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DETERMINING KEY PERFORMANCE INDICATORS WITH BALANCED SCORECARD APPROACH FOR CONSTRUCTION PROJECT WAREHOUSE EFFICIENCY

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Abstract

Recent Covid-19 pandemic had negative impacts on various formal industries in Indonesia. This adverse condition also affected PT Waskita Karya (Persero) Tbk, reflected from the slump in company's business revenue. Waskita was forced to readjust their strategies to overcome the situation and one of them is efficiency. However, Efficiency in construction project warehouse is currently unmanageable because there is no proper Performance Management System for measuring the achievement. Developing and tracking Key Performance Indicators (KPI) with Balanced Scorecard (BSC) approach had been seen as the solution as it is covering four important perspectives of performance namely financial, customer, internal process, and learning and growth. The expert consensus analysis had been conducted with Fuzzy Delphi Method the results of all Balanced Scorecard perspectives (Financial, Customer, Internal Process, and Learning and Growth) are deemed applicable for Waskita's construction warehouse based on the result of expert consensus with the financial perspective became the top priority. Furthermore, 21 out of 28 Key Performance Indicators had been agreed as the performance measurement for Waskita's construction warehouse, with the proportion of 5 financial indicators, 4 customer indicators, 6 internal process indicators, and 6 learning and growth indicators. Those indicators had been translated from strategic objectives that could lead to efficiency. Order fulfillment rate became the most important indicator to track. Performance scoring system has been determined to categorize the performance indicators' achievement of Waskita's construction warehouse by the range of high, medium, and low with specific targets for each indicator.

Keyword: performance indicators, balanced scorecard, construction, warehouse, fuzzy delphi.

Introduction

PT Waskita Karya (Persero) Tbk is one of the biggest state-owned companies that has great contributions in Indonesia's infrastructure development. Throughout 2020 during pandemic situation, Waskita recorded Rp 7,38 trillion net loss and 48,73% drop on their operating revenues. Responding to this situation, Waskita crafted several strategies to ensure business continuity during the pandemic namely: Maximize cash

inflow from project payment and land acquisition credit, Tollroad divestation, OPEX efficiencies, and credit relaxation proposal. OPEX efficiencies is considered possible to be managed by project for now as the smallest business unit in Waskita. Moreover, efficiencies are the most relevant, potentially permanent, and long-term strategy to reach the corporate vision. Construction project in Waskita is the smallest unit with several business processes inside namely: construction operation, financial management, administration and contract management, human capital management, and logistic. Warehouse management is one of logistic element. It covers about 30% of project finance and hold a significant role in determining project's success. So far, project performance indicators are still using financial one, and these types of measures tend to reflect the past performance (Lag Indicators) of an organization rather than predicting future performance (Lead Indicators). This research conducted by implementing BSC approach to design an integrated system of key performance indicators (KPI) both Lag and Lead Indicators that are important for achieving efficiency in project warehouse.

Receiving, putting away, storing, picking, and shipping are the main warehouse activities (Frazelle, 2016). Receiving activities include assigning vehicles to docks and planning and carrying out unloading activities (Gu, Goetschalckx, & McGinnis, 2007). Put away refers to the act of storing a purchased commodity or material in the warehouse. This activity also involves handling materials and checking the product's positioning and material location (Frazelle, 2016). Storage is the transfer of goods from the area of unloading to the location intended (Johnson, Scholes, & Whittington, 2008). Order preparation is called order picking. This is thought to be the primary and labor-intensive function of warehouses. Packing after picking up the orders, assigning vehicles to ports where the orders are, and loading trucks are all aspects of shipping (Gu et al., 2007).

A warehouse performance measurement is a method to measure activity performance, program or service which is provided by a warehouse. Performance measurement system as the sets of metrics used to quantify both the efficiency and effectiveness of action (Neely, Gregory, & Platts, 1995). Performance measurement can be divided in 4 categories: input, output, efficiency, and effectiveness (Ammons, 1995). In general, efficiency and effectiveness are the most widely utilized as a measure of performance (Ammons, 1995) ; (Kusrini & Masruroh, 2014). This is inline with Waskita's strategy which is operational expenditure efficiency.

Construction projects are the spearheads of contractor companies. Their business' goals and targets pretty much depending on how the construction projects are performing. The most definite terms of successful projects are on-time delivery and on budget. If You Can't Measure It, You Can't Manage It. Peter (Drucker, 1974) famously said "Work implies not only that somebody is supposed to do the job, but also accountability, a deadline and, finally, the measurement of results —that is, feedback from results on the work and on the planning process itself,". That's why we need a whole view of our business, set the plan, keeping track on the progresses and problems, and always have an eye on indicators of success.

This is where the performance management take part. Performance management makes it possible for managers to identify and solve issues accurately, communicate better and keep the progress on schedule. Moreover, it could be a benchmarking tools to compare how we coupe with another companies. While every construction works need goods, material, equipment, consumables, and so on, a warehouse must be classified as a primary element. So far, it is usually considered only as a "storage", without putting the business process inside into account. Enterprise Resource Planning (ERP) is there, but as it is only for reporting purpose, the problems inside a warehouse are often overlooked. Thus, a suitable performance management tools are needed to give a more holistic indicators on how the warehouse perform towards the targets.

The research proved that the development of Balanced Scorecard can be started from smaller unit instead of cascading from the top. Therefore, BSC could be developed for another business units in Waskita. Moreover, the Balanced Scorecard could possibly be implemented for another Indonesian SoE construction companies because they are merely in the same scale.

The Fuzzy Delphi Method involves two main processes: Triangular Fuzzy Numbers and Fuzzy Evaluation Processes. To interpret the data from this method, there are three conditions that must be considered to determine whether a KPI should be accepted or rejected based on expert agreement. The first two conditions are related to Triangular Fuzzy Numbers, while the third condition pertains to the Fuzzy Evaluation Process. The Fuzzy Delphi method involves converting a Likert scale chosen by experts into a fuzzy scale using a system of binary numbering and evaluating the resulting values on a scale from 0 to 1. The conversion process will be done by using FDM Template v2.01 that created by (Jamil & Noh, 2020). Fuzzy Score Value is represented by three values: m1, m2, and m3. m1 represents the minimum value, m2 represents the most reasonable value, and m3 represents the maximum value. These values can be depicted graphically in the form of a triangle, with the mean value plotted against the triangular value.

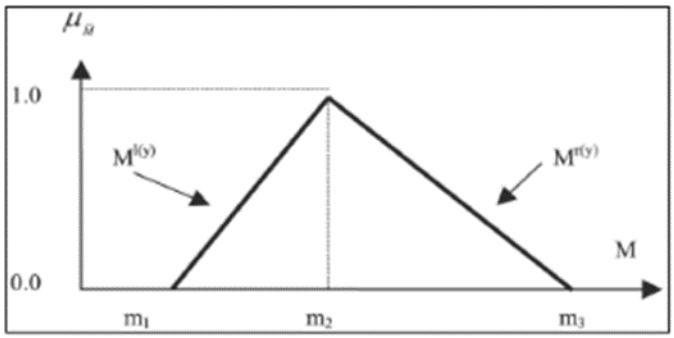


Figure 1 Fuzzy Scale Agreement Level Diagram (Bojadziev & Bojadziev, 2007).

Therefore, Fuzzy Delphi method is used to identify, evaluate, and validate elements based on expert agreement, as determined by three conditions:
(1). Threshold value (d) $d \leq 0.2$

A KPI is accepted by a group of experts if the threshold value (d) is less than or equal to 0.2 ($d \leq 0.2$). This threshold value is used to determine whether an element should be accepted or rejected based on expert agreement. If the threshold value (d) is greater than 0.2, the element is rejected. The threshold value (d) is calculated using a specific formula (1), which involves using the vertex method to determine the distance between the average value of two fuzzy numbers (m and n). These fuzzy numbers are represented by three values (m1, m2, and m3), and the distance between them is calculated using below formula (1). This approach is consistent with the findings of (Chen, 2000), (Cheng & Lin, 2002), and (Jamil & Noh, 2020).

$$d(m,n) = \sqrt{\frac{1}{3}\left[(m_1+n_1)^2+(m_2+n_2)^2+(m_3+n_3)^2\right]} \quad (1)$$

(2). Expert Consensus Percentage ≥ 75%

Elements are only accepted if at least 75% of experts agree on their validity, according to the research of (Chu & Hwang, 2008), (Murry Jr & Hammons, 1995), and (Jamil & Noh, 2020). Elements with a lower level of expert consensus are not accepted.

(3). Fuzzy Score Values (A)

The defuzzification process in the Fuzzy Delphi technique involves determining the relative importance or ranking of each item or variable being analyzed. This process is carried out as part of the data analysis process in the technique and can be calculated using the formula below:

$$A = \frac{1}{3}\, x\, (m_1 + m_2 + m_3) \quad (2)$$

The final step in the process is to calculate the alpha-cut value, which is the median value between "0" and "1", where α-cut = (0+1)/2 = 0.5. If the value of A is less than the alpha-cut value, the item will be rejected because it indicates that the experts do not agree on its acceptance. However, if the value of A is greater than the alpha-cut value, the item will be accepted because it demonstrates a consensus among the experts to accept it, according to (Jamil & Noh, 2020). The data is then organized to determine the fuzzy values, average fuzzy values, threshold values, consensus percentages, defuzzification values, and item rankings. Table below summarize the steps towards the implementation of Fuzzy Delphi Method.

Table 1 Fuzzy Delphi Method Implementation Steps (Rejab, Azmi, & Chuprat, 2019).

Step	Detail
1	Criteria to determined experts involved in the study: • Expert in the field (more than 5 years experience) • 10-15 experts (Adle&Ziglio, 1996)
2	Convert all linguistic variables into a triangular fuzzy number
3	All data is scheduled to obtain the average value (m2, m2, m3)
4	Determine the distance between the 2 numbers fuzzy to determine the value of threshold, d $d \leq 0,2$, meaning that all the experts reach consensus.
5	Determine the consensus of the Group.

	• Value of the percent agreement of experts that must be equal to or more than 75%
6	Define Aggregate Fuzzy Evaluation by adding all fuzzy numbers.
7	Data analysis using the average of fuzzy numbers or average response (Defuzzification Process

The results will be validated by interviewing key stakeholders in research is a common and effective method. According to (Creswell & Clark, 2017), "key informants or stakeholders are individuals who have knowledge or experience related to the research problem and can provide valuable information to help validate the data collected". By conducting interviews with Project Manager as designated user, researchers can verify the accuracy and reliability of their data, as well as gain a deeper understanding of the research problem from different perspectives.

Results and Dicsussion

This section will explain the steps and considerations taken in concluding the hypothesis of suitable Balance Scorecard for warehouse construction in Waskita. The concept of Balance Scorecard was introduced which will be the guidance throughout the Performance Management System crafting process. Corporate situation analysis will be the reference of vision and strategic planning. Strategic objectives will be formulated using SWOT and TWOS analysis and later will be translated into Key Performance Indicators.

Balanced Scorecard (BSC), founded by Robert S. Kaplan and David P. Norton, is a performance management tool that helps organizations to align business activities to the organization's vision and strategy, and to monitor performance against strategic goals (Kaplan & Norton, 1996). According to (Wibisono, 2013), Balance Scorecard (BSC) translates corporate’s mission and strategy into a set of performance indicators that is useful for strategic measurement and management system.

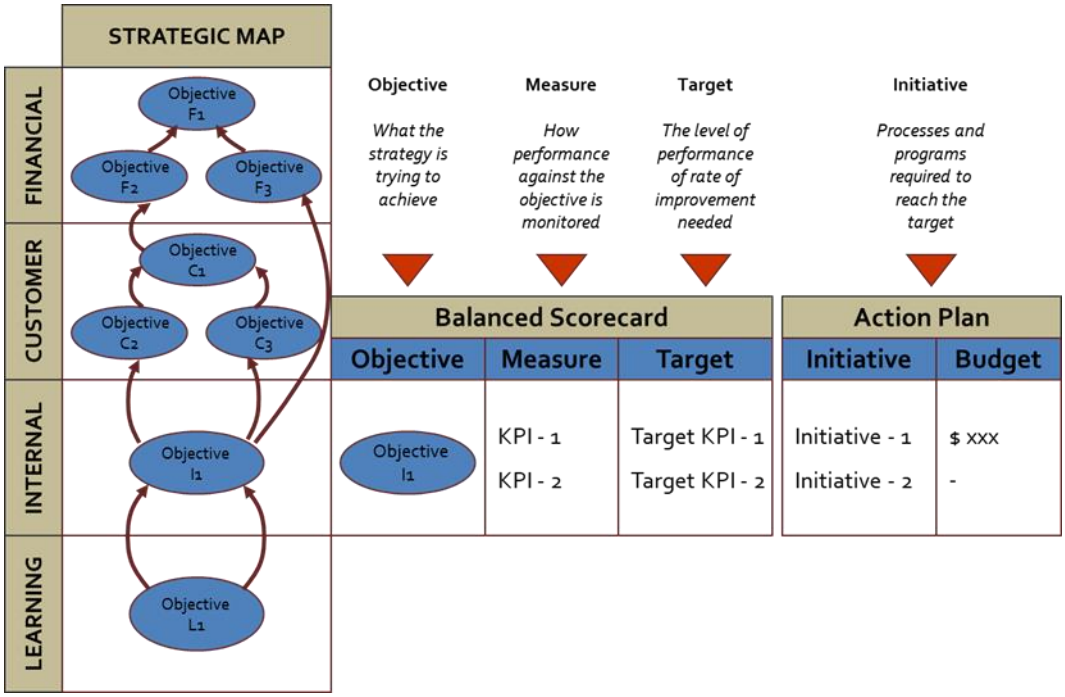


Figure 2 BSC Components (Wibisono, 2013)

The balanced scorecard has four perspectives: financial, customer, internal business process, and learning and growth. The financial perspective measures financial performance and looks at financial goals such as profitability, return on investment, and shareholder value. The customer perspective measures the organization's performance from the perspective of its customers. This includes measures such as customer satisfaction, customer retention, and customer loyalty. The internal business process perspective measures the organization's performance in terms of its internal processes, including measures such as efficiency, quality, and innovation. The learning and growth perspective measures the organization's performance in terms of its ability to learn and grow. This includes measures such as employee training, employee retention, and organizational culture (Kaplan, Robert, Kaplan, & Norton, 2001).

BSC provides a useful framework to convert the overall strategy into specific actions and objectives that can be carried out by the organization, ensure that all employees and departments within the organization understand and are aligned with the strategy, use specific metrics and targets to clearly communicate the progress and success of the strategy to all stakeholders, and involve all relevant parties in the process of creating a balanced scorecard, promoting collaboration and agreement on the strategic goals. It is also can be applied to newly promoted strategies or adjustments that have been made by the company.

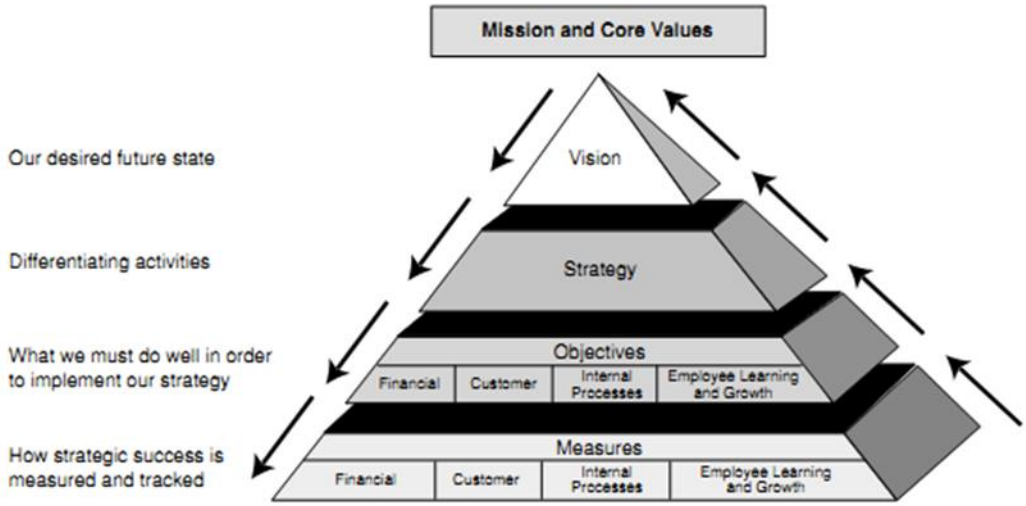


Figure 3 Balanced Scorecard Pyramid (Wibisono, 2013)

From the Balanced Scorecard Pyramid Figure, the first step for forming a Balanced Scorecard is to define the vision of the corporate/organization based on current situation. After that, the general strategy to reach that goals also should be defined. Those strategies will be the reference for defining the objectives to realize the vision on four different perspectives: Financial, Customer, Internal Processes, and Employee Learning and Growth. Those objectives should be SMART (Specific, Measurable, Achievable, Relevant, and Time-bound); hence the objectives would be translated into quantitative performance measures/indicators that would represent the achievement level of the objectives. It is important to first establish the organization's overall vision and mission, as these provide the guiding principles for the balanced scorecard strategy. The initiatives should be chosen carefully and designed to address multiple objectives in a coordinated manner. The objectives, measures, and targets can then be determined, either for the entire strategy or for each perspective individually. The process of setting the vision and mission is typically top-down, while the measures, targets, and initiatives may involve more input from lower levels of the organization. The goal is to achieve full buy-in from all stakeholders for the overall strategy (Wibisono, 2013).

(Wibisono, 2013) stated three important principles for BSC performance measures namely:

1. Make Measurement Simple
   It is important to ensure that the measurements used in the balanced scorecard are easy for everyone to understand, collect, and access. The measurements should be collected on a regular basis, such as hourly, daily, or weekly, and should be visible to all stakeholders, such as by posting them on a wall. The measurements should also be informative, requiring no additional interpretation. This will help to make the measurement process simple and effective.
2. Make Measurement Relevant

It is important to ensure that the measurements used in the balanced scorecard are relevant to the organization's overall strategy and to the expectations of its customers. The measurements should encourage actions that will help the organization to achieve its strategic goals and should be closely linked to the needs and expectations of the customers. This will help to ensure that the measurement process is focused on areas that are most important to the organization and its stakeholders.

3. Measures Output

In the balanced scorecard, it is important to measure the output of both activities and business processes. Output measures can include quantity, cost, time, and quality. These measures can be good predictors of future performance and can help to identify areas for improvement. By focusing on output measures, organizations can better understand the efficiency and effectiveness of their activities and processes and can take action to improve them.

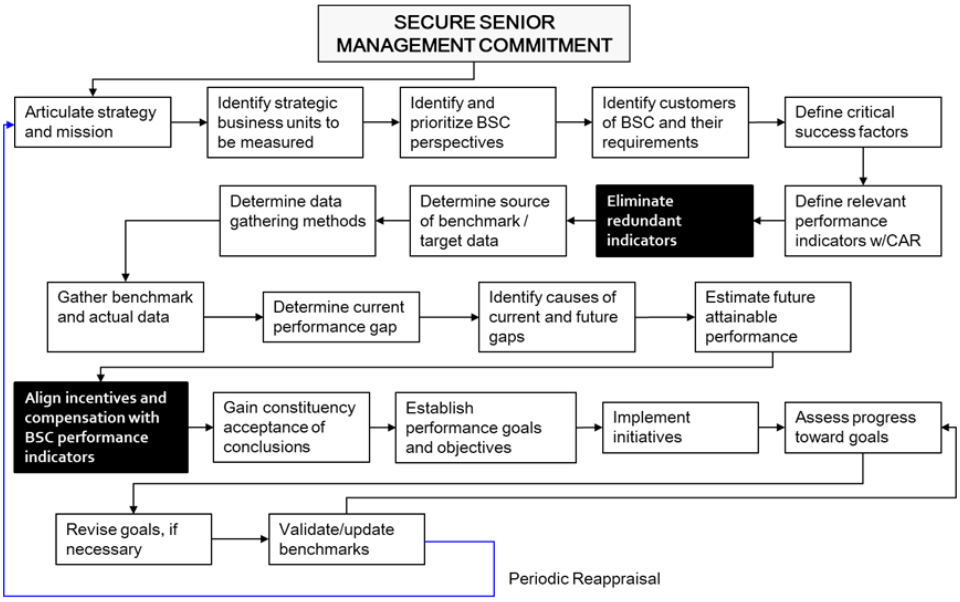


Figure 4 Balanced Scorecard Planning and Implementation Workflow (Wibisono, 2013)

Figure above is the detailed Balanced Scorecard Planning and Implementation Workflow. Senior Management commitment should be secured as a good-to-go signal. On the early stages, strategy, business unit to be measured, BSC perspectives priority, and BSC stakeholders need to be identified. Critical success factors should be defined afterwards as the reference for relevant performance indicators. Eliminating redundant indicators is a significant step (hence it is being highlighted) and it is recommended to have no more that 16 – 20 measures/indicators to capture “Strategic Success” (Wibisono, 2013). This research will be concluded with the indicator’s validation through interview with key stakeholders. Further steps will be reserved for future research.

In order to gain consensus and set the priorities towards the proposed BSC framework, expert agreement has been gathered through questionnaire and analyzed using Fuzzy Delphi Method. The level of agreements was defined by 2 iterations: the

BSC perspective and followed by the key performance indicators. Due to scattered location of the experts, the data gathering process has been conducted via online questionnaire with 7 Likert scale for each item.

10 experts had been carefully selected to gain the consensus of BSC framework with the proportion of 3 Project Managers, 2 Site Administration Manager (SAM), 3 Site Procurement, Logistic, and Equipment Managers (SPLEM), and 2 Site Procurement, Logistic, and Equipment Officers (SPLEO).

Table 2 Expert Demographic Table

Experts		
Code	**Alias**	**Title**
1	MRHS	SPLEO
2	MS	PM
3	HHS	SAM
4	Y	SAM
5	PA	SPLEM
6	BBB	SPLEM
7	MG	SPLEO
8	AR	PM
9	WSD	PM
10	HP	SPLEM

Those experts already met the criteria that has been set with minimum of bachelor's degree holders and have more than 5 years of experience in construction business.

KPI should be agreed based on Specific, measurable, achievable, relevant, and time-bound (SMART) criteria with the explanation as below:

Table 3 Agreements'Criteria

Criteria	Context
Specific	Clear, detailed, and unambiguous.
Measurable	Can be measured by Waskita's existing tools (SAP and PW).
Achievable	Possible to achieve.
Relevant	Suitable with Waskita construction warehouse's characteristic and relevant to the efficiency goal.
Time-bound	Can be measured during certain period of time.

The level of agreement will be expressed from the scale of 1 until 7. The Fuzzy Delphi analysis examined the construct to meet the three specified conditions as below:

Table 4 Expert Consensus Condition

Value	Condition
Threshold value (d)	≤ 0,2

Percentage of expert consensus	> 75%
Fuzzy Score	≥ 0,5 (α-cut value)

Those conditions will be examined in sequence. Once there is one unfulfilled condition, the questionnaires should be revised until the conditions are met. The percentage of consensus conditions are applied both for total percentage and each item percentage. Total percentage will determine the validity of the construct while each item that didn't meet the percentage of consensus will be rejected.

Finding

All Balanced Scorecard perspectives (Financial, Customer, Internal Process, and Learning and Growth) are deemed applicable for Waskita's construction warehouse and inline with the efficiency strategy according to the result of expert consensus. This fact was the proof that BSC approach is generic enough to be implemented in various industries. Financial perspective got the top priority followed by internal process, customer, and lastly the learning and growth perspective. It shows that financial indicators, mostly lag indicators, are still the primary measurements of success in a profit-oriented industries. Internal process perspective came second as it contains the operation activities inside the warehouse. Customer perspective (in this case the warehouse's client is Construction supervisor) was considered as the third most important and learning and growth perspective of human resources involved in the warehouse came last.

Table 5 BSC Four Perspective Consensus Summary

No	Code	Item	Threshold value,d	Percentage of Expert Group Consensus, %	Fuzzy Score (A)	Priority	Expert Consensus
1	A1	Financial	0,049	100%	0,947	1	Accepted
2	A3	Internal Process	0,103	90%	0,910	2	Accepted
3	A2	Customer	0,073	100%	0,907	3	Accepted
4	A4	Learning and Growth	0,128	80%	0,883	4	Accepted

Acceptance condition:
1) Threshold Value (d) ≤ 0,2
2) Percentage of Consensus > 75%
3) Fuzzy Score ≥ 0,5

21 Key Performance Indicators had been agreed as the performance measurement for Waskita's construction warehouse, with the proportion of 5 financial indicators, 4 customer indicators, 6 internal process indicators, and 6 learning and growth indicators. Those indicators had been translated from strategic objectives that could lead to efficiency. Order fulfillment rate became the most important indicator to track because it will determine the continuity of construction work and make sure that the project is proceeding according to plan. Contradict from the result of BSC's perspective result, indicator from Internal Process Perspective became the top priority instead of Financial Perspective, while the top financial indicator sits at 10th priority (Human resource cost).

That fact showed that the awareness of tracking lead indicators instead of lag indicators in Waskita has increased. The % of employees with QHSE training is the second most priority, expressing that the quality of the work, healthy member and working environment, safety operation, and sustainable environment became the fundamental culture of Waskita. The third most important indicator is inventory accuracy, which is tracking the conformity of physical inventory data and web database data. It would determine the logistics plan mostly for procurement purposes.

Table 6 KPI Consensus Result Summary

No	Code	Item	Threshold value,d	% of Experts Consensus	Fuzzy Score (A)	Priority	Expert Consensus
1	B10	Order fulfilment rate	0,049	100%	0,947	1	Accepted
2	B27	% of employees with QHSE training	0,087	90%	0,930	2	Accepted
3	B14	Inventory accuracy	0,098	90%	0,920	3	Accepted
4	B9	Order accuracy	0,073	100%	0,907	4	Accepted
5	B26	% Absent employees	0,132	80%	0,903	5	Accepted
6	B25	Utilization of IT equipment	0,101	90%	0,900	6	Accepted
7	B11	Order lead time	0,132	80%	0,893	7	Accepted
8	B17	% Damage/defect rate	0,132	80%	0,893	7	Accepted
9	B23	% of employees with competency training	0,128	80%	0,883	9	Accepted
10	B16	% Waste	0,172	80%	0,873	10	Accepted
11	B22	Inventory turnover rate	0,172	80%	0,873	10	Accepted
12	B4	Human resource cost	0,118	80%	0,873	10	Accepted
13	B1	Handling cost	0,129	90%	0,870	13	Accepted
14	B2	Equipment overtime cost	0,166	80%	0,863	14	Accepted
15	B3	Labour overtime cost	0,166	80%	0,863	14	Accepted
16	B5	Inventory carrying cost	0,107	80%	0,863	14	Accepted
17	B12	On time delivery	0,166	80%	0,863	17	Accepted
18	B18	% delivery arriving in good condition	0,166	80%	0,863	17	Accepted
19	B20	Surface utilization coefficient	0,159	80%	0,853	19	Accepted
20	B24	% of employees with IT training	0,159	80%	0,853	19	Accepted
21	B28	Time lost due to injury	0,205	80%	0,833	21	Accepted
22	B13	Late delivery rate	0,176	60%	0,827	22	Rejected
23	B19	Time lost due to equipment repair	0,176	60%	0,827	23	Rejected
24	B7	Over stock value	0,250	40%	0,813	24	Rejected
25	B21	Rate of return	0,192	60%	0,810	25	Rejected
26	B15	Rate of obsolete inventory	0,217	50%	0,807	26	Rejected
27	B6	Storage space cost	0,309	40%	0,777	27	Rejected
28	B8	Customer satisfaction	0,247	60%	0,743	28	Rejected

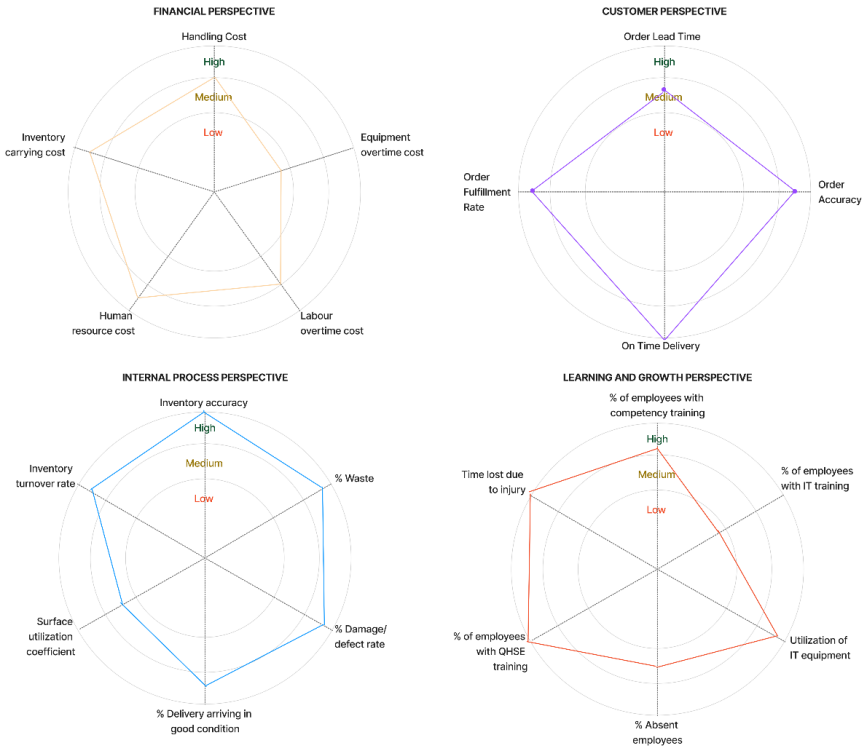
Acceptance condition:
1) Threshold Value (d) ≤ 0,2
2) Percentage of Consensus > 75%
3) Fuzzy Score ≥ 0,5

Performance scoring system has been determined to categorize the performance indicators' achievement of Waskita's construction warehouse by the range of high, medium, and low with specific targets for each indicator. The radar chart is used for dashboard visualization purpose. By tracking and taking the right initiatives based on the achievement, the designated efficiency can be reached.

Table 7 Balance Scorecard with Agreed Targets

	STRATEGIC OBJECTIVES	KEY PERFORMANCE INDICATORS	TARGETS		
			High	Medium	Low
FINANCIAL	Reducing handling cost	Handling cost ↓	<7%	7-16%	>16%
		Equipment overtime cost ↓	<4%	4-10%	>10%
	Reducing labour cost	Labour overtime cost ↓	<5%	5-10%	>10%
		Human resource cost ↓	<22%	22-32%	>32%
	Reducing storing cost	Inventory carrying cost ↓	<9%	9-19%	>19%
CUSTOMER	Increasing order accuracy	Order accuracy ↑	>98%	98-92%	<92%
		Order fulfilment rate ↑	>98%	98-92%	<92%
	Increasing response time	Order lead time ↓	<2 hours	2-4,6 hours	>4,6 hours
		On time delivery ↑	>90%	90-79%	<79%
INTERNAL PROCESSES	Maximum stock accuracy	Inventory accuracy ↑	>98%	98-92%	<92%
	Reduce waste	% Waste ↓	<3%	3-7%	>7%
	Reduce defect	% Damage/defect rate ↓	<2%	2-7%	>7%
		% Delivery arriving in good condition ↑	>97%	97-91%	<91%
	Maximize space utlization	Surface utilization coefficient ↑	>83%	83-77%	<77%
	Maximize inventory turnover	Inventory turnover rate ↑	>1,9	1,9-1,2	<1,2
LEARNING AND GROWTH	Labour competency training	% of employees with competency training ↑	>86%	86-69%	<69%
	Improve digital literacy competence	% of employees with IT training ↑	>75%	75-61%	<61%
		Utilization of IT equipment ↑	>32%	32-22%	<22%
	Improving labour disciplinary	% Absent employees ↓	<7%	7-17%	>17%
		% of employees with QHSE training ↑	>98%	98-86%	<86%
		Time lost due to injury ↓	<7%	7-15%	>15%

Figure 5 Simulation of BSC Target Range Radar Chart



Implementation Plan & Justification

In the current state, the BSC is still missing Weight and Initiative elements to make it fully applicable. Moreover, the documents, parameters, and data gathering method required to construct the target score should be defined. Those targets need to be revised periodically in case those are easily reachable (leave no room for improvement) or otherwise, impossible to reach.

Initiative is the required action to reach, to maintain, or to improve beyond the target. There's no standardization for this. Initiative should be crafted conditionally according to current performance situation.

Furthermore, BSC could be utilized as benchmarking tools to compare warehouse performance among Waskita's projects. To do so, weight of each indicator should be defined. Indicators priority that had been produced through Fuzzy Delphi output could be a helpful reference to determine those weights.

Table 8 Balance Scorecard Implementation Plan

TASK	ASSIGNED TO	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Remaining Development Phase									
"Target" Workshops	Researcher and Experts								
"Indicators' weight" Workshop	Researcher and Experts								
"Data Collection Method" Workshop	Researcher and Experts								
Implementation Phase									
Dissemination	Project Manager								
Training	SAM								
Pilot Testing	SAM, SPLEM, SPLEO								
Evaluation	Project Manager								
Full Implementation	SAM, SPLEM, SPLEO								

Total of two months more are needed to fully implement the warehouse BSC. The first two weeks will be the remaining development phase which will be filled with workshops to determine target, indicators weight, and data collection method. After completing the BSC components, Implementation Phase can be kickstarted with dissemination through all stakeholders so they can get the essence of BSC implementation, fully aware of and then can utilize it optimally. The following step is training for merely four days to make sure that each user understands their role on BSC implementation such as data gathering process and scoring process. Pilot testing will be conducted for a month and later will be evaluated. If there is nothing wrong and the pilot result is up to expectations, then the warehouse BSC can be fully implemented.

To justify the warehouse BSC, an online interview had been conducted with Andrianto Rachmat, one of Waskita Project Manager with 12 years experience on the company. Beside justification, Andrianto also gave some perspective about the relevancy and applicability of the BSC. For him, the warehouse Balanced Scorecard (BSC) could be extremely helpful in reaching Waskita's efficiency goal, as it provides a comprehensive and well-rounded view of the warehouse's performance. It is also nice to have that the KPIs are not only on the operational aspect but also covering financial, customer, and human resources perspective. This kind helicopter view is good for managerial level so he can monitor every aspect on one sweep. He also stated that the strategic objectives are spot on and well-aligned to reach the efficiency goal. Furthermore, He believed that the contribution of warehouse efficiency could have significant effect for the company as whole.

Andrianto was really satisfied with the composition of KPIs for warehouse that had been agreed by the expert as it covers all the important aspects of warehouse management. The fact that several KPIs did not get agreement from the expert could be an indication that the expert is providing valuable input and suggestions for improvement. These expert' selection and composition were accountable enough because their background is matched with the four perspectives of BSC. Moreover, the KPIs are applicable and easy to understand although he would need more effort for dissemination and training for unskilled labour to execute the BSC.

Andrianto gave another view that the BSC would be useful not only for tracking the progress and improvement but also for communication tools. It would be easier for him to manage the warehouse with quantified measurement instead of subjective thoughts. The radar chart would also be helpful to identify current weakness and strong point of warehouse performance.

As a Project Manager, Andrianto would happily implement this BSC to his project. However, He suggested that the BSC development phase should be carried on to create a powerful benchmarking tools for all project warehouses in Waskita. Beside that, it would be great for the BSC to be integrated into insentive system to raise the personnel morale.

Conclusion

All Balanced Scorecard perspectives (Financial, Customer, Internal Process, and Learning and Growth) are deemed applicable for Waskita's construction warehouse and inline with the efficiency strategy according to the result of expert consensus. This fact was the proof that BSC approach is generic enough to be implemented in various industries. Financial perspective got the top priority followed by internal process, customer, and lastly the learning and growth perspective. Furthermore, 21 Key Performance Indicators had been agreed as the performance measurement for Waskita's construction warehouse, with the proportion of 5 financial indicators, 4 customer indicators, 6 internal process indicators, and 6 learning and growth indicators. Those indicators had been translated from strategic objectives that could lead to efficiency. Order fulfillment rate became the most important indicator to track because it will

determine the continuity of construction work and make sure that the project is proceeding according to plan. Performance scoring system has been determined to categorize the performance indicators' achievement of Waskita's construction warehouse by the range of high, medium, and low with specific targets for each indicator. The radar chart is used for dashboard visualization purpose. By tracking and taking the right initiatives based on the achievement, the designated efficiency can be reached. It is recommended that development phase of determining indicator weight and initiatives should be continued to complement the existing research. By doing so, implementation of warehouse Balanced Scorecard could be a powerful benchmarking tools for all warehouses in Waskita. To ensure achieveability, it's important to regularly review and update the target to ensure they remain aligned with the company's strategy. BSC also can later be integrated into insentive system to raise the personnel morale. The incentive system could provide rewards for employees who exceed the targets. Performance scoring system has been determined to categorize the performance indicators' achievement of Waskita's construction warehouse by the range of high, medium, and low with specific targets for each indicator. The radar chart is used for dashboard visualization purpose. By tracking and taking the right initiatives based on the achievement, the designated efficiency can be reached.

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