

Performance measurement using balance scorecard leading to strategy formulation: A case study in water company

Milana^{1*}, Eri Wirdianto², Alexie Herryandie Bronto Adi²

¹ Department of Automotive, Faculty of Engineering, Universitas Negeri Padang
Jl. Prof. Dr. Hamka Kampus UNP, Air Tawar Padang, Indonesia-25131

² Department of Industrial Engineering, Faculty of Engineering, Universitas Andalas
Kampus Limau Manis, Padang, West Sumatra-25175

*Corresponding author: milana@ft.unp.ac.id

Doi : <https://doi.org/10.24036/invotek.v21i3.929>

This work is licensed under a Creative Commons Attribution 4.0 International License



Abstract

Organization goals could be achieved by translating vision and mission into strategy. The strategy should be carefully formulated to direct the operation plans to work in harmony to achieve the goal. This research aims to show how the strategy is formulated based on the performance measurement result. The performance indicators are generated using the Balanced Scorecard approach with its four perspectives; financial, customer, internal business process, and learning and growth. Once these indicators and their benchmarks are defined, performance measurement is carried out. The performance measurement result is then input into a Strength-Weakness-Opportunity-Threat (SWOT) matrix. This approach proved that it could help the company review its existing strategy achievements and competitive position. Furthermore, the SWOT analysis proposes some potential actions taken by the company, which fall on Offensive, Defensive, Adjust, and Survive strategies.

Keywords: Performance Measurement System, Strategy Formulation, Balanced Scorecard, SWOT Analysis

1. Introduction

The success of a company is determined by how well the company satisfies its customers [1]. By taking advantage of the economic circumstance, the company gains profit by increasing process efficiency and product quality [2]. To ensure such operation process and product quality reach the expected performance, the company must determine the performance standards. Afterward, an integrated performance measurement needs to be conducted to formulate strategies to achieve the company's vision and mission. The issue of performance measurement in the context of strategy formulation has been widely discussed in different forms and objectives [3]. Some researches focused on developing an approach to support performance measurement [4-6]. In contrast, some others worked on a survey to determine the contribution of specific indicators to organizational performance [7, 8], to name but a few.

Performance Measurement System (PMS) is intended to tell the people in the company what they are doing and how their works contribute to the overall system. U.S. General Accounting Office (GAO) in Performance Measurement and Evaluation (GAO-11-646SP) highlighted performance measurement on two main activities, which are monitoring and reporting of pre-established goals of a particular element of the organization [9]. Therefore, performance should be connected to the organizational strategic plan [10]. A holistic PMS could be achieved by considering all critical dimensions representing business performance. It means that the performance measurement could highlight the important area of business, while not too many criteria carrying in, but adequate to represent the company's circumstance. Among many performance measurement methods developed recently [11-14], the Balanced Scorecard (BSC) approach is considered to meet this requirement, emphasizing four primary areas: financial, customer, internal business process, and learning and growth. The result of performance

measurement based on the BSC approach is then carried out to identify the internal position of strength and weakness. In addition, the company needs to consider external circumstances to tackle the threat and seize the opportunity. This analysis is conducted by mapping them into a SWOT matrix and proposing a relevant strategy that could be executed. The case study is conducted in a government-owned water company that considers both public-service oriented and profit-oriented. Therefore, it is vital to put internal as well as external factors into account. For this reason, SWOT analysis is useful to formulate the strategy. Previous researches of performance measurement using SWOT analysis have proven that SWOT analysis could be deployed to sharpen strategy formulation [15, 16]. However, this research is novel since it combined the Balanced Scorecard approach with SWOT analysis to define Key Performance Indicators (KPIs) for PMS towards strategy formulation, particularly in a water company.

In light of the above explanation, performance measurement on strategy formulation is unavoidable in any business organisation. Company X is a government-owned water company that provides public services through the piped water supply system. This company has the challenge to provide water which is considered the ultimate but essential requirement of life. As a government company, it must play as public service and hold economic principles to raise the profit. Company X has the vision to provide excellent drinking water service to the community. Meanwhile, the mission is to create a healthy, independent, and professional regional water company that can provide the best service in quantity, quality, and continuity and contributes to the regional income. Furthermore, this vision and mission are translated into goals and then into strategies. To achieve performance standards that align with strategic objectives, the company needs to assess its current performance.

2. Method

This research has two main steps to reach the aim, which are measuring performance and formulation strategy. It is started by determining the KPIs to measure performance using four BSC perspectives, identifying data requirements for each perspective, collecting data, verifying data, and then deploying the data to get the conclusion.

2.1 Balanced Scorecard Approach for Performance Measurement

In this research, the BSC’s four perspectives are deployed to identify the KPIs of the water company. Since BSC works as a performance measurement tool as well as a strategic management system, it could describe the performance and articulate it to design future strategies to achieve the business goal [14, 17]. The integration of the BSC approach to measure performance is depicted in Figure 1.

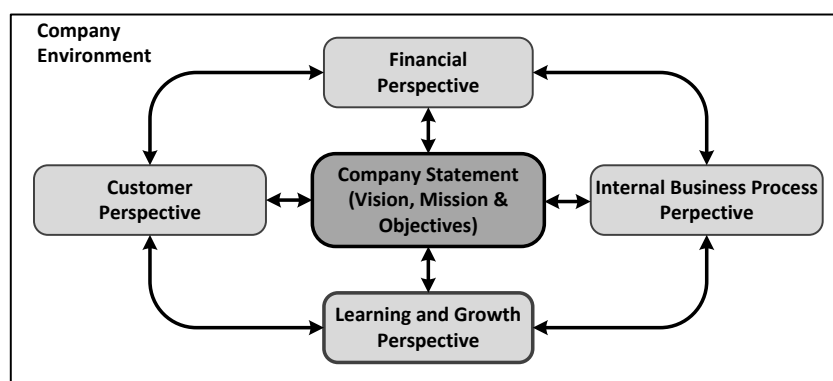


Figure 1. BSC approach for formulating strategy [18]

Figure 1 shows how external as well as internal aspects influence the company’s performance. External aspects are determined by the company environment, such as community behavior, government policy, and global issue. Meanwhile, the internal aspects of the company are represented by some primary perspectives, which build the overall system. BSC suggests four perspectives that connect each other. These perspectives contribute to determining the required KPIs to measure the company’s performance. It balances financial perspective assessment with non-financial perspectives. The financial

perspective is intended to assess the company’s financial condition to know its circumstances against standard criteria and the possibility of future improvement. Customer perspective is represented by customer satisfaction as one of the company's critical goals in the business. It could only be achieved when the product or service meet or exceed customer expectations [19]. The internal business process perspective is highlighted to ensure that the company can deliver the value proposition to the customer and attain a satisfying financial return for the shareholders [18]. The indicators on this perspective refer to all efforts made to improve the operational process. The learning and growth perspective is the backbone for the other three perspectives to pursue improvements, especially for the employees. Therefore, the company has to support employees to fulfill their professional, personal, and social needs [20].

2.1.1 Data Collection

Financial performance is measured through company financial ratios. The variables to calculate financial ratios are taken from the financial statement. There are two primary documents used for this need, which are the Balance Sheet and Income Statement. The balance sheet indicates the financial condition of the company at a particular moment. At the same time, Income Statement is a financial statement that shows the flow of transactions over time [21]. The performance indicator used from the customer perspective is service coverage. It shows the percentage of the population that Company X. has served. From the internal business process perspective, the critical indicators measured are installation productivity and water loss. The installation productivity is expected to increase, while the water loss is expected to decrease. The last one is the learning and growth perspective, which is focused on the employee. The available data on this perspective is Employee to 1000 Customer ratio. It indicates the ability of Company X to serve its customer on different types of service.

The benchmarks are decided through the discussion with the managers and the direction board. These could be generated from either the previous year's achievement or good practices from other similar companies. In this research, two perspectives involving human, customer and employee, are also assessed through satisfaction surveys. Each survey is held by distributing a questionnaire to some groups of samples which represent the population. The questionnaire encompasses two sets of questions about the current and expected conditions.

2.1.2 Customer Satisfaction Survey

In the water company, water is delivered with some services included. Thus, besides ensuring that the water is available as expected, the company needs to ensure that the service provided also meets customer expectations. The dimensions of service quality are presented in Figure 2.



Figure 2. Dimensions of service quality [22]

Since service is intangible and does not result in the product's ownership [23], customer satisfaction on service provided is maintained on 10 dimensions of service quality, as shown in Figure 2. The survey is conducted to assess all departments appointed to serve the customer in different areas. The sample taken for assessing customer satisfaction is decided by using different sampling methods relevant to the population characteristics, as shown in Table 1.

Table 1 Sample distribution for customer population

No.	Type of Customer Based on Water Treatment	Sample Method
1	Complete Treatment	Fixed
2	Semi-Complete Treatment	Randomized
3	Incomplete Treatment	Randomized
4	Artesian Well (No Treatment)	Randomized

From Table 1, there is only one complete treatment water source available, so it is chosen automatically. Meanwhile, the other water sources have more than one service area, so each water source sample is chosen randomly.

2.1.3 Employee Satisfaction Survey

According to the learning and growth perspective, employee satisfaction represents the organization's performance. The critical aspects of employee satisfaction are shown in Figure 3.



Figure 3 Aspects influencing employee satisfaction [23]

From Figure 3, there are at least four aspects that the company should take into account to satisfy its employees: 1) Psychological aspect, related to mental health, 2) Social aspect, related to social interaction, 3) Physical aspect, related to work environment dan employee physical condition, and 4) Financial aspect, related to assurance and welfare. Once the company can fulfill their personal needs and satisfy them, they will put passion, commitment, and discretion into their job.

The sample for the employee satisfaction survey is decided by using different sampling methods relevant to the population characteristics, as shown in Table 2.

Table 2 Sample distribution for the employee population

No.	Employee Position	Sample Method
1	Directors	Fixed
2	Research & Development Department	Fixed
3	Internal Auditor Unit	Fixed
4	Customer Department	Stratified Random Sampling
5	Production Department	Stratified Random Sampling
6	General Department	Simple Random Sampling
7	Financial Department	Simple Random Sampling
8	Distribution Department	Simple Random Sampling
9	Planning Department	Stratified Random Sampling
10	Branch Leader	Stratified Random Sampling

For the departments with a few members, the total sampling is taken. Meanwhile, conditionally, for the departments with many members, the sample is decided by using either simple random sampling or stratified random sampling methods. To ensure that the questionnaire is valid to be used in this research, several tests are carried out: the validity test, reliability test, and sufficiency data test. From all tests, it can be concluded that both the questionnaires for customers and employees are valid, and the data could be used in the research to derive the conclusion and take the decision.

2.2 SWOT Analysis for Strategy Formulation

Strategy formulation refers to the company statement (vision, mission, and objectives). Thus, the strategy must be developed by considering the holistic conditions influencing the business [24]. SWOT stands for Strength, Weakness, Opportunity, and Threat. A SWOT analysis is the identification of various factors systematically to formulate a company's strategy. It compares external (opportunities and threats) with internal (strengths and weakness) factors. This analysis aims to maximize strength and opportunity while simultaneously minimize weakness and threat. This method is widely used and acceptable to map the overall situation faced by the company to define its potential plan. The matrix of SWOT is depicted in Figure 4.

		Internal Factors	
		Strength	Weakness
External Factors	Opportunity	Offensive (Strength vs Opportunity) Create strategy which deploy the strength and seize the opportunity	Defensive (Weakness vs Opportunity) Create strategy which minimise the weakness and seize the opportunity
	Threat	Adjust (Strength vs Threat) Create strategy which deploy the strength and overcome the threat	Survive (Weakness vs Threat) Create strategy which minimise the weakness and overcome the threat

Figure 4 Matrix of internal and external factors in SWOT analysis [25]

Figure 4 shows how internal and external factors are analyzed in pairs to generate rational strategy recommendations. When the strength meets the opportunity, the recommendations correspond to offensive strategy. On another extreme condition, when the weakness meets the threat, the company must consider survival strategy as the realistic option.

3. Results and Discussion

The data are compiled, calculated, and used together to figure out the current performance of Company X. The recapitulations of the customer satisfaction survey and employee satisfaction survey as the primary data are presented in Table 3 and Table 4.

Table 3. Recapitulation of the customer satisfaction survey

KPIs	Expectation (E)		Reality (R)		Difference (R – E)	
	Score	%	Score	%	Score	%
Water supply	4,75	95,0	4,13	82,6	-0,87	-17,4
General service	4,36	87,2	3,46	69,2	-0,90	-20,6
Registration service	4,61	92,2	3,73	74,7	-0,88	-19,0
Installation service	4,54	90,8	3,87	77,4	-0,67	-14,7
Bill payment service	4,38	87,6	4,12	82,4	-0,23	-5,9
Debt payment service	4,57	91,3	3,66	73,2	-0,91	-19,9
Complain service	4,65	93,1	3,78	75,5	-0,88	-18,9
Average	4,59	91,7	3,82	76,4	-0,77	-16,6

Table 4. Recapitulation of the employee satisfaction survey

KPIs	Expectation (E)		Reality (R)		Difference (R – E)	
	Score	%	Score	%	Score	%
Psychology	4,04	80,8	3,52	70,5	-0,52	-12,8
Social	4,39	87,9	3,86	77,1	-0,54	-12,2
Physical	4,28	85,5	3,69	73,8	-0,59	-13,7
Financial	4,30	86,1	3,39	67,8	-0,91	-21,3
Average	4,25	85,1	3,61	72,3	0,64	15,0

Both surveys show that the expectations of satisfaction level are higher than the reality. The difference between these levels is then used to indicate the company's performance. From Table 3 and Table 4, it can be seen that the level of the gap in all parts is negative. That means that the expected performance is higher than the current performance. On the customer satisfaction survey, the most significant gap between the expectation and reality performance is general service, while the smallest gap is in bill payment service. However, registration, debt payment, and complaint services indicate high gaps between current and pre-requisites performance. On the employee satisfaction survey, it is found that the company has to put more attention on the financial aspect to increase employee satisfaction. However, the rest three aspects show a pretty similar proportion of gaps towards their expectation of satisfaction. Finally, all data obtained from primary and secondary sources are compiled to see the overall performance of Company X towards the benchmarks. The recapitulation of the performance measurement of Company X is shown in Table 5.

Table 5 Recapitulation of performance measurement of Company X

No.	Key Performance Indicator (KPI)	Benchmark	Actual	Remarks
FINANCIAL PERSPECTIVE				
1	Asset Turnover Ratio (Efficiency Ratio)	4.93	5.58	Good performance
2	Net Profit Margin Ratio (Profitability Ratio)	9.44	10.04	Good performance
3	Current Ratio (Liquidity Ratio)	0.19	0.17	Below expectation
4	Debt Equity Ratio (Leverage Ratio)	0.74	0.76	Below expectation
CUSTOMER PERSPECTIVE				
1	Customer Satisfaction (Survey)	91.7%	76.4%	Below expectation
2	Service Coverage	59%	60%	Good performance
INTERNAL BUSINESS PROCESS PERSPECTIVE				
1	Installation Productivity	76,2%	74,7%	Below expectation
2	Water Loss	30,7%	30,3%	Good performance
LEARNING AND GROWTH PERSPECTIVE				
1	Employee Satisfaction (Survey)	85.1%	72.3%	Below expectation
2	Employee to 1000 Customer Ratio	6,25	5,99	Good performance

Overall, the performance of Company X on each perspective of BSC was balanced. There are good and bad performances on each of them. Since the benchmark indicates the company's target in that year, the performance above the benchmark is categorized as Strength. Otherwise, the performance below the benchmark is categorized as Weakness. Based on the result obtained from measuring the performance of Company X, the SWOT matrix can be built by considering external aspects. The remarks in Table 5 explain whether the particular indicator is classified as Strength or Weakness. The next step is mapping the internal and external indicators to the SWOT matrix.

The formulation of strategies can be done by analyzing the Strength, Weaknesses, Opportunity, and Threat of Company X. This process is managed through discussion sessions with the management team. The performance measurement results are used as input in identifying the strength and weaknesses of Company X. Meanwhile, the information of external factors is acquired from the management team and other resources to figure out the opportunity and threats of this company. The strategies could be generated from the pair-wise combination of the SWOT matrix, which falls into four formulas: Offensive Strategy, Defensive Strategy, Adjust Strategy and Survive Strategy. The SWOT matrix of Company X is presented in Figure 5.

	Strength	Weakness
	1. Experience as water company for ± 30 years 2. Experienced employees 3. Employee to Customer Ratio is good 4. Holding exclusive right to process the drinking water from natural sources 5. Service coverage increased 6. Water loss decreased 7. Efficiency ratio is good 8. Profitability ratio is good	1. Customer satisfaction is lower than expectation 2. Employee satisfaction is lower than expectation 3. High cost of renewing installation 4. Installation productivity is low 5. Current ratio is not good 6. Debt equity ratio is not good
Opportunity	Offensive (Strength vs Opportunity)	Defensive (Weakness vs Opportunity)
1. The growth of population 2. The growth of income 3. Number of waiting list increased 4. Potential unprocessed water sources 5. Joint venture with other companies	(S1,S2,S6,O1,O3): Increase the growth of customers with current installation network (S3,S5,S7,O2,O4): Build new installation on unprocessed water sources (S4,S6,O1,O3): Develop new installation in the extended area (S4,S6,S7,O4,O5): Develop a diversification of business unit, such as	(W1,O1,O2): Improve employee skill through relevant trainings (W3,W4,O3,O4): Develop new installation within operational area (W2,O1,O2): Strengthen the role of HRM to facilitate employees' needs
Threat	Adjust (Strength vs Threat)	Survive (Weakness vs Threat)
1. The increase of electrical tariff 2. The increase of fuel price 3. Ground water taxes 4. Implementation of customer protection policy	(S1,T1,T2,T3): Optimise the resources utilisation and increase the operational efficiency (S1,S2,S3,T4): Improve the operational procedures to serve the customer better (S7,S8,T1,T2,T3): Adjust the service rates	(W1,W5,W6,T1,T2): Develop a network with relevant institution to reduce water loss (W4,T4): Prepare emergency water tank to fulfil water deficiency on certain areas (W3,W4,T1,T2): Maintain current installation to increase productivity

Figure 5. Matrix of SWOT analysis of Company X

As the feedback of PMS, these recommendations are eventually passed to the direction boards to help them map the current performance. It also could help them to create the prioritized improvement and strategic plan for the upcoming year.

4. Conclusion

The development of PMS by using the BSC approach and SWOT analysis to formulate strategy has figured out the current situation of Company X from both internal and external sides to improve the strategic plan. Performance of Company X has been measured based on four perspectives of BSC, namely financial, customer, internal business process, and learning and growth, which represented the strength and weakness of the company. The strategies have been formulated and grouped into four business orientations from the SWOT analysis: offensive, defensive, adjust, and survive strategies. This proposed strategy recommendation is beneficial to help the company to prepare next strategic priority.

References

[1] M. Choshin and A. Ghaffari, "An investigation of the impact of effective factors on the success of e-commerce in small- and medium-sized companies," *Computers in Human Behavior*, vol. 66, pp. 67-74, 2017/01/01/ 2017.

[2] A. Gervais, "Product quality and firm heterogeneity in international trade," *Canadian Journal of Economics/Revue canadienne d'économique*, vol. 48, no. 3, pp. 1152-1174, 2015.

[3] P. Micheli and L. Mari, "The theory and practice of performance measurement," *Management Accounting Research*, vol. 25, no. 2, pp. 147-156, 2014/06/01/ 2014.

[4] Milana, M. K. Khan, and J. E. Munive, "Development the conceptual design of Knowledge Based System for Integrated Maintenance Strategy and Operation," *IOP Conference Series: Materials Science and Engineering*, vol. 65, no. 1, p. 012035, 2014.

- [5] M. Arena, G. Azzone, and I. Bengo, "Performance Measurement for Social Enterprises," *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations*, journal article vol. 26, no. 2, pp. 649-672, April 01 2015.
- [6] A. Bhattacharya *et al.*, "Green supply chain performance measurement using fuzzy ANP-based balanced scorecard: a collaborative decision-making approach," *Production Planning & Control*, vol. 25, no. 8, pp. 698-714, 2014/06/11 2014.
- [7] R. F. Speklé and F. H. M. Verbeeten, "The use of performance measurement systems in the public sector: Effects on performance," *Management Accounting Research*, vol. 25, no. 2, pp. 131-146, 2014/06/01/ 2014.
- [8] S. P.-J. Wu, D. W. Straub, and T.-P. Liang, "How information technology governance mechanisms and strategic alignment influence organizational performance: insights from a matched survey of business and it managers," *MIS Quarterly*, vol. 39, no. 2, pp. 497-518, 2015.
- [9] (2011). *Performance Measurement and Evaluation: Definitions and Relationships*.
- [10] W. Artley, D. Ellison, and B. Kennedy, *The Performance-Based Management Handbook*. California: The Performance-Based Management Special Interest Group (PBM SIG), 2001.
- [11] A. Neely, M. Gregory, and K. Platts, "Performance measurement system design: A literature review and research agenda," *International Journal of Operations & Production Management*, vol. 15, no. 4, pp. 80-116, 1995.
- [12] A. M. Ghalayini, J. S. Noble, and T. J. Crowe, "An integrated dynamic performance measurement system for improving manufacturing competitiveness," *International Journal of Production Economics*, vol. 48, no. 3, pp. 207-225, 1997.
- [13] J. R. Dixon, A. J. Nanni, and T. E. Vollmann, *New Performance Challenge: Measuring Operations for World-Class Competition*. Homewood, IL: Irwin Professional Pub, 1990.
- [14] R. S. Kaplan and D. P. Norton, *The Balanced Scorecard: Translating Strategy into Action*. Boston: Harvard Business School Press, 1996.
- [15] B. Phadermrod, R. M. Crowder, and G. B. Wills, "Importance-Performance Analysis based SWOT analysis," *International Journal of Information Management*, vol. 44, pp. 194-203, 2019/02/01/ 2016.
- [16] A. Pratiwi, W. Sutopo, R. Zakaria, and A. M. Rasli, "Formulating Strategy Through QSPM Based on SWOT Framework: A Case Study Spin-Off Company in Malaysia," *Advanced Science Letters*, vol. 23, no. 9, pp. 8646-8651, // 2017.
- [17] N. Coe and S. Letza, "Two decades of the balanced scorecard: A review of developments," *Poznan University of Economic Review*, vol. 14, no. 1, pp. 63-75, 2014.
- [18] R. S. Kaplan and D. P. Norton, *Alignment: Using the Balanced Scorecard to Create Corporate Synergies*. Boston: Harvard Business School Press, 2006.
- [19] D. A. Garvin, *Managing Quality: The Strategic and Competitive Edge*. New York: The Free Press, 1988.
- [20] P. F. Drucker, *Management: Tasks, Responsibilities, Practices*. New York: Routledge, 2011, p. 552.
- [21] M. Bertoneche and R. Knight, *Financial Performance*, Third Edition ed. Oxford: Butterworth-Heinemann, 2001.
- [22] A. P. Parasuraman, V. A. Zeithaml, and L. L. Berry, "A Conceptual Model of Service Quality and its Implication for Future Research (SERVQUAL)," *Journal of Marketing*, vol. 49, pp. 41-50, 1985.
- [23] M. As'ad, *Seri Ilmu Sumber Daya Manusia: Psikologi Industri*. Yogyakarta: Penerbit Liberty, 2003.
- [24] F. Rangkuti, *Analisis SWOT Teknik Membedah Kasus Bisnis*. Jakarta: PT Gramedia Pustaka Utama, 2003.
- [25] D. Aryo, L. Mardiono, and D. Arga, "Integrasi SWOT, Balanced Scorecard, dan QFD sebagai Alternatif Pengukuran Kinerja Perbankan," in *National Industrial Engineering conference*, Surabaya, 2002.