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تقييم الأداء المالي لعمليات شركة دانة غاز في العراق دراسة تطبيقية باستخدام نموذج (VECM)

Evaluating the financial performance of Dana Gas Company operation in Iraq, an applied study using the VECM model

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الكلمات المفتاحية: التقييم، شركة دانة غاز، الأداء المالي، VECM، العراق

Keywords: Evaluation, Dana Gas Company, financial performance, VECM, Iraq

المستخلص

يعد الأداء المالي أمرًا بالغ الأهمية في اتخاذ القرارات الاستراتيجية ويستخدمه المديرون بشكل كبير لتحديد الخطوط العريضة لعملياتهم المستقبلية. في الشركات الكبيرة مثل شركات الطاقة، يعد تحليل الأداء المالي أمرًا بالغ الأهمية. و في هذا الصدد، تحاول الدراسة الحالية تقييم الأداء المالي لشركة دانة غاز في العراق من الربع الأول من عام 2007 إلى الربع الرابع من عام 2021 باستخدام نموذج تصحيح الخطأ المتجهي (VECM). حيث تساهم الدراسة في فهم أفضل للعلاقات بين المؤشرات المالية ونمو الإيرادات في قطاع الطاقة. أن نهج VECMيوفر أداة مفيدة لتقييم الأداء المالي، مما يسمح للشركات بتحديد مجالات التحسين واتخاذ قرارات تعتمد على البيانات. و يكشف التحليل عن علاقات طويلة الأمد مهمة بين المؤشرات المالية ونمو الإيرادات. الربحية والعائد على الأصول والسيولة مع نمو إيرادات الشركات. ومع ذلك، يُظهر العائد على حقوق الملكية علامة سلبية، في حين أن حجم الشركة غير مهم. النتائج لها آثار على صنع القرار الاستراتيجي وممارسات الإدارة المالية التي تهدف إلى تعزيز الأداء المالي لشركة دانة غاز وقدرتها على الصمود في بيئات السوق الديناميكية.

Abstract:

Financial performance is crucial in making strategic decisions and is highly used by managers to outline their future operations. In large-scale companies like energy companies analyzing financial performance is of utmost importance. In this regard, the present study attempts to evaluate the financial performance of DANA GAS Company in Iraq from 2007Q1 to 2021Q4 using a Vector Error Correction Model (VECM). The study contributes to a better understanding of the relationships between financial indicators and revenue growth in the energy sector. The VECM approach provides a useful tool for evaluating financial performance, allowing companies to identify areas for improvement and make data-driven decisions. The analysis reveals significant long-term relationships between financial indicators and revenue growth. Profitability, return on assets and liquidity with the company's revenue growth. However, the return on equity shows a negative sign, while the company size is insignificant. The findings have implications for strategic decision-making and financial management practices aimed at enhancing Dana Gas Company's financial performance and resilience in dynamic market environments.

Introduction:

Energy is the lifeblood of economic activities and a crucial pillar of modern

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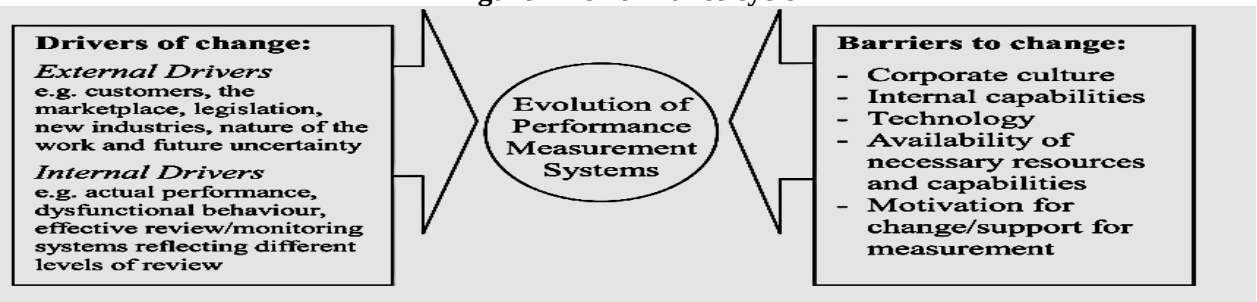
economies, because of their key role in national and international supply chains.
Meanwhile the financial performance of energy companies plays a crucial role in decision making and providing insights into the companies' health, financial robustness, and adaptability (Brigham & Houston, 2019). Usually, companies with large production scales, benefit from economies of scale and enjoy higher financial performances. It is mostly due to fixed costs, quantity discounts on the purchases grabbing larger supply orders and so on (Ali & Fatima, 2023). Therefore, assessing the financial performance of energy companies is of utmost importance. One of the well-known energy companies in the Middle East is the Dana Gas Company (DGC). In 2005 Dana Gas Company has established creative collaborations and made strategic investments in state-of-the-art technologies to foster advancement and broadening (Moyer et al., 2018). It is headquartered in Abu Dhabi. Also, it works and has assets inside the Kurdistan Region of Iraq (KRI) and Egypt. The company's participation in the Kurdistan Gas Project highlights its crucial contribution to promoting energy stability and financial progress in the area (Kurdistan Regional Government, 2020). Inside the KRI, Dana Gas is bolted in and has an interface in upstream, midstream and downstream works out, tallying the examination, era and planning of characteristic gas, and gas transmission. In Egypt, the primary operations revolve around the development and production of gas assets in the onshore Nile Delta, with a focus on 14 active fields. Upon the ratification of the concession consolidation, DGC anticipates being awarded new exploration acreage, with three exploration prospects ready for drilling. DGC is a financially prudent company that prioritizes profitable growth by efficiently managing its assets and maintaining a balance between capital expenditures and operational cash flow and collections. Its diverse portfolio of assets offers substantial potential for new developments and the discovery of new fields, in addition to the current production. The company holds 2P reserves surpassing 1 billion barrels of oil equivalent, and our average group production exceeds 60 thousand barrels of oil equivalent per day.

Problem of the Study: Taking into account all the logical reasons, this paper aims to contribute to the discourse on financial performance evaluation within the energy sector by examining DANA GAS Company's operations in Iraq. By synthesizing scholarly research, empirical evidence, and industry insights, this paper seeks to enrich our understanding of financial performance evaluation and its pivotal role in shaping the future trajectory of the energy sector in Iraq and beyond.

Theoretical Background: Organizational leadership relies heavily on performance measurement, which is a foundation for establishing clear objectives, aligning strategic initiatives, and monitoring progress towards desirable outcomes. Based on Wagner (2009), a company's performance is its ability to enhance the resources invested, genera profit, increase the value of the company and at the same time it is

the ability to secure future development. While companies attempt to produce output from input, financial performance anticipates the output of the company simultaneously (Zalai, 2010). Financial performance is the ability of the company to attain the specified impacts in quantifiable units. In other words, financial performance is the assessment of the financial-related condition of a company over a period, which incorporates the collection of cash, measured by a few measures of capital adequacy ratio, liquidity, leverage, solvency, and profitability. Financial performance alludes to a company's capacity to control and oversee its assets (IAI, 2016). In this regard, assessing how companies are performing is the key issue for managers and stakeholders (Asadi and Kiani Nejad, 2013). Assessing the performance of companies is challenging nowadays. Despite providing a clear vision about the company's financial status, with growing complexity of companies, financial measure is not sufficient to appropriately reflect their financial position. One of the critical shortfalls of financial measures is that they are incapable of showing competitive circumstances and strategies (Johanson & Kaplan. 1987). Hence, Kennerley and Neely (2002) developed a certain process within a determined framework. This process framework is called "the performance cycle" as illustrated in Figure 1 below. The starting point in the chart measurement, next comes performance evaluation. The third stage shows the performance improvement program which results in improved performance. Accordingly, to operate properly, companies and organization ought to evaluate their performance. Not surprisingly, financial performance stands out from other evaluation criteria (Safaei Ghadikalaei & Khalili, 2014). In this manner, the financial performance metrics have been used to a large extent due to features such as being quantitative, feasible,) objective, and tangible) .

Figure 1 Performance cycle



Source: Kennerly & Neely, 2002.

Such theoretical frameworks pave the way for understanding financial performance appraisal and its impact on organizational success. Financial performance metrics can be categorized into four primary categories: financial ratios, integrated accounting and market indicators, financial metrics, and economic indicators (Lee et al., 2018). Financial ratios, such as return on investment (ROI), debt-to-equity ratio, and gross profit margin, provide valuable insights into a company's financial well-being and its capacity to generate returns on capital invested (Brigham & Houston, 2016) By

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understanding financial metrics and their application organizations can optimize resource allocation, improve profitability, and drive sustainable growth.

Review of Literature: Financial analysis which is used to assess the financial status and performance of companies has received much attention in recent literature(Lee, 2014; Kubenka, 2016). However, the language measuring a company's performance is becoming increasingly important for its overall financial evaluation. In addition, the comments of Company management are important for a correct interpretation. Westerfield & Jordan (2003) highlight the importance of financial ratios in assessing managerial performance and evaluating a company's competitive advantage. Similarly, Daryanto & Nurfadilah(2018)emphasize the value of financial ratios in measuring and comparing a company's performance against industry averages. The evaluation of financial performance is a complex and multifaceted task that requires a nuanced understanding of various financial metrics and their applications. According to Ghosh & Ansari(2018), firm characteristics are defined as the representation of ethnic differences on board of diversity as the variation of social and cultural identities among people. Westerfield & Jordan(2003)highlight the importance of financial ratios in assessing managerial performance and evaluating a company's competitive advantage. Similarly, Daryanto & Nurfadilah(2018)emphasize the value of financial ratios in measuring and comparing a company's performance against industry averages. Hasan(2019)included diverse measures to define the economic efficiency and financial performance of organizations such as earnings per share, return on assets(ROA)return on equity(ROE)and return on capital. Zahedi(2017)employed a multi-faceted approach to evaluate the financial performance of chemical companies listed on the Tehran Stock Exchange, integrating financial ratios, value-based metrics, and advanced analytical techniques such as fuzzy AHP and TOPSIS. Hasiholan & Daryanto(2018)offered a meticulous appraisal of PT Perusahaan Gas Negara Tbk's financial health, leveraging a comprehensive battery of financial ratios validated through governmental imprimatur. Javadi et al(2018)examined the financial metrics used to evaluate the performance of Iranian gas distribution companies, using the Analytical Hierarchy Process(AHP)to rank the importance of capital structure, profitability, liquidity, and operational efficiency metrics. Al-Shammari et al(2019)undertook a granular examination of Iraqi oil enterprise financial performance, deploying sophisticated financial ratio analyses to unpack the influence of exogenous factors such as oil price dynamics and governmental policies. Shiarbahadori et al(2020)evaluated petrochemical companies' financial performance using grounded theory and interpretive structural modelling, delving into the underlying factors that drive fiscal outcomes. Other research confirmed the importance of ROA and ROE for investigating a firm’s financial performance. Aastvedt et al. (2021) assessed the effect

of green innovation on the financial performance of the US and European oil and gas sectors from 2010-2018. Using panel data methods, they came to the conclusion that innovation improves the financial performance of those companies. Dopierala et al. (2022) studied the financial performance of 38 renewable energy producers between 2011 and 2019 by using the panel data approach. Their results emphasized the importance of the size of the company and their assets on their performance. Ghaffarifard & The study demonstrates the value of methodological diversity in accurately capturing the complexities of financial performance. Olugbenga et al. (2022) investigated the interrelationship between firm-specific characteristics and financial performance in 12 Nigerian oil and gas sectors during 2015-2019. They revealed a negative relationship between the size and a positive relationship between leverage and financial performance. Anozie et al. (2023) investigated how the financial performance of oil and gas companies in Nigeria was affected by capital structure from 2011 to 2020. They applied ex-post facto methods and found that such energy companies should reduce their long-term debts and take more caution with their capital structure. Rojo-Suarez et al. (2024) explored the ramifications of environmental, social, and governance (ESG) imperatives on the financial performance of American oil and gas enterprises. Ali & Fatima (2023) traversed the contours of firm size dynamics vis-à-vis financial performance within the Indian oil and gas milieu. In conclusion, this review of literature highlights the significance of assessing the financial performance of companies as they are the key metrics for decision-making, especially in large-scale energy companies. Also, the literature shows a lack of research in energy specifically Gas companies in Iraq which this study aims to evaluate.

Research Hypothesis: In line with the related literature and theoretical background to assess the financial performance of DANA GAS Company hypotheses have been proposed:

1-Profitability positively affects the revenue growth of Dana Gas Company.
2-Return on equity positively affects the revenue growth of Dana Gas Company.
3-Return on assets positively affects the revenue growth of Dana Gas Company.
4-Liquidity positively affects the revenue growth of Dana Gas Company.

The hypotheses reflect the financial performance of companies and to test them the VECM model is employed.

Methodology and Data : This study evaluates the financial performance of Dana Gas Company in Iraq for 2007 to 2021. Since there were insufficient observations, all data were converted from annual to quarterly using Eviews 12. As a result, the study period spans from 2007Q1 to 2021Q4. The variables include revenue growth (rev) which indicates the growth of the companies, profitability (prof), return on equity (ROE), return on asset (ROA), liquidity (liq) as independent variables and

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the size (size) of the company as a controlling variable. The data is extracted from the Global Data website which has the key financial indicators of big companies. Vector Error Correction Model (VECM) is a powerful application of Vector Auto Regression Model (VAR). VECM is an extension of the VAR model where variables are assumed to be stationary. In other words, VECM is a cointegrated VAR of the order p - 1 on the differences of the variables, and an error-correction term derived from the known (estimated) cointegrating relationship. The VECM introduces the error terms into the VAR model. VECM methodology models the dynamic interdependence of variables that are cointegrated. The VECM is depicted as follows:

$$\mathbf{Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \cdots + A_p Y_{t-p} + U_t} \quad \textbf{(1)}$$

$$\mathbf{U_t = N(0, \delta)} \quad \textbf{(2)}$$

Where the vector elements Y_t and (K×1) represent the variables and their lagged counterparts. Across A_i and i=1, .., p, the matrices (K×K) denote the model coefficients, while the vector (K×1) captures the error terms associated with each equation which measure the speed of adjustment of variables to their long-term equilibrium (Andrei & Andrei, 2015).

Eq. 3 can be rewritten as follows to integrate the short-term adjustments with long-term equilibrium:

$$\mathbf{\Delta Y_t = \beta_1 \Delta Y_{t-1} + \beta_2 \Delta Y_{t-2} + \cdots + \beta_{p-1} \Delta Y_{t-p-1} + \pi Y_{t-p} + U_t} \quad (3)$$

$$\mathbf{\beta_1 = -(1 - A_1 - A_2 - \cdots - A_i)} \quad , \quad \mathbf{\pi = -(1 - A_1 - A_2 - \cdots - A_p)} \quad (4)$$

Where coefficients (α) indicate the adjustment mechanism towards long-term equilibrium and comprises the coefficient matrix (β). Also, the $\acute{\beta} Y_{t-p}$ is K vector columns and indicates the Error Correction Term (ECT) within a univariate framework ($U_t = Y_t - \beta X_t$). The VECM model is estimated by the Ordinary Least Squares (OLS) approach. In all econometric analyses, the classical prerequisites are assessed. First, the unit root tests are applied to define the stationarity of the variables. Then the optimal lag length is defined by the Akaike Information Criterion (AIC)or Schwarz Bayesian Criterion (SBC). In the end as Granger (1986) mentioned, to prevent spurious regression and identify shared trends among time series variables (Engle & Yoo 1987), the Johansen cointegration test is applied.

Results & Discussion: This section provides the descriptive statistics of variables the results of the prerequisites and the VECM model. Table 1. demonstrates the descriptive statistics of the analysis. The mean logarithmic value of revenue is 1.081 with the Std. Dev of 0.26, profitability equals 0.706 with the Std. Dev of 0.28 Similarly, the mean values of ROA, ROE, LIQ and SIZE are 0.699 0.702 1.72 and 8.08 respectively.

Table 1. Descriptive statistics

Variable	Mean	Max.	Min.	Std. Dev
REV	1.081	1.823	0.502	0.265
PROF	0.706	1.835	-0.152	0.288
ROA	0.699	0.857	0.603	0.036
ROE	0.702	0.881	0.590	0.042
LIQ	1.724	2.867	0.924	0.512
SIZE	8.084	8.274	7.767	0.134

Source: Authors' calculations.

The unit root test results indicate the non-stationarity of the series at the level and their stationary with the first difference.

Table 2. Unit root test results

	REV	PROF	ROA	ROE	LIQ	SIZE
ADF (0)	0.312	-0600	0.013	0.161	0009	0.080
	(0.772)	(0.452)	(0.682)	(0.727)	(0681)	(0.704)
ADF (1)	-2.061	-2.345	-1.917	-1.671	-2.851	-2.462
	(0.039)	(0.019)	(0.053)*	(0.089)*	(0.005)	(0.015)

Source: Authors' calculations. *Significant at 10%

The subsequent step in the chosen performance evaluation is determining the optimal threshold for the model. For this purpose, adjusted AIC, BIC, and Hannan-Quinn criteria are utilized. The results for the first-order to fifth-order thresholds are displayed in the table. The fifth threshold is employed as the optimal threshold.

Table 3. Lag-order selection

Lag	Logl	LR	FPE	AIC	SC	HQ
0	472.7786	NA	1.71e-15	-16.97377	-16.75478	-16.88908
1	921.6633	783.5080	5.21e-22	-31.98776	-30.45488	-31.39498
2	1039.668	180.2255	2.77e-23	-34.96975	-32.12299	-33.86888
3	1063.063	30.62605	4.95e-23	-34.51138	-30.35073	-32.90242
4	1085.554	24.53595	1.04e-22	-34.02016	-28.54561	-31.90311
5	1278.218	168.1428*	5.55e-25*	-39.71702*	-32.92858*	-37.09187*

Source: Authors' calculations. * Indicates lag order selected by the criterion

Table 4 presents the results of cointegration tests. The results assure the presence of a long-term cointegration among variables.

Table 4. Cointegration

Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Trace	6	5	5	6	5
Max-Eig	6	5	5	6	5

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.624873	202.5385	95.75366	0.0000
At most 1 *	0.581767	149.5919	69.81889	0.0000
At most 2 *	0.569120	102.5192	47.85613	0.0000
At most 3 *	0.478948	57.05522	29.79707	0.0000
At most 4 *	0.332655	21.85233	15.49471	0.0048
At most 5	0.000224	0.012114	3.841465	0.9122

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.624873	52.94654	40.07757	0.0011
At most 1 *	0.581767	47.07270	33.87687	0.0008
At most 2 *	0.569120	45.46402	27.58434	0.0001
At most 3 *	0.478948	35.20289	21.13162	0.0003
At most 4 *	0.332655	21.84021	14.26460	0.0027
At most 5	0.000224	0.012114	3.841465	0.9122

Source: Authors' calculations. * Denotes rejection of the hypothesis at the 0.05 level. **MacKinnon-Haug-Michelis (1999) p-values

Table 5. demonstrates the estimation results of VECM. The first row of the table demonstrates the long-run coefficients of the model. Results indicate that ROE has a statistically significant coefficient of -37.29, and PROF, ROA and LIQ have significant positive coefficients of 7.47, 98.09 and 0.47 respectively. This finding reflects the fact that in long-term any increase in return on equity of the DANA GAS Company reduces its revenue, while growth in profitability, return on assets and liquidity increases DANA GAS company's revenue. So, hypotheses 1, 3 and 4 are accepted. The second part of the table shows the adjustment coefficients of the variable toward the long-term equilibrium. The adjustment coefficients show the adaptation speed of the variables to ensure convergence. According to the results, the adjustment speeds of PROF, ROA and ROW are positive and are equal to 0.15, 0.19 and 0.02 respectively. The calculated coefficients suggest that PROF, ROA and ROE have 15%, 1.9% and 2% deviation from their long-term equilibrium which are corrected during each period. Moreover, LIQ and REV have negative speed adjustments of -0.67 and -0.26. The third part of the table demonstrates the short-term error correction pattern which shows the effect of past values on the current value of variables. Except for REV in the first 1 and ROA, ROE and LIQ in the fourth lag, others are insignificant demonstrating that short-term variations do not affect REV significantly.

Table 5. Estimation results of the VECM model

Lag	REV	PROF	ROA	ROE	LIQ	SIZE	C
Cointegrating Eq		7.466625	98.09164	-37.29519	0.474015	0.359736	-41.93048
		(1.31394)	(30.8535)	(18.6286)	(0.12796)	(0.43693)	
		[5.68261]	[3.17927]	[-2.00204]	[3.70431]	[0.82333]	
Error Correction	-0.258997	0.150042	0.019765	0.022669	-0.674900	0.064862	
	(0.20973)	(0.27871)	(0.03342)	(0.03972)	(0.33613)	(0.05622)	
	[-1.23489]	[0.53835]	[0.59140]	[0.57078]	[-2.00784]	[1.15366]	
Lag 1	1.173814	-3.980408	101.4836	-55.69606	-0.357175	-1.090794	
	(0.36690)	(4.62593)	(72.7678)	(33.8444)	(0.23558)	(2.05793)	
	[3.19930]	[-0.86046]	[1.39462]	[-1.64565]	[-1.51617]	[-0.53004]	
Lag 2	0.426352	0.867873	4.673384	-9.205060	-0.067726	-1.240965	
	(0.44463)	(3.94677)	(50.4231)	(22.9943)	(0.16477)	(2.48926)	
	[0.95889]	[0.21989]	[0.09268]	[-0.40032]	[-0.41104]	[-0.49853]	
Lag 3	0.360307	0.707409	3.013910	-7.298453	-0.045679	-0.793013	
	(0.44912)	(3.96383)	(50.9730)	(23.4293)	(0.16582)	(2.54695)	
	[0.80224]	[0.17847]	[0.05913]	[-0.31151]	[-0.27547]	[-0.31136]	
Lag 4	-0.618238	7.124823	134.5009	-71.23315	0.495929	4.405750	
	(0.44336)	(3.92647)	(51.2529)	(23.8012)	(0.16370)	(2.51988)	
	[-1.39442]	[1.81456]	[2.62426]	[-2.99284]	[3.02947]	[1.74840]	
Lag 5	-0.497912	7.291396	33.26824	22.33967	-0.147389	1.290724	
	(0.78011)	(10.2427)	(111.878)	(32.5585)	(0.27736)	(4.36744)	
	[-0.63826]	[0.71186]	[0.29736]	[0.68614]	[-0.53140]	[0.29553]	

Source: Authors' calculations. Standard errors in () & t-statistics in [ ]

Conclusion and policy implication

Due to the importance of financial performance for managers and decision-makers in defining a company's visions and strategies, this study examines the financial performance of Dana Gas Company in Iraq. The Vector Error Correction Model (VECM) is applied over the 2007Q1-2021Q4. The long-run results indicate that

profitability (PROF) is positively correlated with revenue growth. This result is in line with the findings of Sitohang & Siagian (2021). ROA and LIQ also present a positive relationship with the revenue growth of the company, similar to Tantra et al. (2022 and Rahayu (2018) the increase in return on assets raises the growth of the company. In other words, ROA provides an acceptable insight into investment opportunities since it shows the efficiency of the company in using its assets to make a profit. Therefore, the positive coefficient highlights the satisfactory job of the company in profit making in every investment. Gahyono et al. (2023), suggest that DANA GAS Company more liquidity levels boost the growth of the company and on-hand resources are appropriate to invest in growth opportunities. Similar to Gahyono et al. (2022), ROE negatively affects the financial performance of Dana Gas Company which might be to different reasons such as the market condition, the dividend polices or the high equity base. In summary, to operate more profitably, it can be suggested that the Dana Gas Company had better rebalance the profitability and ROE since maximizing ROE might outweigh the profitability and adversely affect the company's growth. Also, maintaining optimal liquidity levels supports revenue growth and utilizing assets to invest in new and cutting-edge technologies enhances performance.

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