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Evaluation of the Implementation of Quality Management System in Risk-Based Construction Services Procurement Process to Improve Contractor Quality Performance in PT XYZ

Alda Dea Vinna[1], Yusuf Latief[2]

[1,2]Fakultas Teknik, Program Studi Teknik Sipil, Universitas Indonesia

Email: alda.dea@ui.ac.id[1], yusuflatief73@gmail.com[2]

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Abstract:
This study aims to evaluate the implementation of a risk-based Quality Management System (QMS) in the procurement process of construction services at PT XYZ to improve contractor performance quality. The research method used is descriptive, employing both qualitative and quantitative approaches. Data were collected through interviews, observations, document studies, and surveys using questionnaires. The study analyzes business processes, organizational structure, Standard Operational Procedures (SOPs), and quality objectives in the procurement of construction services based on the Presidential Regulation No. 12 of 2021 and the PMBOK Sixth Edition framework. Additionally, risk factors affecting contractor performance quality were identified, and their relationship to performance outcomes was analyzed using statistical methods and thematic analysis. The results indicate that the implementation of a risk-based QMS at PT XYZ requires improvements in integrating risk management with the procurement process. Key risk factors include supply delays, regulatory uncertainties, and inadequate monitoring of contractor activities. Proposed improvement strategies include enhancing inter-departmental coordination, strengthening SOPs, and conducting risk management training. Implementing these strategies is expected to enhance efficiency, effectiveness, and contractor performance quality while supporting project sustainability. This study provides practical contributions for PT XYZ and other construction companies in integrating risk-based QMS as an effort to improve the quality of construction service procurement.

Keywords: Quality Management System, Risk-Based, Construction Service Procurement

INTRODUCTION

Quality in the construction industry is a key factor that determines the success of a project. It includes meeting established standards, using high-quality materials, adhering to technical specifications, and performing work in accordance with correct procedures and methods (Amalia et al., 2024; Eko et al., 2024). Good quality not only ensures the safety and reliability of the built structure but also increases client satisfaction, reduces potential future repairs or failures, and extends the service life of the project (Sami'an, 2024); (Wicaksono & Wacono, 2021). In addition, focusing on quality helps build a positive reputation of the construction company, which in turn can open up greater business opportunities in the future (Hairuddin et al., 2022); (Mukhibat & Makmun, 2019). Therefore, the integration of an effective quality management system becomes a strategic element in ensuring projects run on time, within budget, and with optimal results.

PT XYZ is a company engaged in the automotive sector that produces, markets, and sells two-wheeled vehicles, four-wheeled vehicles, and outboard engines. PT XYZ is also supported by a network of after-sales services, spare parts, and vehicle maintenance and repair services that are spread and integrated throughout Indonesia in serving its customers. PT XYZ also exports two-wheeled vehicles

and four-wheeled vehicles to 81 countries around the world, with details of export destinations as follows: 21 countries in Europe, 3 countries in Africa, 7 countries in the Middle East, 12 countries in Asia, 6 countries in Oceania, and 31 countries in the Americas.

Currently, the percentage of shareholders in PT XYZ is 94.94% PT XYZ based in Japan, 4.55% PT XYZ Indonesia, and 0.51% PT PQR. According to data from the Association of Indonesian Automotive Industries (Gaikindo) in 2022, PT XYZ ranked fourth in automotive companies with the highest vehicle sales volume in Indonesia, reaching 7,651 units. With the increasing demand from year to year, the company will also increase production to meet consumer demand. To support this, PT XYZ has 1 head office, 4 main factories, 82 main dealers, and 617 outlets with the following details:

1. Pulogadung Head Office, as the center of operational administration and sales, with an area of 2,000 m2.
2. Cikarang Plant, as a manufacturing plant for car body and assembly components, engine assembly, and car transmission with an area of 1,307,000 m2 and also equipped with administrative offices, this plant has an area of 124,000 m2.
3. Tambun II Plant, as an automobile component manufacturing and assembly plant with an area of 420,000 m2.
4. Tambun Sparepart Factory, as a spare parts management and distribution center with an area of 125,000 m2.
5. 82 main dealers consisting of 51 car dealers, 21 motorcycle dealers, and 10 outboard engine dealers, spread throughout Indonesia.
6. 617 outlets consisting of 308 car outlets, 292 motorcycle outlets, and 17 outboard engine outlets.

To meet the need for goods / services within PT XYZ, a procurement process is held either by direct appointment, direct procurement, or tender. In the process, to get the best Vendor, PT XYZ continues to strive to refer to applicable regulations in Indonesia, namely Presidential Regulation Number 16 of 2018 concerning goods / services procurement policies which include:

a. Improve the quality of goods/services procurement planning
b. Carry out more transparent, open and competitive procurement of goods / services
c. Strengthening the institutional capacity and human resources of goods/services procurement
d. Develop an e-market place for goods/services procurement
e. Using information and communication technology, and electronic transactions
f. Encouraging the use of domestic goods/services and Indonesian National Standards
g. Providing opportunities for micro, small, and medium enterprises
h. Encouraging the implementation of research and creative industries
i. Implement sustainable procurement

As for its implementation, the procurement process must apply the principles of efficiency, effectiveness, transparency, openness, competition, fairness, and accountability. The principles mentioned earlier are the standard for the successful achievement of governance objectives within PT XYZ. Therefore, so that the principles mentioned can run and the company's targets can be achieved, PT XYZ compiles instruments that become a foothold in the implementation of the procurement process of goods / services within PT XYZ, namely in the form of departments, quality management systems, to standard operating procedures. Although these instruments have been prepared in such a way and refer to applicable regulations in Indonesia, in reality in the implementation in the field there are still many problems that occur, especially in the implementation of complex procurement, such as construction work. Construction work within PT XYZ often experiences problems ranging from specification mismatches, delays, to contract breaks that lead to blacklists. With these obstacles, it will have an impact on the operational process either in a section, a department, or a work area. Here are

some documented construction contract problems in the last 5 years.**Table 1. Construction Contract Issues**

No.	Name of work	Year	Value of work	Status	Problems	Problem Cause Analysis
1.	Cikarang Dormitory Floor Casting Work	2023	Rp 450.000.000	Blacklisted	- Work is not based on agreement and approval of service users so that it cannot be accepted and causes problems	- The absence of material specification standards set by PT XYZ - No routine inspection of work - The absence of a checklist form as evidence that checks have been carried out to ensure the suitability of material specifications in the bid with the materials used in the field.
2.	Tambun Injection Plant Roof Replacement	2022	Rp. 222.125.441	Blacklisted	- Workers do not use personal protective equipment properly, causing work accidents - During the work, it was found that the specifications of the materials used were not in accordance with the requirements.	- The absence of standard requirements set by PT XYZ in the bidding related to the application of safety in the work process - The absence of standard material specifications set by PT XYZ
3.	Dormitory Pejaten Channel	2022	Rp 69.495.200	Blacklisted	- Material specifications used were not in	- The absence of material specification

	Area Repair Work				accordance with the agreement - During the maintenance period it was found that the concrete had cracked, the quality of work was considered poor	standards set by PT XYZ - Absence of routine inspections during work execution
4.	Installation Work of Dust Collector Plant Tambun	2021	Rp 1.210.788.244	Blacklisted	- During the installation of the dust collector there was a fire due to the negligence of the service provider	- Absence of service provider selection criteria - Selection of service providers is not based on their competence
5.	Exterior Painting Work of Cikarang Dormitory Building	2021	Rp 202.000.000	Blacklisted	- During inspection of the work, it was found that the specifications of the materials used were not in accordance with the requirements.	- The absence of material specification standards set by PT XYZ - Absence of routine inspections during work execution
6.	Tambun Plant Genset Repair Work	2021	Rp 55.680.719	Blacklisted	- During the execution of the work there was an explosion because the service provider did not have the ability to complete the work	- Absence of service provider selection criteria Selection of service providers is not based on their competence
7.	Pejaten Dormitory Frame Replacement Work	2021	Rp 78.119.320	Blacklisted	- The service provider was unable to show work progress after	- Absence of service provider selection criteria - Selection of service

					being given the opportunity.	providers is not based on their competence
8.	Grand Wisata Showroom Construction Work	2020	Rp 13.985.600.000	Blacklisted	- 6 months after the handover process, the concrete deck area collapsed on a number of vehicles belonging to the customer.	- During the tender process, there was no BoQ from PT XYZ. BoQs were prepared by each participating contractor with different specifications. - No routine inspection of work
9.	BSB Semarang Showroom Construction	2019	Rp. 20.000.000.000	Blacklisted	- Building quality is assessed as poor and construction failure occurs - Service provider is dissolved	- Selection of service providers is not based on clear criteria - During the tender process, there was no BoQ from PT XYZ. BoQ was prepared by each participating contractor with different specifications. - No routine inspection of work
10.	Puri indah Showroom Renovation	2019	Rp 14.000.000.000	Blacklisted	- Building quality is poor and construction failures occur	- Selection of service providers is not based on clear criteria - During the tender process, there was no BoQ from PT XYZ.

						BoQ was prepared by each participating contractor with different specifications. - No routine inspection of work

Based on the table above, the analysis of the causes of construction work failure problems occurs due to the absence of standard material specifications set by PT XYZ, the absence of routine work inspections, the absence of a checklist form as evidence that checks have been carried out to ensure the suitability of material specifications in the bid with the materials used in the field, the selection of service providers is not based on clear criteria, there is no BoQ from PT XYZ which causes the BoQ to be prepared by each participating contractor with different specifications, and others. This is related to the construction services procurement process at PT XYZ which has not yet referred to Presidential Regulation Number 12 of 2021 and PMBOK, so that in the process with the construction services procurement process at PT XYZ there are important activities that should exist but are not carried out at PT XYZ, such as there are criteria for selecting service providers, there are HPS preparation activities during the procurement planning process, there are job inspection activities in the work implementation process (procurement control), and others.

The analysis of the causes mentioned earlier has the potential to cause problems such as delays in work completion, mismatches in service provider competencies, and mismatches in work results related to specifications, which are quite common and are in the spotlight in the work environment of PT XYZ. These problems have an impact on the low quality of work and poor work results (Lisananda, 2021; Lubis, 2016). Problems that occur can be caused by changes in project design and unfriendly weather conditions, but this can be overcome if the contractor implements a good performance management system. Therefore, the process of selecting and determining a contractor becomes something that is considered quite crucial before starting a construction work project. The success in selecting a contractor can be determined by the tender process and the qualification process applied (Fassa, 2020; Purwana, 2022).

Quality Management System (QMS) is a systematic framework designed to ensure that all processes in an organization run consistently according to established quality standards (Putri, 2022; Safitri, 2020). In construction projects, the implementation of QMS plays an important role in improving operational efficiency, management effectiveness, and compliance with quality standards. QMS helps identify, manage, and control various risks that can affect project quality, such as the use of materials that do not meet specifications or the implementation of work that is not in accordance with procedures (Darmawan et al., 2020). With a QMS in place, organizations can ensure that all construction activities are planned, executed, and evaluated in a structured manner. This not only improves the quality of project outcomes but also reduces waste, accelerates project completion, and ensures client and stakeholder satisfaction.

Risk-based management is a strategic approach that focuses on identifying, analyzing, and mitigating risks that may affect the achievement of construction project objectives (Rahmiwijayanti, 2018; Simanjuntak et al., 2022). In the procurement of construction services, this approach is relevant because it is able to anticipate potential problems such as delays, increased costs, or decreased quality

due to technical, operational, or administrative risks (Perwiranegara, 2024). By understanding risks early on, project managers can develop effective mitigation plans, such as selecting competent service providers, ensuring regulatory compliance, and optimizing resource allocation (Suryaningsum et al., 2016). This approach also increases transparency and accountability in the procurement process, helping to ensure service quality and project sustainability (Masgode et al., 2024).

Previous research by (Lestari et al., 2024) showed that implementing a QMS integrated with risk management can help contractors meet quality standards, reduce operational errors, and improve project efficiency. Research by (Safitri, 2020) also reveals the importance of QMS adaptation to the specific needs of companies, including in the construction sector, to optimize results. For example, research by (Arum, 2020) highlights how the use of ISO 9001 in procurement processes can improve regulatory compliance and lower potential project claims. In addition, (Djamaris & Asmi, 2023)'s work on risk management implementation showed that this approach is effective in identifying key risks, such as supply delays or technical issues, enabling more strategic decision-making. These results provide a strong basis for research at PT XYZ to evaluate how the implementation of a risk-based QMS can improve contractor performance and support the achievement of construction project objectives.

This research is significant because it aims to improve the effectiveness and efficiency of the construction procurement process at PT XYZ through evaluating the implementation of a risk-based Quality Management System (QMS). By identifying weaknesses in the procurement process and risks that may affect the quality of contractor performance, this research makes a real contribution to the development of a more structured and proactive management strategy.

This research aims to provide a comprehensive evaluation of the construction services procurement process at PT XYZ with a risk-based approach and Quality Management System (QMS). Specifically, this research aims to identify business processes and procurement activities based on the company's internal practices, Presidential Regulation No. 12 of 2021 regulations, and PMBOK 6th Edition framework. In addition, this research also aims to recommend improvements to procurement activities, identify the organizational structure, Standard Operational Procedure (SOP), and quality objectives applicable at PT XYZ. This research will also identify risk factors that affect the quality of contractor performance and analyze the relationship between these risks and performance outcomes. Furthermore, this research aims to develop a QMS strategy that can improve the quality of contractor performance in the context of construction services procurement at PT XYZ. The results of this research are expected to help PT XYZ in ensuring compliance with quality standards, reducing potential project failures, and increasing competitiveness in the construction industry. In addition, this research is also relevant to the industry in general as it offers practical insights on the integration of QMS and risk management, which can be applied to drive the success of other construction projects.

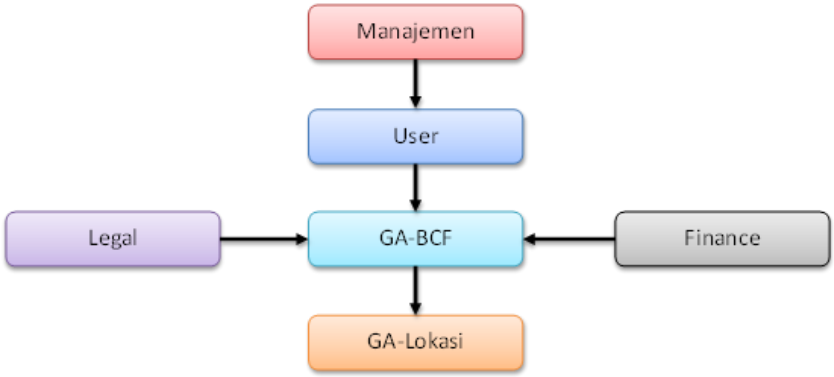
RESEARCH METHODS

This research uses a descriptive method with a qualitative and quantitative approach to evaluate the implementation of a risk-based Quality Management System (QMS) in the construction services procurement process at PT XYZ. This approach aims to obtain a comprehensive picture of the business process, organizational structure, Standard Operational Procedure (SOP), and quality objectives in the procurement of construction services. Data was collected through in-depth interview techniques, direct observation, and document studies that included relevant regulations, such as Presidential Regulation Number 12 of 2021 and the PMBOK 6th Edition framework. In addition, a questionnaire survey was conducted to identify risk factors that affect the quality of contractor performance and to analyze the relationship between these risks and the achievement of expected quality standards.

Data analysis was conducted using a triangulation approach, where the results of interviews, observations and surveys were compared to ensure the validity and reliability of the findings. Quantitative data from the survey was analyzed using descriptive and inferential statistical methods to determine the pattern of relationships between the variables studied. Meanwhile, qualitative data from interviews and observations were thematically analyzed to identify key issues in implementing a risk-based QMS. With this method, the research is expected to provide applicable recommendations for PT XYZ to improve the efficiency, effectiveness, and quality of contractor performance through optimizing the risk management-based procurement process.

RESULTS AND DISCUSSION

Organization Structure



Ficture 1.Organizational Structure of the Construction Services Procurement Process at PT XYZ

The organizational structure of the construction procurement process at PT XYZ is designed to ensure effective coordination between various parties. Management acts as a strategic decision maker by giving final approval to procurement. Users, as the party that needs construction services, are in charge of identifying project needs and submitting procurement requests to GA-BCF. Furthermore, GA-BCF acts as the main manager of the procurement process, starting from the preparation of tender documents, contractor evaluation, to project implementation.

In this process, GA-Location is responsible for field supervision to ensure the work meets specifications, while Legal handles the legal aspects of the contract, and Finance ensures budget and payment management. All parties are interconnected to support the smooth running of procurement, from planning to evaluation of work results, so as to achieve efficiency, accountability and quality in the implementation of construction projects.

The organizational structure of the construction procurement process at PT XYZ plays an important role in ensuring a coordinated, efficient, and compliant workflow. This structure includes various elements, such as the procurement team, project managers, and other supporting units, which work together to manage the tender process, contractor evaluation, and contract execution. Research by (Marthiasari et al., 2024; Septianingsih, 2022) emphasizes that a clear and integrated organizational structure can increase transparency and accountability in the procurement of construction services. In addition, research by (Hermawan, 2023) found that unclear division of roles and responsibilities is often the cause of delays and decreased quality of project results. In the context of PT XYZ, an evaluation of the organizational structure was conducted to identify crucial roles and potential barriers, so as to support the implementation of a risk-based Quality Management System (QMS) more optimally in improving contractor performance.

Standard Operational Procedure (SOP) on the Procurement Process of Construction Services at PT XYZ

Based on the results of data collection and analysis, SOP improvements were made to the construction service procurement process identified at PT XYZ which was the result of integration of Presidential Regulation No. 12 of 2021 and PMBOK Edition K-6. The SOP improvement in the construction services procurement process at PT XYZ consists of six processes, including procurement planning, procurement preparation, preparation for the selection of construction services, implementation of the selection of construction services, contract implementation, and handover of work. The following describes each finding in the construction services procurement process at PT XYZ.

Procurement Planning

In procurement planning there are 2 (two) additional activities which can be seen in the following table. Additional activities are colored red.

Table 2. Findings on Procurement Planning at PT XYZ

No.	Before Improvement	After Improvement
1.	User creates a project request memo	User creates a project request memo that has been approved by the Dept. Head with complete attachments: - Scope of work - Field photos/documentation - Project layout - Target implementation / utilization
2.	GA BCF receives project requests submitted by users	Project request memo that has been approved by Dept. Head sent to Location GA Staff
3.		Site GA staff sends project request memo to GA-BCF construction services procurement staff
4.		Review the completeness of information in the submitted project request memo

Source: Author's Preparation

Procurement Preparation

In preparation for procurement there are 4 (four) additional activities which can be seen in the following table. Additional activities are colored red.

Table 3. Findings on Procurement Preparation at PT XYZ

No.	Before Improvement	After Improvement
1.		Conduct on site surveys related to the scope of work and volume of work
2.		Conducting the preparation of Own Estimate Price (HPS)
3.		The user reviews the self-estimated price (HPS) that has been prepared by the GA-BCF construction services procurement staff.
4.		Approve the HPS preparation process by signing it until the tender document with the final HPS is approved.

Source: Author's Preparation

Preparation for Selection of Construction Services

In preparation for the selection of construction services there are 2 (two) additional activities which can be seen in the following table. Additional activities are colored red.

Table 4. Findings on Preparation for Selection of Construction Services at PT XYZ

No.	Before Improvement	After Improvement
1.	GA BCF together with the user conducts the Aanwijzing process (explanation of work) to the tendering contractor.	Establish a procurement schedule
2.	Participating contractors receive invitations to tender	Determine participating contractors based on source selection criteria
3.		Send tender invitations to participating contractors
4.		Kontraktor peserta menerima undangan tender

Source: Author's Preparation

Implementation of Construction Services Selection

In the implementation of the selection of construction services there are 3 (three) additional activities which can be seen in the following table. Additional activities are colored red.

Table 5. Findings on Preparation for Selection of Construction Services at PT XYZ

No.	Before Improvement	After Improvement
1.	GA BCF together with the user conducts the Aanwijzing process (explanation of work) to the tendering contractor.	GA-BCF construction services procurement staff together with contractors, users, and Site GA carried out the aanwijzing process. In the aanwijzing process, there is also a clarification process regarding whether or not there is additional work.
2.	Tendering contractors submit price quotations in accordance with the provisions presented in the Aanwijzing process.	GA-BCF construction procurement staff send tender documents and MOM aanwijzing to tendering contractors.
3.	The complete price bid verification process is as follows: - Bid validity period - Method of payment - Method and time of implementation	Tendering contractors submit price quotation documents in accordance with the provisions presented during the aanwijzing.
4.	GA BCF carries out the price analysis process in accordance with predetermined provisions including: - work item verification process - price clarification & negotiation process	GA-BCF construction services procurement staff opened the price bidding documents witnessed by the section head/group head.

No.	Before Improvement	After Improvement
	- price determination process	
5.	Users create and submit AFA requests based on price analysis submitted by GA BCF in accordance with company regulations	GA-BCF's construction services procurement staff checks the completeness of the price bid documents submitted by contractors with due regard: - Completeness of tender documents - Bid validity period - Payment method
		GA-BCF construction procurement staff conducts the evaluation process of price bidding documents and conducts price negotiations (if needed).
		Price analysis approval process by BCF Section Head, then price analysis is sent to Procurement for approval.
		GA-BCF construction services procurement staff determines and announces the winner to all participating contractors while taking into account objections (if any).
		GA-BCF's construction procurement staff sends the approved price analysis to the GA-Location for AFA preparation.
		GA-Location makes and submits an AFA request to management based on the price analysis from GA-BCF.
		AFA project that has been approved by management will be received by the user
		User will send the approved AFA to GA-BCF Construction Services Procurement staff.

Source: Author's Preparation

Contract Implementation

In the implementation of the contract there are 11 (eleven) additional activities which can be seen in the following table. Additional activities are colored red.

Table 6. Findings on Contract Implementation at PT XYZ

No.	Before Improvement	After Improvement
1.	GA BCF issues and distributes the Letter of Agreement (SPB) and Work Order (SPK) to the contractor.	GA-BCF drafts the Letter of Agreement (SPB) and Work Order (SPK) In this case, the Legal section is also involved.
2.	The contractor applies for a project work permit in accordance with the terms and conditions that have been set.	The Borongan Agreement Letter (SPB) and Work Order Letter (SPK) are sent to the Legal department for review.
3.	Contractors carry out project work in accordance with predetermined provisions	After the Borongan Agreement Letter (SPB) and Work Order Letter (SPK) have been reviewed and approved by all parties involved (GA-BCF, Section Legal, Contractor), the SPB and SPK are submitted to the contractor.

No.	Before Improvement	After Improvement
4.		The contractor makes an application for a project Work Permit Letter (SIK) in accordance with the terms and conditions that have been determined.
		The contractor sends the Work Permit to the Site GA and safety team at each work site for approval.
		Advance payments to contractors are made by the Finance and Accounting department.
		The contractor prepares a quality program for each project
		GA-BCF construction procurement staff reviews the quality program for each project and sends it to GA-Location.
		GA-Location staff receive and monitor the quality program to be used as a reference in supervising the construction project implementation process.
		GA-BCF construction services procurement staff sends invitations to project implementation preparation meetings.
		The contractor receives the invitation to the project implementation preparation meeting and the meeting is held together with the GA-BCF construction services procurement staff, GA-Location, and the user.
		Contractors carry out project work in accordance with predetermined conditions
		GA-Location staff make weekly progress monitoring reports which are also reported to GA-BCF.
		GA-BCF construction services procurement staff inspect the work in the field (together with GA-Location staff) to check the conformity of the quality list with actual conditions.
		Users provide an assessment on the contractor's performance evaluation form along with assessments from GA-Location and GA-BCF which will then become an attachment in the work handover process.
		GA-BCF construction services procurement staff sends the evaluation form to the contractor.

Source: Author's Preparation

Handover of Work

In the handover of work there are 5 (five) additional activities which can be seen in the following table. Additional activities are colored red.

Table 7. Findings on Handover of Work at PT XYZ

No.	Before Improvement	After Improvement
1.	Users and contractors carry out the work handover process equipped with:	GA-BCF construction procurement staff, GA-Location, and users coordinate on the final deliverables.

No.	Before Improvement	After Improvement
	- Minutes of Work Completion - Final documentation of work	
2.		GA-BCF Construction Services Procurement staff sends invitation to handover work to contractor
3.		The contractor accepts the invitation to hand over the work by preparing the complete documents: - Minutes of Handover of Work - Work Checklist
4.		GA-BCF carries out the work handover process which is carried out together with GA-Location, users and contractors. The work handover document will be processed for approval by the Department Head of GA-Location.
5.		The work handover document that has been approved by the GA-Location Department Head will be sent to the GA-BCF construction services procurement staff for approval by the BCF Department Head.
6.		Payment of work by the Finance and Accounting Department

Source: Author's Preparation

Standard Operational Procedure (SOP) in the process of procuring construction services at PT XYZ is a work guide that aims to ensure that all stages of procurement are carried out consistently, efficiently, and in accordance with predetermined quality standards. Research by (Rakhman, 2023) the existence of a structured SOP can reduce the risk of administrative errors and increase accuracy in contractor assessments. The study by (Muka, 2024) revealed that the improvement of SOPs in the procurement of construction services contributed significantly to mitigating potential conflicts between service providers and users. At PT XYZ, SOP evaluation is carried out to ensure compliance with the latest regulations such as Presidential Regulation Number 12 of 2021 and the PMBOK 6th Edition framework, so that existing SOPs can support the implementation of a risk-based Quality Management System (QMS) and improve the quality of contractor performance.

Quality Objectives in Construction Services Procurement

Based on the results of data collection and analysis, it was found that there are 54 quality objectives that are the main guidelines in the process of procuring construction services at PT XYZ. These quality objectives are designed to measure the performance of each activity in various stages of the business process, from planning, implementation, to project evaluation. They serve not only as quality control tools, but also as indicators to ensure that every step in the procurement process is in line with the set standards. Once identified, each quality objective is validated through a systematic process to ensure its relevance to the company's strategic objectives. Next, an in-depth analysis is conducted to evaluate the level of achievement and potential for improvement, so that the procurement process can be continuously improved to support operational efficiency, effectiveness and accountability.

(Syarif et al., 2023) revealed that clear and measurable quality objectives can reduce implementation deviations and improve compliance with project specifications. In addition, (Siswanto & Salim, 2019) revealed that quality objectives agreed between users and construction service providers contribute to the creation of harmonious working relationships and improved quality of project results. Thus, setting good quality objectives can support the achievement of time, cost, and technical specification targets.

Risk Factors in the Construction Services Procurement Process at PT XYZ

Based on the results of data collection and analysis, there are 10 (ten) highest risk events. The risk events are as follows:

Table 8. Highest Risk Variables

Variable	Average Frequency Score	Average Impact Score	Risk Value	Risk Level	Risk Ranking
X1	0,408	0,271	0,111	Medium	10
X2	0,317	0,213	0,067	Medium	26
X3	0,142	0,175	0,025	Low	46
X4	0,175	0,154	0,027	Low	43
X5	0,483	0,600	0,290	High	1
X6	0,342	0,217	0,074	Medium	19
X7	0,342	0,204	0,070	Medium	24
X8	0,175	0,188	0,033	Low	42
X9	0,342	0,238	0,081	Medium	17
X10	0,350	0,317	0,111	Medium	9
X11	0,225	0,183	0,041	Low	38
X12	0,183	0,183	0,034	Medium	41
X13	0,183	0,138	0,025	Medium	45
X14	0,133	0,158	0,021	Medium	48
X15	0,325	0,254	0,083	Medium	15
X16	0,483	0,392	0,189	High	4
X17	0,133	0,138	0,018	Low	53
X18	0,425	0,154	0,066	Medium	27
X19	0,183	0,125	0,023	Low	47
X20	0,367	0,208	0,076	Medium	18
X21	0,183	0,233	0,043	Low	37
X22	0,342	0,142	0,048	Low	34
X23	0,467	0,329	0,154	Medium	8
X24	0,275	0,142	0,039	Low	39
X25	0,325	0,208	0,068	Medium	25
X26	0,133	0,113	0,015	Low	54
X27	0,150	0,133	0,020	Low	50
X28	0,167	0,158	0,026	Low	44
X29	0,450	0,138	0,062	Medium	31
X30	0,158	0,129	0,020	Low	49
X31	0,217	0,179	0,039	Low	40
X32	0,150	0,129	0,019	Low	52
X33	0,442	0,158	0,070	Medium	23
X34	0,133	0,146	0,019	Low	51
X35	0,417	0,217	0,090	Sedang	12
X36	0,308	0,183	0,057	Low	33
X37	0,417	0,217	0,090	Medium	11
X38	0,325	0,200	0,065	Medium	28
X39	0,375	0,196	0,073	Medium	20
X40	0,425	0,146	0,062	Medium	30

X41	0,300	0,238	0,071	Medium	21
X42	0,408	0,204	0,083	Medium	14
X43	0,392	0,208	0,082	Medium	16
X44	0,325	0,263	0,085	Medium	13
X45	0,525	0,438	0,230	Medium	3
X46	0,325	0,217	0,070	Medium	22
X47	0,558	0,467	0,261	High	2
X48	0,450	0,371	0,167	Medium	6
X49	0,392	0,158	0,062	Medium	29
X50	0,308	0,188	0,058	Low	32
X51	0,200	0,225	0,045	Low	36
X52	0,242	0,192	0,046	Low	35
X53	0,483	0,379	0,183	High	5
X54	0,408	0,388	0,158	Medium	7

Source: Author's Preparation

Based on the results of the qualitative risk analysis of all variables, it was found that the risk events were at low and medium levels. To fulfill the minimum sample requirement of 10% of the total 54 variables, 6 events with the highest risk were selected. However, these six events do not represent all business processes, because they do not cover all construction service procurement business processes. Therefore, additional variables were selected to represent all construction procurement business processes. These highest risk events need to be anticipated so that quality objectives can be achieved. The response to these risks can be seen in the following figure.

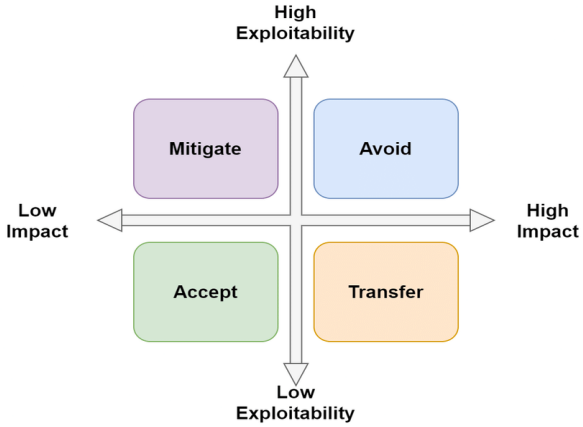


Figure 2. Risk Response Strategies

Based on the figure above, it can be concluded that high and medium level risks require a strategic response to minimize their impact on project success. The recommended approach for these risks is through mitigation or transfer strategies. Mitigation involves proactive measures to reduce the likelihood of the risk occurring or its impact, such as increasing supervision, strengthening planning, or providing additional resources. Meanwhile, a transfer strategy involves transferring some or all of the consequences of the risk to another party, such as through insurance or subcontractor contracts that include responsibility for certain risks. (Pattiraja et al., 2024; Sholeh, 2023) state that high risks in procurement, such as material supply delays and regulatory uncertainty, can be minimized through the implementation of risk analysis-based mitigation strategies. This approach allows organizations to manage risks more effectively, reduce the direct burden on the project management team, and ensure that potential disruptions to the procurement process or project execution are minimized.

Development of Quality Management System in the Procurement Process of Construction Services at PT XYZ

Based on the results of data collection, causes, impacts, and preventive and corrective actions related to the highest risk events were found. The data analysis showed a link between the causes and impacts of the highest risks, which can be seen in the following table.

Table 5. 11 Risk Cause and Impact Matrix by Process Category

Kategori	X1.1	X2.1			X2.6			X3.5		X4.6	X5.13			X5.15			X5.16			X6.3		X6.4		Dampak																		
	X1.1	X5			X10			X16		X23	X45			X47			X48			X53		X54																				
Penyebab	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P16	P17	P18	P16	P19	P20	P21	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15	D16	D17	D18
X1	X																							X																		
X2		X	X	X	X	X	X																		X	X	X	X	X	X	X	X									
X3								X	X																							X									
X4										X																							X								
X5											X	X	X	X	X	X	X	X	X															X	X	X					
X6																				X	X	X	X													X	X	X	X	X	X

Source: Author's Preparation

From the table above, it can be seen that each category has similar and different causes and impacts. For example, in the procurement preparation process, there are risks X2.1, and X2.6 caused by P2, P3, P4, P5, P6, and P7, which will impact D2, D3, D4, D5, D6, D7, D8, and D9. Another example, there is the contract execution process that has risks X5.13, X5.15, and X5.16 caused by P11, P12, P13, P14, P15, P16, P17, and P18, which will impact D12, D13, and D14. One of the risks with the same impact is X6.3, where the service provider uses specifications that are not in accordance with the provisions will have an impact on unacceptable work so that the time to complete the work is delayed or even the work becomes abandoned (D10). In addition to cause and impact mapping, recognition pattern mapping is also carried out to find out how Preventive Action (TP) can be applied to each Cause (P) for the highest risk event in the construction services procurement process at PT XYZ. Likewise, Corrective Action (TK) is applied to the Impact (D) arising from each of the highest risk events.

Through such mapping, each risk can be analyzed in depth to determine the most effective mitigation and response priorities. Preventive Actions (TP) aim to reduce the likelihood of risk causes occurring, such as improving oversight at the procurement preparation stage or tightening the selection of service providers to ensure technical specifications are met. On the other hand, Corrective Actions (TK) are designed to minimize the impact once the risk has occurred, for example by speeding up the process of document revision or contract adjustment to reduce further delays. This approach allows PT XYZ to not only respond to risks reactively, but also adopt proactive measures in risk management at every stage of the procurement process. Thus, a structured application of TP and TK can improve operational efficiency while maintaining the overall quality of project performance.

CONCLUSIONS

The conclusion of this study shows that the implementation of risk-based Quality Management System (QMS) in the procurement process of construction services at PT XYZ has a strategic role in improving the quality of contractor performance. The identification of business processes, organizational structure, Standard Operational Procedure (SOP), and quality objectives revealed that although PT XYZ has adopted QMS principles, there are still some weaknesses in its implementation, such as the lack of integration between risk management and procurement process. Key risk factors affecting the quality of contractor performance include supply delays, regulatory uncertainty, and lack of monitoring of contractor activities. The findings emphasize the need to strengthen a more risk-based procurement system to mitigate potential problems and ensure compliance with quality standards.

The study also concluded that optimization of risk-based QMS implementation can be achieved through the development of strategies focused on improving inter-departmental coordination, developing more comprehensive SOPs, and training personnel on risk management. In addition, analysis of the relationship between risk and performance shows that proactive risk management significantly improves procurement efficiency and effectiveness, while increasing client satisfaction with project outcomes. The recommendations generated from this research are not only relevant for PT XYZ but can also serve as a reference for other construction companies in implementing a similar approach to support the sustainable success of construction projects.

REFERENCES

[1] Amalia, N., Nabila, U., Abbas, F. M., & Putra, W. D. (2024). Penerapan Prinsip Lean Contruction dalam Sistem Manajemen Mutu Konstruksi untuk Meningkatkan Produktivitas dan Kualitas. *Journal of Comprehensive Science (JCS)*, *3*(5).

[2] Arum, A. S. (2020). *Analisis Penerapan Sistem Manajemen Mutu ISO 9001: 2015 di PT Indocement Tunggal Prakarsa Tbk, Unit Operasi Citeureup*. Fakultas Ekonomi dan Bisnis Universitas Pakuan.

[3] Darmawan, A., Wacono, S., & Saputra, J. (2020). Penerapan Sistem Manajemen Mutu Iso 9001 pada Kontraktor Pt. X. *Construction and Material Journal*, *2*(3), 201–211.

[4] Djamaris, A., & Asmi, A. (2023). *Proyek Tepat Waktu Menyingkap Faktor Keterlambatan dan Solusi Proyek Konstruksi di Indonesia*. Universitas Bakrie Press.

[5] Eko, D., Prihandono, S. T., Ngurah, G. D. M., Anzas, I. K., & Putra, D. A. (2024). *Manajemen efektif dalam proyek konstruksi: perencanaan dan pengendalian: buku referensi*.

[6] Fassa, F. (2020). *Metode pengadaan jasa konstruksi dan proses penawaran*. Podomoro University Press.

[7] Hairuddin, A., Ashad, H., & Bachmid, S. (2022). Analisa Sistem Manajemen Mutu ISO 9001: 2015 Pada Proyek Pembangunan Gedung Pusat Pelayanan Haji Dan Umrah Terpadu (PLHUT) Kabupaten Jeneponto. *Jurnal Konstruksi: Teknik, Infrastruktur Dan Sains*, *1*(10), 1–11.

[8] Hermawan, D. A. (2023). *Studi Faktor-Faktor Penyebab Keterlambatan Pengadaan Tanah Dan Pengaruhnya Terhadap Waktu Pelaksanaan Proyek Pembangunan Bendungan Bagong Paket 1 Di Kabupaten Trenggalek (MYC)*. Universitas Islam Indonesia.

[9] Lestari, I. G. A. A. I., Diputera, I. G. A., & Purwana, I. K. E. D. (2024). Kajian Penerapan Standardisasi Sistem Manajemen Mutu Iso 9001: 2015 Pada Perusahaan Kontraktor Di Kabupaten Karangasem: Studi Kasus: PT. Arsa Buana Manunggal dan PT. Dharma Buana Karya. *Jurnal Ilmiah Kurva Teknik*, *13*(1), 49–59.

[10] LISANANDA, A. A. (2021). *Manajemen Risiko Konstruksi pada Proyek Pembangunan Perpipaan Air Limbah berdasar Konsep ISO 31000: 2018 Risk Management-Guidelines*.

[11] Lubis, M. R. I. (2016). Perbaikan Proses Konstruksi Pembangunan Pipa Gas Dengan Penerapan Metode Lean Construction Untuk Mereduksi Waste. *Sepuluh Nopember Institute of Technology, Surabaya*.

[12] Marthiasari, G. F., Hidayat, S. A., Bahari, M. A., Nugroho, L. S., & Setiyani, L. (2024). Analisis Perencanaan Proyek Pengembangan Sistem Informasi Procurement. *Dirgamaya: Jurnal Manajemen Dan Sistem Informasi*, *4*(3), 9–15.

[13] Masgode, M. B., Hidayat, A., Laksmi, I. A. C. V., Triatmika, I. N. A., Puspayana, I. P. A. I., Iskandar, A. A., Syarif, M., Rachman, R. M., Herlambang, A. R., & Dirgantara, A. (2024). *Dinamika Industri Konstruksi di Indonesia*. Tohar Media.

[14] Muka, I. W. (2024). Penerapan Manajemen Mutu Sesuai Iso 9001: 2015 pada Kontraktor Pt. Narendra Putra Dewata. *Teknika*, *19*(1), 17–25.

[15] Mukhibat, M., & Makmun, A. R. (2019). *Implementasi Risk Based Thinking dalam Pengembangan Sistem Manajemen Mutu di Institut Agama Islam Negeri Ponorogo*.

[16] Pattiraja, A. H., Gai, A. M., Pontan, I. D., SE, M. T., MM, I. P. M., Eng, A., & Sahrullah, S. T. (2024). *Manajemen proyek teknik sipil strategi dan taktik untuk proyek konstruksi: buku referensi*. PT. Media Penerbit Indonesia.

[17] Perwiranegara, A. F. (2024). *Strategi Manajemen Risiko dan Percepatan Pekerjaan Untuk Mereduksi Waktu dan Biaya Pada Proyek Konstruksi (Studi Kasus: Proyek Pengendalian Banjir Dan Rob Sungai Loji-Banger Paket 1)*. Universitas Islam Sultan Agung (Indonesia).

[18] Purwana, I. K. E. D. (2022). *Analisis Penerapan Standardisasi Sistem Manajemen Mutu ISO 9001: 2015 pada Perusahaan Kontraktor di Kabupaten Karangasem (Studi Kasus: PT. Arsa Buana Manunggal dan PT. Dharma Buana Karya)*. Universitas Mahasaraswati Denpasar.

[19] Putri, N. T. (2022). *Manajemen kualitas produk dan jasa*. Andalas University Press.

[20] Rahmiwijayanti, H. (2018). *Analisa Sistem Pengukuran Kinerja Manajemen PT. XYZ Berbasis Risiko dengan Pendekatan Konsep AHP dan OMAX*. Institut Teknologi Sepuluh Nopember.

[21] Rakhman, A. A. (2023). Penyusunan Standar Operasional Prosedur (SOP) Perencanaan Pengadaan Barang/Jasa.

Jurnal Pengadaan Barang Dan Jasa, *2*(1), 47–59.
[22] Safitri, F. R. N. (2020). *Tinjauan Mutu Pada PT. XYZ Berdasarkan Sistem Manajemen Mutu ISO 9001: 2015*. Institut Teknologi Sepuluh Nopember.
[23] Sami'an, S. H. (2024). *Manajemen Konstruksi dan Klaim Konstruksi*. CV. Oxy Consultant.
[24] Septianingsih, C. A. (2022). *Analisis Perencanaan Pengadaan Dan Sistem Pengadaan Barang Jasa Secara Elektronik (E-Procurement) Dalam Mewujudkan Transparansi Dan Akuntabilitas*.
[25] Sholeh, M. N. (2023). *Manajemen Risiko Proyek Konstruksi*. Universitas Diponegoro.
[26] Simanjuntak, I. J., Siagian, R. T., Prasetyo, R., Rozak, N. F., & Purba, H. H. (2022). Manajemen Risiko Pada Proyek Konstruksi Jembatan: Kajian Literatur Sistematis. *Jurnal Teknologi Dan Manajemen*, *20*(1), 59–76.
[27] Siswanto, A. B., & Salim, M. A. (2019). *Proyek*.
[28] Suryaningsum, S., Wulandari, R., & Ahmadyansyah, A. (2016). *Manajemen Risiko. Cet 1*. LPPM Universitas Pembangunan Nasional" Veteran" Yogyakarta.
[29] Syarif, M., Purnama, H., Latupeirissa, J. E., Gusty, S., Putri, T. S., Latif, F., Wiriantari, F., & Pagoray, G. L. (2023). *Manajemen Proyek Konstruksi*. TOHAR MEDIA.
[30] Wicaksono, S. P., & Wacono, S. (2021). Analisis Penerapan Sistem Manajemen Mutu ISO 9001: 2015 Terhadap Kinerja Biaya Mutu Pada Proyek UIN Sulthan Thaha Saifudin Jambi. *Jurnal Ilmiah Rekayasa Sipil*, *18*(2), 156–166.