satisfied only five indictors (ITR, ASP, RCP, TART & D/E), and need to improve in 10 indicators. PGCL satisfied only 7 indicators (ROE, ART, RCP, APT, PPP, TART & D/E), and need to improve in the rest 8 indicators, KGDCL satisfied only 11 indicators and needs to improve in the rest 4 indicators (CR, WCR, APT & PPP), and SGCL satisfied only 7 indicators (ROE, ART, RCP, APT, PPP, TART & D/E), and need to improve in rest 8 indicators. Based on the result of satisfaction, KGDCL stood in the 1st position, PGCL in the 2nd position, SGCL in the 3rd position, TGTDCL in the 4th position, and JGTDSL in the 5th position, respectively. TGTDCL and JGDCL need to improve their financial ratios to sustain in the market.

Table 5

Table 5 Pearson Correlation Between Receivable Collections Periods (RCP) With Profitability

NPM	GPM	ROE	ROA
-0.41	-0.24	-0.43	-0.46

Source: The data compiled and collected from the annual reports and audit reports;, indicates consecutively statistically significant at the 5% and 1% levels, where the number of observations N =50.

Table 5 indicates that the receivable collection period relates to NPM, GPM, ROE, and ROA are -0.41, -0.24, -0.43, and -0.46, respectively, with each of the profitability. This represents that receivable collection periods have a significant negative impact on NPM, ROE, and ROA, and the result is similar to Nguyen et al. (2020)) an insignificant negative impact on GPM. Collecting a period of receivables (lower) sooner indicates higher profitability and vice versa.

Table 6

Table 6 Pearson Correlation of the Profitability and Financial Ratios of Selected Gas Distribution Companies in Bangladesh

Variables	NPM	GPM	ROE	ROA	CR	LQ	WCR	ITR	ART	APT	TATR	D/E
NPM	1	0.81	0.90	0.87	-0.11	0.16	0.01	-0.05	0.42	0.05	-0.01	-0.06
GPM	0.81	1	0.65	0.58	0.01	0.25	0.12	-0.1	0.35	-0.01	-0.36	0.30
ROE	0.90	0.65	1	0.84	-0.19	0.05	-0.09	0.16	0.45	-0.02	0.14	-0.04
ROA	0.87	0.58	0.84	1	-0.2	0.07	-0.09	-0.25	0.45	0.21	0.44	-0.45
CR	-0.11	0.01	-0.19	-0.2	1	0.89	0.97	0.14	-0.39	0.02	-0.22	0.28
LQ	0.16	0.25	0.05	0.07	0.89	1	0.91	0.07	-0.25	0.02	-0.17	0.25
WCR	0.01	0.12	-0.09	-0.09	0.97	0.91	1	0.09	-0.33	0.01	-0.22	0.26
ITR	-0.05	-0.1	0.16	-0.25	0.14	0.07	0.09	1	-0.31	-0.40	-0.30	0.47
ART	0.42	0.35	0.45	0.45	-0.39	-0.25	-0.33	-0.31	1	0.31	0.13	-0.11
APT	0.05	-0.01	-0.02	0.21	0.02	0.02	0.01	-0.40	0.31	1	0.31	-0.24
TATR	-0.01	-0.36	0.14	0.44	-0.22	-0.17	-0.22	-0.30	0.13	0.31	1	-0.82
D/E	-0.06	0.30	-0.04	-0.45	0.28	0.25	0.26	0.47	-0.11	-0.24	-0.82	1

Source: *Data compiled from secondary data significant at 5% level (2-tailed), significant at 1% level (2-tailed); where the number of observations N =50.*

Table 6 shows the correlation of NPM, GPM, ROE, ROA, CR, LR, WCR, ITR, ART, TATR, and D/E where each of the items estimated by the degree of association 0.81 , 0.90 , 0.87 , -0.11, 0.16, 0.01, -0.05, 0.42 , 0.05, -0.01, and -0.06 respectively. Profitability ratio (ROA, ROE, and GPM) has a positive relation with net profit margin and is similar to the result of Palamalai and Britto (2017); liquidity ratio (CR) has an insignificant negative impact on profit that is similar to the result of Endri et al. (2020) , the efficiency ratio (ART) has a significant relation with profit that indicates receivable collection has a positive impact on profit, and the result is adverse to Nguyen et al. (2020) . However, others (ITR, TART) have insignificant hostile relations, contrary to Ahmed et al. (2021); Palamalai and Britto (2017). The Solvency ratio (D/E) has a negative insignificant relation with the net profit margin ratio. This result aligns with Ahmed et al. (2021); Tudoset et al. (2022). Total Assets turnover ratio (TATR) has an insignificant negative impact on net profit that is adverse to the result Ahmed et al. (2021) . TATR has a significant negative impact on GPM, similar to the result Parveen and Mohideen (2014) . ITR has an insignificant negative impact on GPM and is similar to the result Parveen and Mohideen (2014) . Thus, the null hypothesis is partially rejected [hypothesis- 02] and there is a

significant relationship between financial ratios and profitability of the selected natural gas distribution companies in Bangladesh.

Table 7

Table 7 Relationship Between Control Variable (Age, Size) With Profitability			
NPM	GPM	ROE	ROA
Age			
-0.59	-0.77	-0.54	-0.37
Size			
-0.45	-0.60	-0.42	-0.30

Source: *Data compiled from secondary data significant at 5% level (2-tailed), significant at 1% level (2-tailed). Where the number of observations N =50.*

Table 7 shows the relationship between age, size and profitability. Typically, cumulative retained earnings depend on the company's age, and funds may be used to invest in profitable sectors to increase profitability. It is noted from the above that the company's age has no relation to profitability. The age of the selected natural gas distribution companies in Bangladesh has a negative association with NPM, GPM, ROE, and ROA at -0.59 , -0.77 , -0.54 , and -0.37 at a 1% significance level. Endri et al. (2020) and Vatavu et al. (2018) stated that profitability was unrelated to the company's size. However, the size of the companies has a significant negative relation to profitability (NPM, GPM, ROE and ROA) of the gas distribution companies in Bangladesh, similar to the result of Dinh and Pham (2020), Imhanzenobei (2020) but contradictory with Kanakriyah (2020); Nguyen et al. (2021); Tudoset et al. (2022). The hypothesis is accepted [hypothesis 3], and it is concluded that the age and size of the company have a negative relation to profitability.

3. MAJOR FINDINGS OF THE STUDY

Based on the analysis and interpretations of financial data, the major findings are as follows:

1) There is a significant difference in ROA among the gas distribution companies in Bangladesh based on ROA with unsatisfactory variations.
2) The ROE positions except TGTDCL are satisfactory and within a desirable position. The return on equity (ROE) is more than the market rate.
3) KGDCL and SGCL have a strong and satisfactory position in GPM, while other companies like TGTDCL, JGTDSL, and PGCL have not achieved the expected standard.
4) The net profit margin of newly established companies is comparatively better than that of the old companies. Bad debts and system loss are higher in old companies, significantly affecting the net profit In the recent year 2022-23, the net profit rate decreased to 4%, and TGTDCL incurred a loss Islam (2023) . This is alarming for all the selected gas distribution companies in Bangladesh.
5) The study makes a comparison of selected natural gas distribution companies' current ratios (CR), revealing that none have sufficient short-term payment capabilities. Some companies, such as JGTDSL, PGCL, and KGDCL, have lower current assets than liabilities, indicating subpar current liabilities paying abilities. The maximum CR was recorded for KGDCL in 2020-2021, with SGCL having the highest ratio. The EGR shows a declining

trend for TGTDCL and SGCL, while KGDCL and PGCL show an increasing trend. The study concludes that the debt-paying ability of the selected companies is incapable, inconsistent, and significantly different from the results.

6) The overall liquidity ratio of the selected natural gas distribution companies is satisfactory and above the standard where the SGCL, TGTDCL and KGDCL have satisfied value and the other two companies (JGTDSL and PGCL) cannot meet the standard. These two companies face financial shortages and cannot pay their liabilities immediately. TGTDCL and SGCL's liquidity ratio is declining, indicating a signal of financial risk.
7) The working capital ratios of the selected gas distribution companies are abysmal and unsatisfactory. The position of the working capital ratio of JGTDSL and PGCL is so weak have to face a financial crisis to pay the liabilities.
8) The inventory management system of the selected gas distribution companies is satisfactory because the primary goods of natural gas supply are lower than the market demand. The inventory includes obsolete and old unused inventory that should be excluded to measure accurate inventory turnover.
9) The accounts receivable turnover of TGTDCL and JGTDSL is lower than the standard. Along with two companies, KGDCL are facing the problem of bad debts and is supported by Amacha and Dastane (2017), Uddinu and Khan(2015).
10) The accounts payable turnover ratio of all the selected gas distribution companies except PGCL is unsatisfactory. These distribution companies' natural gas suppliers are BGFCL, SGFCL, BAPEX, IOCs (Chevron, Tullow), and LNG suppliers. The EGR of the APT ratio showed an increasing trend for PGCL and KGDCL while decreasing trends for TGTDCL, SGCL, and JGTDSL. The payment periods for TGTDCL and SGCL are very high.
11) The total assets turnover ratio of selected natural gas distribution companies in Bangladesh, except SGCL, performs satisfactorily. The EGR showed an increasing trend, except for KGDCL.
12) The debt-equity ratio of all the companies is not satisfactory, which indicates that these companies depend on external liabilities. Especially SGCL and JGTDSL, the debt-equity ratio is much higher than the standard.
13) The correlation of the various financial ratios such as NPM, GPM, ROE, ROA, CR, LR, WCR, ITR, ART, TATR, and Debt-equity shows that profitability ratios (GPM, ROA, ROE) have a positive relationship with net profit margin, LR, WCR, APT have a positive but insignificant relationship with profit, and CR, ITR, TATR, and the Debt-equity ratio have a negative but insignificant relationship with profit.
14) The age and size of the selected gas distribution companies significantly negatively impact profit.
15) Based on the comprehensive liquidity management, newborn companies are in a better position in liquidity than the older ones except TGTDCL, and the result is similar to Huda et al. (2022) .
16) Annual reports present qualified auditors' opinions, which indicate transparency is not maintained at an acceptable level in gas distribution companies in Bangladesh.

4. CONCLUSION

The natural gas marketing companies are controlled and monitored by the direct supervision of the government in Bangladesh through Petrobangla. The selling prices of gas per unit, distribution margin, transmission margin, tariff etc. are also directly controlled by BERC (Bangladesh Energy Regulatory Commission). The financial performance of the Bangladeshi gas marketing companies is a downward trend. The overall performance of in these sectors is unsatisfactory. Profitability ratios and efficiency ratios have a significant correlation to financial performance, but liquidity ratios, leverage, and asset turnover negatively relate to profitability. The management should recruit skilled personnel and finance for the formulation of policy and implementation for the betterment of the company.

5. SUGGESTIONS AND RECOMMENDATIONS

The following guidelines and ideas should be implemented by the management of natural gas distribution firms in order to enhance their financial performance.

1) Management should take the initiative to increase the net profit or decrease the average assets to improve the ROA.
2) TGTDCL's management should take steps to increase the return, reduce expenditures, or increase the distribution margin of gas sales with the help of BERC.
3) The management should improve the gross profit margins of the distribution companies by re-fixing selling prices through BERC open discussion, decreasing transmission charges, increasing other operating income, reducing system loss, etc. The gross profit margins of TGTDCL and JGTDSL should also be improved to hold a sustainable position in the competitive market.
4) The management and policymakers of the gas distribution companies should take the initiative to reduce and control expenditures to improve the net profit ratio.
5) Management should take the necessary steps to reduce current liabilities or invest in current ones to improve debt-paying ability.
6) Management should take the initiative to improve the liquidity ratio of JGTDCL and PGCL to pay its current liabilities and increase investment in liquid assets. TGTDCL, KGCL, and SGCL management should also reduce liquid assets to be in an optimum position. The liquidity position of the selected gas companies may improve by paying liabilities, long-term financing, reducing expenses and costs, proper management of receivables and payables, etc.
7) Management should take necessary action to improve the working capital ratio. This ratio can be increased by increasing the cash reserve, reducing expenditures, improving accounts receivable turnover, forecasting, improving the operating cycle, etc.
8) Management should take the necessary steps to monitor inventory management. Actual closing inventory should be determined by revaluation, physical counting, excluding deed lock, and removing obsolete items, especially in TGTDCL. The gas company's inventory turnover may be improved by accurately forecasting the demand for inventory, eliminating old or obsolete stocks, selling excess inventory, etc. The inventory sales

period in PGCL should be improved. Otherwise, deed lock and obsolete items will increase over the period, impacting profit.

9) The management should take the necessary steps to collect the accounts receivable from customers to improve the accounts receivable turnover, especially government staff quarters, large industries, power, and other customers engaged for a long time to pay their liabilities. The accounts receivable turnover may be improved by improving customer relationships, creating an easy and quick payment system, automating software, providing incentives for advance payment, monitoring the accounts receivables, etc.
10) Management should invest current assets to repay suppliers' accounts payable, especially LNG suppliers, for a smooth gas supply. Improving cash flow and building good relationships with suppliers may improve accounts payable turnover. The payable payment periods should be minimized, and standards should be set to create good relationships with suppliers.
11) Management should take the initiative to increase sales volume or decrease the average total assets to improve the total assets turnover ratio, especially SGCL. The ratio may be improved by maintaining optimum assets, effective asset utilization, inventory management, supply chain improvement, customer satisfaction, employee motivation, technology advancement, etc.
12) The management of SGCL and JGTDSL should take the initiative to reduce liabilities or pay liabilities to reduce dependency on debt. The dependency on external debts may be reduced by paying its existing loans and liabilities, issuing new shares, and keeping more earnings and investments.
13) To improve liquidity position, the management should take necessary steps to modify the capital structure by issuing new shares, preference shares, debentures, long-term financing, investing in current assets, repaying current liabilities, etc.
14) Management must maintain to ensure transparency and give freedom for the work of the internal auditors and members of the audit committee to ensure the authenticity and reduce the financial corruption in all business operations that solve the qualified opinion of external auditors supported by Ayodele et al. (2016) .

6. LIMITATIONS OF THE STUDY

Tobin's Q is not used because, except for TGTDCL, all other companies are not enlisted in the stock market, and it is not possible to collect the market value of the share. Data presentation in the annual statements is not identical. The research result is based on secondary data, management's opinions, and executive opinions regarding performance not considered due to the time barriers. Further research may be conducted to find the pinpoint errors considering all the macro and micro economics variables.

CONFLICT OF INTERESTS

None.

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