

Integration of Balanced Scorecard and Analytical Hierarchy Process as a Method of Performance Measurement and Target Strategy Selection

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Abstract - This study evaluates the performance of PT. XYZ, a prominent ready-mix concrete company in Toba Regency, North Sumatra, Indonesia, from 2018 to 2022. Utilizing a descriptive and quantitative research approach, data were gathered through document analysis, questionnaires, and interviews. The findings reveal significant financial weaknesses, particularly in the total asset turnover, return on investment (ROI), and debt-to-asset ratios. However, the company demonstrates strong performance in customer satisfaction, internal business processes, and learning and growth dimensions. Employing the Balanced Scorecard (BSC) framework, this research assesses these four perspectives and highlights the critical importance of the learning and growth perspective for strategic development. Through the integration of the Analytical Hierarchy Process (AHP), the study identifies the enhancement of information systems as a key strategic goal. This approach not only provides a comprehensive evaluation of PT. XYZ performance over the five-year period but also offers targeted recommendations for future business development and sustainable growth. PT XYZ overall performance is rated as good based on the Balanced Scorecard, with most indicators showing positive results, and the development of an information system is identified as a top priority to support the company's learning and growth.

Keywords: Performance, Balanced Scorecard, Analytical Hierarchy Process

1. Introduction

The construction industry has experienced an increase in recent years. Based on the third quarter report of 2022 by the Central Bureau of Statistics (BPS), the construction industry experienced an increase of 4.72% quarterly (BPS, 2022). This is because many infrastructure developments require factories producing construction materials to support the National Long Term Development Plan program (RPJMN 2025-2045). One of the programs is the development of the Lake Toba National Tourism Destination. The existence of this program triggered the emergence of companies that produce concrete in the Lake Toba area.

PT XYZ is a company engaged in the production of concrete construction materials launched by the government and other private parties to support the Lake Toba National Tourism Strategic Area Program (KSPN). This company is a concrete producer in the Lake Toba area which triggers business competition so that companies are required to generate profits, provide the best service in the face of competition. Based on the information obtained from interviews with the company's administrative clerk, until now the company still uses conventional performance measurements. It can be concluded that this company measures performance only from a financial perspective and does not measure other important aspects such as from the perspective of customers, business process views and employee capabilities.

Conventionally, performance measurement based on financial ratio analysis is unable to measure intangible assets and intellectual property (Zuniawan et al., 2020). Measurement from the financial aspect is a narrow assessment because it looks at the amount of income so that it cannot produce the right strategy to survive in the competition. Sari et al. in Pika & Dharmadiaksa (2018) states that measurement based on financial aspects is useful for a short period of time because the high and low profits of the company in the long term are determined by customer satisfaction, employee capabilities, and resource utilization. In measuring performance, it is necessary to measure non-financial aspects such as customer satisfaction, product innovation, and productive human resources. Companies need performance measurement tools to find out how the company's success rate and in preparing strategies to face market competition with other concrete production companies (Zuniawan et al., 2020). Based on the problems above, proper performance measures are needed to encourage company performance both from financial and non-financial aspects. Currently there is an integrated performance measurement method so that performance measurement is not only assessed based on financial aspects but also from non-financial aspects and this method is the Balanced Scorecard.

PT XYZ has been facing significant challenges in accurately measuring and improving its

overall performance. Traditional performance evaluation methods, which focus primarily on financial metrics, have proven inadequate in capturing critical non-financial aspects such as customer satisfaction, internal processes, and learning and growth. This research will help to see an overview of the performance that has been carried out and produce a long-term strategy so that the company is able to compete with other similar industries. Thus, this research was conducted to measure company performance according to the Balanced Scorecard method and to determine priority strategic goals using the Analytical Hierarchy Process method.

Several previous studies have demonstrated the effectiveness of the Balanced Scorecard (BSC) in providing a comprehensive framework for measuring both financial and non-financial performance. Kaplan and Norton (1996), the creators of the BSC, highlighted that companies using the BSC could align their business activities with the organization's vision and strategy, leading to improved overall performance. Hermawan et al. (2020) & Fauzan et al. (2023) applied the BSC in a manufacturing company, showing that attention to financial, customer, internal process, and learning and growth perspectives provided a clearer view of performance and helped identify strategic goals aligned with long-term business objectives. Additionally, Saaty & Vargas (2012) showed the effectiveness of the Analytical Hierarchy Process (AHP) for prioritizing strategic goals by weighing the importance of each indicator based on expert judgment. These studies affirm the reliability of using BSC and AHP together, supporting their application in PT XYZ to enhance competitiveness and ensure sustainable growth.

1.1. Performance Measurement

Helfert on (Pardanawati et al., 2020) stated that Performance measurement is a way to understand and assess the overall condition of a company over a specific period, including how a company utilizes its resources and how its operational activities impact its achievements or outcomes. Performance measurement involves assessing results and work processes, as well as providing feedback and recommendations for improvement (Pandaleke et al., 2021). Based on this perspective, performance measurement is a systematic evaluation of an organization or company's effectiveness, aimed at obtaining insights into past performance over a specific period. The results guide necessary actions and strategic planning to achieve future targets. Performance measurement will later become a benchmark for companies from financial and non-financial aspects to evaluate the results.

The benefits of performance measurement according to Lynch and Cross in (Silalahi, 2019), namely:

1. Evaluating performance based on what customers want helps customers feel more connected to the

company and helps people in the organization understand what customers need to satisfy them.

2. Motivate employees to understand the work being done because it is part of the chain of internal customers and suppliers.
3. Reducing unnecessary actions that are considered as waste within the company.
4. Accelerating the learning process of the organization to develop a strategic goal that is usually unclear to become more concrete.
5. Build an agreement to make a change by rewarding the expected behavior.

1.2. Traditional Performance Measurement

The weaknesses of traditional performance measurement according to Yeremina (2022) are as follows:

1. Not focusing on the company's long-term interests and more oriented towards operational management and less towards strategic management.
2. No ability to measure intangible assets and intellectual property (HR).
3. Not able to fully talk about the company's past because it does not consider invisible assets and intellectual property and is unable to fully guide the company in a better direction.

1.3. Performance Measurement with Balanced Scorecard

According to Pandaleke et al. (2021), the Balanced Scorecard serves as a performance measurement and management tool to achieve the company's goals in both financial and non-financial aspects. According to Mulyadi in (Galib & Hidayat, 2018), the Balanced Scorecard has advantages in generating strategic plans due to the following four points:

1. Comprehensive
2. Coherent
3. Balanced
4. Measurable

1.4 Balanced Scorecard Perspectives

Robert Kaplan dan David Norton on (Astawa et al., 2020) propose that the Balanced Scorecard has four perspectives as follows:

1. Financial Perspective, aspects of performance measurement to provide insight into the goals and strategies of the company in improving its financial condition.
2. Customer Perspective, to find out where the company will compete and describe how the company looks in the eyes of customers.
3. Internal Business Process Perspective focuses on the internal processes of the organization and how those processes contribute to the success of the organization.
4. Learning and Growth Perspective, focuses on developing organizational human resources,

organizational culture, and internal organizational information systems.

1.5 Key Performance Indicators (KPI)

KPIs are a set of measurable indicators that provide information on how well and to what extent strategic goals have been achieved by an organization (Ghufroni & Kurniawan, 2022). According to Sukmana (2020), KPIs are used to track progress and identify areas for improvement to achieve performance enhancement. KPIs can be linked to an organization's strategy and integrated with performance measurement tools such as the Balanced Scorecard. KPIs are determined by defining the company's vision and mission as strategic goals within the four perspectives of the Balanced Scorecard. From these strategic goals, KPIs are derived as key indicators.

1.6 Analytical Hierarchy Process (AHP)

According to Damayanti & Fitriani (2023), the established strategic objectives and Key Performance Indicators (KPIs) need to undergo weighting to determine the prioritized strategic objectives for the company. The weighting method used is the Pairwise Comparison from the Analytical Hierarchy Process (AHP) method. AHP is a decision-making technique used to prioritize goals and strategies using a hierarchical structure by comparing and evaluating different options to determine the best course of action (Peryoga, 2018). According to Sharma and Bagwa in (Edison, 2016), AHP breaks down problem-solving into smaller parts within the hierarchy, aiding decision-making based on pairwise comparisons that indicate the strength of relationships between elements in the hierarchy.

2. Research Method

The research method used in this research is descriptive research with the nature of research is quantitative research. The data collection methods used include interviews, studying the company's history, conducting surveys through questionnaires, and observation. Once all the data is gathered, the

data is processed by measuring all the indicators from the four perspectives according to the Balanced Scorecard approach.

2.1 Balanced Scorecard Perspective

A. Financial perspective, four measurement ratios are used:

1) Liquidity Ratios

$$\text{Current ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}} \times 100\%$$

$$\text{Quick ratio} = \frac{\text{Current Assets} - \text{Inventories}}{\text{Current Liabilities}} \times 100\%$$

2) Activity Ratios

$$\text{Total Assets Turn Over} = \frac{\text{Total Sales}}{\text{Total Assets}} \times 100\%$$

$$\text{Inventory Turnover} = \frac{\text{Total Sales}}{\text{Inventories}} \times 100\%$$

3) Profitability Ratios

$$\text{Net Profit Margin} = \frac{\text{Net Profit}}{\text{Total Sales}} \times 100\%$$

$$\text{Return of Investment} = \frac{\text{Net Profit}}{\text{Total Assets}} \times 100\%$$

$$\text{Return of Equity} = \frac{\text{Net Profit}}{\text{Equity}} \times 100\%$$

4) Solvency Ratio

$$\text{Debt to Asset Ratio} = \frac{\text{Total Debt}}{\text{Total Assets}} \times 100\%$$

To determine whether a company's performance is good or bad from a financial perspective, a benchmark is needed to become a standard of measurement. The benchmarks for the assessment are listed in Table 1 as national industry standards.

Table 1. Financial Ratio Assessment Standards

Ratio	Indicators	Criteria			Sources
		Bad	Average	Good	
Liquidity	<i>Current ratio</i>	<200%	=200%	>200%	Kasmir in Simanullang (2020)
	<i>Quick ratio</i>	<150%	=150%	>150%	
	<i>Total Assets Turn Over</i>	<100%	=100%	>100%	
Activity	<i>Inventory Turnover</i>	<2000%	=2000%	>2000%	(Febryanti et al., 2021)
	<i>Net Profit Margin</i>	<20%	=20%	>20%	
Profitability	<i>Return of Investment</i>	<30%	=30%	>30%	(Febryanti et al., 2021)
	<i>Return of Equity</i>	<40%	=40%	>40%	

Ratio	Indicators	Criteria			Sources
		Bad	Average	Good	
Solvability	<i>Debt to Asset Ratio</i>	>35%	=35%	<35%	Kasmir in Simanullang (2020)

B. Customer perspective measurement based on customer satisfaction

$$\text{Customer Satisfaction} = \frac{\text{Total score of respondents' answers}}{\text{Number of respondents} \times \text{Number of questions}}$$

Customer satisfaction is tested using a questionnaire. Benchmarks for assessing customer satisfaction scores are listed in Table 2.

Table 2. Customer Satisfaction Criteria

Respondents Answer	Scale
Very Dissatisfied	1 - 1,79
Not Satisfied	1,8 – 2,59
Satisfied Enough	2,6 – 3,39
Satisfied	3,4 – 4,19
Very Satisfied	4,2 - 5

Source: Kaplan & Norton in (Nababan, 2022)

C. Internal business process perspective, three measurement indicators are used:

1) Innovation process

$$\text{Innovation Process} = \frac{\text{New Product}}{\text{Old Product}} \times 100\%$$

If during the evaluation period the company has made product innovations, it will be given a good score, because the company is able to adjust to market demand.

2) Operational process

$$\text{MCE} = \frac{\text{Processing Time}}{\text{Finishing Time}}$$

If the manufacturing cycle efficiency (MCE) value of a company is less than 1, it can be said that there are still those who do not add value to the product during the production process and if it is below 0.5 than half of the production process, be it inspection, production and other activities, is not value added (Fuada, 2020).

3) After-sales service

After-sales service is a responsibility service company to customers for the products/services offered.

$$\text{Defective Ratio} = \frac{\text{Devective Product}}{\text{Total Production}} \times 100\%$$

D. Learning and Growth perspective, there are two measurements:

1) Employee turnover rate

Employee turnover rate is a ratio that can be measures the percentage of employees who leave the company to the total number of employees owned at a certain period.

$$\text{Employee Turnover} = \frac{\text{Total Turnover}}{\text{Total Employees}} \times 100\%$$

2) Employee satisfaction

The employee satisfaction assessment aims to find out level of satisfaction by using a questionnaire.

$$\text{Employee Satisfaction} =$$

$$\frac{\text{Total score of respondents' answer}}{\text{Number of respondents} \times \text{Number of questions}}$$

Afterward, strategic goals for the company are determined based on the performance measurements and the translation of the company's vision and mission, categorized according to the four perspectives of the Balanced Scorecard. The determination of strategic goal measurement indicators aligns with the indicators of the four Balanced Scorecard perspectives as (KPIs). The four Balanced Scorecard perspectives, strategic goals, and KPIs are then assigned weights of importance by experts or stakeholders using the pairwise comparison method. After weighting, data processing is carried out using the (AHP) to determine which perspective the company should prioritize for business development.

2.2 Analytical Hierarchy Process (AHP)

AHP is one of the most widely used Multiple-Criteria Decision-Making (MCDM) methods because it can solve structured problems by making a series of pairwise comparisons to produce priority problems/decisions that are needed/need to be made (Edison, 2016). The value filled in the pairwise comparison matrix will show the value of the relative importance of one element to another by looking at the comparison factor. In general, the value assigned to each matrix cell is in the range 1 to 9.

Table 3. Comparison Value Scale

Interest Scale	Description
1	Element 1 and element 2 are equally important
3	Element 1 is slightly more important than element 2
5	Element 1 is more important than element 2
7	Element 1 is much more important than element 2
9	Element 1 is absolutely more important than element 2
2,4,6,8	Element 1 and element 2 have adjacent value considerations

Source: Saaty in (Simanullang, 2020)

To calculate the Consistency Ratio (CR) in the Analytic Hierarchy Process (AHP), follow these steps: First, create a pairwise comparison matrix by identifying the criteria and filling in values from 1 to 9, indicating the relative importance of each element. Next, compute the sum for each row and derive the priority vector by normalizing these sums. Multiply the original matrix by the priority vector to obtain a new vector, then calculate the maximum eigenvalue (λ_{max}) by averaging the results. Use this value to find the Consistency Index (CI), where n is the number of elements. Determine the Random Consistency Index (RI) from predefined tables based on n , and finally,

calculate the CR. A CR of 0.10 or less indicates consistency, while a CR greater than 0.10 suggests the need for reevaluation of the pairwise comparisons.

3. Result and Discussion

3.1. Balanced Scorecard Measurement Results

From the results of data processing, it can be obtained that PT XYZ's performance is in the good category. Of the 14 indicators calculated, there are 11 indicators in the good category and 3 indicators in the bad category as shown in Table 4.

Table 4. Result of Measurement

Perspective	Year					Average	Desc
	2018	2019	2020	2021	2022		
Financial Perspective							
1. Liquidity Ratios							
<i>a. Current ratio (%)</i>	511.85	600.28	561.66	829.27	999.90	700.59	Good
<i>b. Quick ratio (%)</i>	511.07	598.82	559.89	827.53	997.91	699.04	Good
2. Activity Ratios							
<i>a. Turn Assets Turnover (%)</i>	84.74	79.63	54.44	91.72	112.20	84.55	Bad
<i>b. Inventory Turnover (%)</i>	862444.22	527112.77	415370.64	549202.45	570485.19	584923.05	Good
3. Profitability Ratios							
<i>a. Net Profit Margins (%)</i>	23.78	30.35	24.52	32.44	29.51	28.12	Good
<i>b. Return On Investment (%)</i>	20.15	24.17	13.35	29.76	33.11	24.11	Bad
<i>c. Return On Equity (%)</i>	40.05	53.07	39.89	64.90	72.44	54.07	Good
4. Solvency Ratio							
<i>Debt to Asset Ratio (%)</i>	49.67	54.46	66.54	54.15	54.29	55.82	Bad
Customer Perspective							
Customer Satisfaction							
<i>a. Products and Services</i>			4.36				
<i>b. Corporate Image</i>			4.35			4.36	Good
<i>c. Relations with Customers</i>			4.36				
Internal Business Process Perspective							
1. Innovation Process	0	0	0	33	0	7	Good
2. Operation Process			0.83			0.83	Good
3. After Sales Service	0	0	0	0	0	0	Good
Growth and Learning Perspectives							
1. Employee Turnover Rate	3.03	6.06	6.45	5.88	5.41	5.37	Good
2. Employee Satisfaction							
<i>a. Employee Satisfaction Attributes</i>			3.81				
<i>b. Information System Capability Attributes</i>			3.79				Good
<i>c. Attributes of Motivation, Empowerment and Alignment</i>			3.85			3.82	

Source: Results of data processing by researchers

3.2. Formulation of Strategic Goals

The determination of strategic objectives is done by translating the company's vision and mission into the Balanced Scorecard perspective, which is then aligned with the results of the previous measurement evaluations. The resulting strategic objectives must be realistic, measurable, and time-bound. Here are the Vision and Mission of PT XYZ:

Vision:

To become a company that provides optimal services to customers and serves as a supplier of ready-mix concrete and precast concrete, supporting the development of infrastructure in Indonesia, particularly in the National Strategic Tourism Area (KSPN) of Lake Toba.

Mission:

- a. To provide optimal services to customers.
- b. To ensure credibility and reputation in the eyes of customers.
- c. To become a supplier of high-quality ready-mix and precast concrete.

- d. To strive for revenue growth.
- e. To expand into new marketing territories.

The description of the vision and mission that generates strategic objectives is then aligned with the four perspectives of the Balanced Scorecard. With the Balanced Scorecard, strategic objectives that serve as the company's long-term targets are achieved through continuous measurement and monitoring (Elisabeth, 2018). Strategic objectives with similar goals are consolidated into one strategic objective for each perspective. Strategic objectives that have been determined based on the four perspectives of the Balanced Scorecard must have measurement metrics. This measurement metric serves as a tool to measure the progress of strategic goals. Each defined strategic goal must have appropriate measurement metrics to monitor its achievement. These measurement metrics are referred to as Key Performance Indicators (KPI). The resulting strategic objectives dan KPIs can be seen in Table 5.

Tabel 5. Perspective, Strategy Objectives and KPIs

Perspective	Strategy Objectives	KPIs
Finance	Increase revenue	Net profit margin
	Increase asset utilization	Return on investment
	Improve cost efficiency	Total assets turnover Inventory turnover
Customer	Increase customer satisfaction	Customer satisfaction level
	Increase customer loyalty	Customer retention rate
	Increase market share	Market share
Internal Business Process	Increase the number of customers	Customer acquisition rate
	Improve service quality	After-sales service level
	Increase production effectiveness	The effectiveness of the production process
	Improve product quality	Product conformity level
	Increase product innovation	Product innovation rate

Source: Results of data processing by researchers

3.3 Calculation of Perspective Interest Weight, Strategic Targets and KPI

Table 6 show the calculation results using the Analytical Hierarchy Process (AHP) method. The

AHP method is utilized to evaluate and prioritize various perspectives, strategic objectives, and KPIs. These priorities are critical for the company's decision-making and strategic planning.

Tabel 6. Result of Perspective Interest Weight, Strategic Targets and KPI 2018 to 2022

Perspective	Weight	Strategy Objectives	Weight	KPIs	Weight
Finance	0.291	Increase revenue	0.621	Net profit margin	1
		Increase asset utilization	0.282	Return on Investment	1
		Improve cost efficiency	0.097	Total asset turnover Inventory turnover	0.875 0.125
Customer	0.104	Increase customer satisfaction	0.073	Customer satisfaction level	1
		Increase customer loyalty	0.187	Customer retention rate	1
		Increase market share	0.440	Market share	1
		Increase the number of customers	0.300	Customer acquisition rate	1
Internal Business Process		Improve service quality	0.085	After-sales service level	1
		Increase production effectiveness	0.561	The effectiveness of the production	1

Perspective	Weight	Strategy Objectives	Weight	KPIs	Weight
Learning and Growth	0.486	Guarantee product quality	0.189	process	1
				Product conformity level	
		Increase product innovation	0.165	Product innovation rate	1
				User satisfaction level	
		Information system development	0.481	Percentage of training employees	1
				Employee satisfaction level	
		Improving employee capabilities	0.283	User satisfaction level	1
				Improve the ability of the administrationsystem	
			0.077		1

Source: Results of data processing by researchers

Table 6 show the financial perspective of an organization's strategy, emphasizing the importance of financial objectives. With a weight of 0.291, this perspective signifies that 29.1% of the overall strategic focus is allocated to financial goals. Key strategy objectives include increasing revenue, enhancing asset utilization, and improving cost efficiency. Each objective is measured using specific Key Performance Indicators (KPIs), such as the net profit margin for revenue growth, return on investment for asset utilization, and total assets turnover and inventory turnover for cost efficiency. The weight assigned to each KPI reflects its significance in evaluating the organization's financial performance, helping to prioritize strategic efforts effectively. Similarly, the perspectives of Customer, Internal Business Process, and Learning and Growth also contribute to the overall strategic framework.

4.4. Discussion

Liquidity ratios include the current ratio and quick ratio. The current ratio from 2018 to 2022 has shown some improvement but remains poor, with a five-year average of 56.23%, which is significantly below the industry standard of 200%. In terms of activity ratios, there are two measured ratios: Total Assets Turnover ratio and inventory turnover. The five-year average of the Total Assets Turnover ratio is 59.93%, which is considered poor as it remains below the industry average of 200%. According to Anggraeni on (Puspitasari & Thoha, 2021), a high sales level will increase future sales and contribute to the long-term growth of the company. However, in the year 2020, the company experienced a decrease in sales. The inventory turnover ratio over the past five years at this company is categorized as excellent because the comparison between total sales and average inventory is significantly above the industry average, at 2000%.

Next is the profitability ratio. This ratio measures Net Profit Margin, Return on Investment, and Return on Equity. Based on Net Profit Margin and Return on Equity, PT XYZ is considered good as it has values above the industry average. However, in

terms of return on investment, the company is still considered poor in generating profits for investors. For Return od Investment, the company has a ratio that increases every year. According to (Sipayung & Hulu, 2022), a higher ROI indicates that the company's performance is improving because it is enhancing its ability to generate profits for shareholders from its investments.

From a customer perspective, the measurement indicator used is customer satisfaction. According to the measurement of customer satisfaction, PT XYZ has a very satisfactory performance. The processed customer questionnaire results indicate a score of 4.36 with a category of very satisfied. From the perspective of internal business processes, there are three measurement indicators: innovation process, operations process, and after-sales service. The innovation process in this company shows good performance as it has conducted product innovations according to market demand. Next is the operations process, where PT XYZ has good performance in operations as the Manufacturing Cycle Effectiveness is around 0.83, which is close to 1. In terms of measuring after-sales service performance, PT XYZ has never handled any product complaints. From the perspective of growth and learning, there are two measurements: employee turnover rate and employee satisfaction. The employee turnover rate at PT XYZ is considered good as the number of employees leaving each year does not increase. According to Shaw in (Harvida & Wijaya, 2020), companies with high employee turnover ratios tend to cause other employees to leave the company as well. To decrease this ratio, the company needs to reduce the number of employees leaving by creating a comfortable working environment to ensure employees stay for a longer period.

After reviewing the performance assessment, the company formulates strategic objectives and KPIs for the development and improvement of company performance. The company considers prioritizing strategic objectives. Using the AHP method, it is determined that the

priority strategic objective is the Development of Information Systems.

4. Conclusion

This study evaluated PT XYZ's performance using the Balanced Scorecard framework across four perspectives: financial, customer, internal business processes, and learning and growth. The overall performance is categorized as good, with 11 out of 14 indicators rated positively. Notably, financial indicators like current ratio and net profit margin performed well, while total asset turnover and return on investment were rated poorly. Customer satisfaction with services and products was high, and internal processes showed good performance in innovation and after-sales service. The learning and growth perspective also indicated positive employee turnover rates and satisfaction. The analysis led to the identification of 15 strategic objectives and 16 KPIs, with the learning and growth perspective deemed the most critical, focusing on developing an information system for performance monitoring.

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