

Management of ABC project through performance measurement and strategy improvement determination

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ABSTRACT

Effective performance management and the appropriateness of improvement strategies influence project success. The right strategy can help identify areas of improvement and maximize resources, thereby increasing the chances of achieving overall project goals. Periodic evaluation is vital, as it allows teams to adjust their approach based on feedback and results. The application of appropriate performance management tools and techniques will greatly support the effectiveness of improvement strategies, creating a more productive work environment and responsiveness to changing project needs. This research aims to measure the performance of the ABC project and determine the optimal strategy to improve efficiency. Project performance evaluation was conducted using the performance prism method, which assesses five key aspects: stakeholder satisfaction, stakeholder contribution, strategy, process, and capability. In addition, the Critical Success Factor (CSF) method was used to identify the main factors affecting project success. SWOT analysis was applied to formulate improvement strategies that fit the project conditions. Data processing was conducted through surveys, interviews, and in-depth analysis of project conditions. The ABC project's implementation was most affected by the process aspect, while the final inspection activity was the most important factor in its success. The analysis identified 12 improvement strategies that could boost efficiency and mitigate project delays. These strategies include process optimization, technology implementation, and improved coordination between stakeholders. The findings of this research are expected to contribute to project management in optimizing performance, improving the effectiveness of resource management, and supporting the achievement of more efficient and highly competitive projects.

Keywords: Critical success factors; improvement strategies; performance prism; project performance; swot analysis

1. INTRODUCTION

The manufacturing sector has experienced significant growth post-COVID-19. The post-pandemic period saw a 4.64% increase, contributing 18.67% to Indonesia's total economy [1]. The growth of the manufacturing sector correlates with an increase in supporting workforce numbers. In 2023, the total workforce in the manufacturing sector reached 19.34 million, an increase of 0.88% from the previous year [2]. This growth signifies that Indonesia's economic cycle is moving towards an ideal condition, driven by the normalisation of production processes, allowing orders to be fulfilled as before.

The current ideal condition of the manufacturing sector presents an opportunity for productivity improvement. Productivity success is reflected in the effectiveness and efficiency of utilisation within an organisation. When productivity runs smoothly, it drives economic growth [3]. One of the key determinants of productivity in the manufacturing sector is workforce conditions [4]. Every manufacturing industry strives to enhance employee productivity to maintain competitiveness [5].

Employee productivity improvement can be measured through performance achievements [6]. Performance evaluation has a positive impact on employee productivity. Employees in the manufacturing sector must be equipped with the necessary skills and competencies to perform their

duties effectively. Maintaining and enhancing work quality ensures that employees contribute significantly to the sector's overall performance [7]. Therefore, manufacturing companies must develop strategies to maximise employee performance.

Strategic policies related to employee performance are also essential for maintaining company profitability. Profits are influenced by customer satisfaction with the company's manufactured products [8]. High employee performance positively affects production quality, which in turn enhances customer satisfaction and company profitability. Employee motivation plays a crucial role in performance. Highly motivated employees tend to work harder, display greater loyalty, and exhibit enthusiasm in their tasks, which is reflected in job satisfaction [9]. This research is expected to help control the ABC project's performance so it follows the planned schedule. Improving project performance helps minimize additional costs due to project acceleration.

2. METHOD

This study focuses on the ABC project, executed by PT X, a state-owned enterprise in Madiun. The research area is limited to the finishing phase of the ABC project. The study begins with literature and field studies to establish a theoretical foundation and identify research gaps [10]. The success of these preliminary studies is crucial for problem identification, which in turn helps define the research scope through a comprehensive understanding of the issues and their urgency [11].

Data collection in this research is divided into two categories: direct and indirect data collection. Direct data collection involves field observations, particularly during the finishing process of the ABC project, using tools such as questionnaires, surveys, and interviews [12]. The data obtained includes interview transcripts, questionnaire responses, and brainstorming session results. Indirect data collection involves acquiring secondary data from third parties or internal requests from PT X [13], such as regional gross domestic product (PDRB) data and ABC project activity timelines.

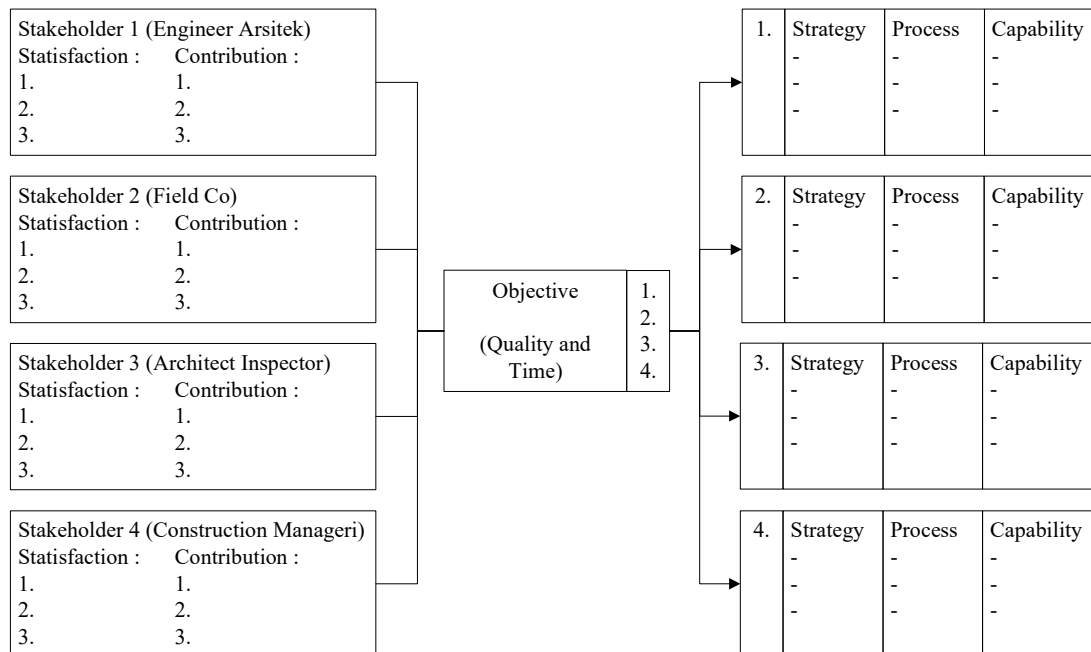


Figure 1. KPI identification for construction projects

The collected data is processed using the performance prism and CSF methods. The performance prism method evaluates project performance through five aspects: stakeholder satisfaction, stakeholder contribution, strategy, processes, and capabilities [14]. Identifying Key Performance Indicators (KPIs) is crucial for performance measurement using this method. KPI identification on a project can be seen in Figure 1. The CSF method helps identify key factors influencing the success of the ABC project [15]. Project performance constraints are identified based on the selected strategy [16], which is expected to address all challenges in project implementation [17]. The identified constraints

necessitate a control strategy, analysed using SWOT methodology. The SWOT-based project strategy formulation aims to provide control and improvement recommendations based on internal and external project conditions [18]. The next stage after data processing is the conclusion. The purpose of the conclusion is to show the essence of the results and contribution of the research [19].

3. RESULTS AND DISCUSSION

The performance measurement of the ABC project was analyzed using the Performance Prism method. Table 1 presents the results of the Performance Prism measurement for the ABC project. The ABC project involves 13 stakeholders, whose presence aligns with the project activity phases scheduled in the finishing process. The stakeholder process begins with identifying the satisfaction and contribution of the stakeholders in the ABC project. Satisfaction identification indicates the level of satisfaction of stakeholders [20] involved in the ABC project, while contribution identification shows the level of contribution from each stakeholder [21] in maintaining project success within the planned timeframe. The determination of project success is based on time and quality, ensuring that the identification results align with project conditions as per the initial plan. The results of stakeholder satisfaction and contribution identification for the ABC project are presented in Table 1. The total activities in executing the ABC project amount to 13 activities, with each activity being performed differently depending on job descriptions and qualifications.

Table 1. Identification results of stakeholder satisfaction and contribution in project ABC

Stakeholder	Satisfaction	Contribution
Activity 1	1 Assembly of inner and outer sliding doors	1 Stakeholders prepare doors for indoor and outdoor use
	2 Bogie assembly	2 Stakeholders assemble all components of the bogie
	3 Pipeline preparation	3 Stakeholders organize piping needs and supporting components
	4 Harness preparation	4 Stakeholders provide harnesses as support in material transfer
...
Activity 14	1 Air brake testing	1 Stakeholders conduct air brake condition tests
	2 Electrical testing	2 Stakeholders test all electrical components
	3 Interior and exterior inspection	3 Stakeholders inspect every aspect of the interior and exterior
	4 Curve, static, and running tests	4 Stakeholders review strength, all aspects in static conditions, and conduct running tests
	5 Repair	5 Stakeholders perform corrections on components that failed the test
	6 Delivery	6 Stakeholders schedule deliveries through third parties, ensuring safety and packing considerations

KPI criteria consist of strategy, process, and capability. The calculation of the comparative matrix is based on the weight of each criterion. Table 2 presents the weight calculation and performance values of KPI criteria, stakeholders, and elements. The KPI identification results found 54 KPIs, with each strategy, process, and capability having two KPIs from the 14 involved stakeholders. The pairwise matrix calculation results indicate that the highest criterion weight is the process, with a value of 0.458. The consistency ratio of the weighting results is 0.027, which is less than 0.1, indicating

pairwise consistency. This suggests that PT X prioritizes the process aspect in executing the ABC project. The process aspect drives PT X to emphasize punctuality to prevent project delays. If delays occur, PT X will face penalties in the form of fines and a loss of trust from future project owners. All process constraints must comply with proper procedures and minimize repetition as much as possible.

Table 2. Weight calculation and performance values

KPI Criteria	Weight	Performance Value	Stakeholder	Weight	Performance Value	Element	Overall Weight	Score	Performance Value
Strategy	0,354	2,455	Stakeholders in Activity 1	0,020	0,119	KPI S1	0,024	9	0,212
			....	....	....	KPI S2	0,024	7	0,165
		
			Stakeholders in Activity 14	0,135	1,128	KPI S27	0,027	10	0,271
Process	0,458	3,465	Stakeholders in Activity 1	0,081	0,909	KPI S28	0,031	7	0,220
			....	....	....	KPI P1	0,030	9	0,272
			....	....	....	KPI P2	0,049	8	0,390
			Stakeholders in Activity 14	0,38	1,525	KPI P27	0,036	9	0,328
Capability	0,188	1,307	Stakeholders in Activity 1	0,100	0,580	KPI P28	0,040	8	0,320
			....	....	....	KPI K1	0,043	4	0,170
			....	....	....	KPI K2	0,039	8	0,313
			Stakeholders in Activity 14	0,177	0,668	KPI K27	0,046	5	0,229
						KPI K28	0,012	7	0,086

The weight calculation results among the involved stakeholders are shown in Table 3. The highest weight value is for Activity 14, with a value of 0.451. The consistency ratio of stakeholder weighting is 0.096, which is less than 0.1, confirming the significant role of stakeholders in Activity 14 in maintaining the performance of the ABC project. The ABC project is ensured to be in good condition at the time of handover to its owner. PT X guarantees the project owner that if damage occurs under normal usage without standard modifications, necessary repairs will be provided.

Table 3. Stakeholder weight calculation results

Stakeholder	Weight	Inconsistency Ratio
Stakeholders in Activity 1	0,201	0,096
Stakeholders in Activity 2	0,258	
...	...	
Stakeholders in Activity 13	-0,126	
Stakeholders in Activity 14	0,451	

The Performance Prism measurement results indicate that final quality testing activities contribute the most to the performance of the ABC project. Further handling through CSF (Critical Success Factors) measurement is necessary. The CSF method helps improve the ABC project's performance to avoid losses for PT X. Improvements through CSF involve identifying the weight of factors influencing the consistency of the ABC project's performance. The CSF measurement parameters for the ABC project are detailed in Table 4, which includes eight key factors based on previous relevant studies.

Table 4. CSF alternatives for project ABC.

CSF Alternative	Source	CSF Alternative	Source
Top management support	[17], [22], [23]	Knowledge management	[24], [25], [26]
Communication	[17], [27], [28]	Planning	[29], [15], [30]
Human resource competency	[31], [32], [26]	Leadership	[17], [33], [28]
Monitoring and evaluation	[29], [16], [34]	System integration	[17], [35], [36]

The eight alternative factors were calculated through priority weight calculations. The weight calculation is obtained by multiplying the criteria weight by the alternative weight, using mathematical software assistance. The ranking results are displayed in Figure 2, where the highest ranking is for monitoring and evaluation, with a value of 0.222. The weight ranking results require consideration by the executive management level, particularly those in managerial positions. Implementation recommendations significantly influence the improvement of project execution for future projects.

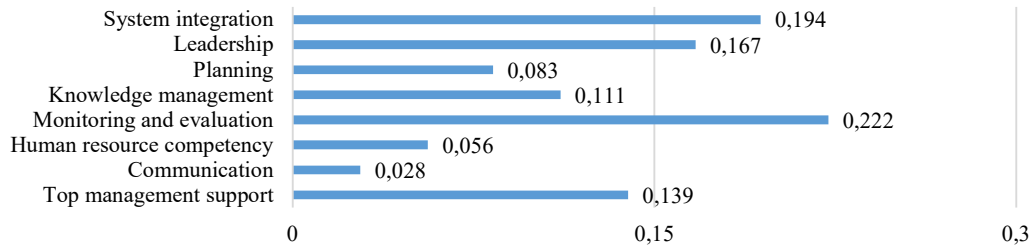


Figure 2. CSF alternative ranking.

Table 5 presents alternative strategies based on the highest weight of CSF alternatives. The determination of alternative strategies considers the aspects of strengths, weaknesses, opportunities, and threats (SWOT). The relationship between these aspects aligns with the conditions of the ABC project. The S-O strategy relates to the use of AI and IoT for defect monitoring to prevent equipment failure. The S-T strategy involves avoiding rework by strengthening Standard Operating Procedures (SOPs) and implementing Total Quality Management (TQM). The W-O strategy contributes to improving workflow systems through communication and coordination between production, Quality Control (QC), and suppliers. The W-T strategy focuses on minimizing waste and product defects through lean manufacturing and smart manufacturing approaches. The resulting alternative strategies consist of 16 actions that can be taken to ensure that the ABC project proceeds according to the initial plan.

Table 5. Strategic alternatives based on CSF Weights

	Strengths	Weaknesses
	S-O Strategy	W-O Strategy
Opportunities	<ol style="list-style-type: none"> 1) Implementing sensor technology for real-time monitoring. 2) Integrating cloud-based data systems for product quality trend analysis 3) Applying Condition-Based Monitoring (CBM) for real-time machine performance tracking. 4) Ensuring optimal machine performance to prevent sudden project stoppages. 	<ol style="list-style-type: none"> 1) Using Enterprise Resource Planning (ERP) for data synchronization across departments. 2) Implementing Design for Manufacturing (DFM) to minimize reprocessing during project execution. 3) Establishing quality-based agreements to ensure consistent raw material supply. 4) Selecting the best suppliers using a supplier performance rating system.
	S-T Strategy	W-T Strategy
Threats	<ol style="list-style-type: none"> 1) Conducting regular inspections using checklists before the final inspection stage. 2) Forming an internal audit team to ensure compliance with industry standards. 3) Placing quality control gates at multiple production points for step-by-step inspections. 4) Identifying production bottlenecks using digital twin simulation. 	<ol style="list-style-type: none"> 1) Implementing error-proofing systems to reduce project obstacles from the early production stages. 2) Executing continuous improvement initiatives to maintain long-term project quality. 3) Enhancing inspection accuracy with the help of Augmented Reality (AR). 4) Encouraging investment in Robotic Process Automation (RPA) to improve project efficiency and accuracy.

The research findings indicate that the process component carries the greatest significance in evaluating the performance of project ABC, underscoring the necessity of timeliness in project

execution. PT X, as the project executor, shall adhere to the work processes to mitigate the risk of delays. Activity 14, encompassing the final inspection, emerges as the primary factor influencing the project's success, as it is intrinsically linked to the ultimate quality before handover. Monitoring and evaluation aspects are essential for sustaining consistent project performance. The Critical Success Factor (CSF) methodology demonstrates that control measures reliant on frequent assessments are vital for mitigating losses and sustaining stakeholder confidence. The identification of enhancement strategies by SWOT analysis yielded 16 strategies categorized into four groups: S-O, S-T, W-O, and W-T. This study's conclusions offer strategic guidance for project management to enhance efficiency, mitigate risks, and ensure that project quality adheres to specified criteria.

4. CONCLUSION

The research concludes that the analysis and assessment of the ABC project's performance indicate that the process element is the paramount criterion in its management. The process aspect carries the most significance (0.458), rendering it the most vital component in the success of project ABC. The stakeholders engaged in activity 14, namely the final inspection phase, exert a significant influence on the entire project performance, possessing the largest weight compared to other stakeholders. This evidence underscores the significance of final quality control to prevent grievances and delays in project completion. The Critical Success Factor (CSF) method was employed to ascertain the project's major success determinants, resulting in "monitoring and evaluation" emerging as the most significant influence on project performance. Utilizing these data, a SWOT analysis was conducted to develop 16 enhancement strategies, categorized into four groups: S-O, S-T, W-O, and W-T methods. These techniques emphasize the utilization of technology, enhancement of inter-team communication, and fortification of quality management and process control systems. The results of this study highlight that the effectiveness of process management and the quality of performance monitoring significantly influence project success. Consequently, the execution of suitable methods is essential to augment efficiency, reduce the likelihood of delays, and bolster the company's competitiveness in forthcoming project management. Additional research is advised to investigate the correlation between project performance and financial factors to enhance the efficacy of project financial planning.

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