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Maturity Level of Client in the Implementation of Construction Safety Management System

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Abstract

The implementation of the Construction Safety Management System (SMKK) generally focuses on contractors because accidents often occur during construction work. However, construction safety is a shared responsibility among all parties involved in construction projects. This study aims to identify the safety maturity level of clients in the implementation of SMKK and to develop strategies to improve client safety maturity so that SMKK implementation can be enhanced. The measurement of client safety maturity used criteria based on the audit form attached to Permen PUPR No. 10 of 2021 concerning SMKK, which was validated by experts through two rounds of the Delphi method. Respondent samples were selected based on specific criteria using purposive sampling to obtain respondents who served as Budget User Representatives, Commitment-Making Officials, and Procurement Working Groups in the procurement of construction goods and services. Expert validation was used to assess the suitability of conditions and formulate strategies. The results of the study showed that the maturity level of clients was between reactive and compliant. Internal audits and management reviews by clients in the implementation of SMKK were generally conducted only when accidents occurred. To improve SMKK implementation, clients need to establish clear procedures as references for conducting audits and management reviews.

INTRODUCTION

Construction is one of the high-risk industries (Yiu et al., 2019). In Indonesia, there were 150 accident cases in construction projects throughout 2010–2022, based on case data from District Courts, High Courts, and the Supreme Court (Bria et al., 2024). In response to this issue, the government has established regulations on occupational safety through the Regulation of the Minister of Public Works and Public Housing No. 10 of 2021 concerning the Construction Safety Management System (Sapitri et al., 2023). Although various safety policies have been implemented, conditions in the field show that accidents still occur frequently (Zulkarnain et al., 2025). The lack of client participation in construction safety and health is one of the factors contributing to the high rate of work accidents in the construction industry (Khoza & Haupt, 2021).

Research on the influence of clients' roles on occupational safety and health performance remains limited and generally focuses on the role of service providers because accidents often occur during the implementation of construction work. The implementation of occupational safety is the responsibility of all parties, and all parties must contribute to building an occupational safety culture in the project environment. One of the best ways to increase awareness of construction safety is through clients, who are responsible for being involved in

all stages of the work (Holen et al., 2024) (Onubi et al., 2020) (Indrayana et al., 2023) (Keun Oh et al., 2021) (Hastama et al., 2023).

As the initiators of construction projects, clients have the ability to influence occupational health and safety during project implementation (Lingard & Pirzadeh, 2025). Through their purchasing power, the government, as a client, is in a strategic position to encourage improvements in occupational safety and health in the construction sector through decision-making in the procurement process (Boadu et al., 2022). In his research, Boadu proposed a framework for construction procurement stages consisting of planning, tendering, tender evaluation and contract awarding, contract requirements, and contract administration and monitoring. Other research divides construction work into three stages, namely pre-construction, construction, and post-construction (Sun et al., 2024).

In Indonesia, government procurement of goods and services is regulated by Presidential Regulation No. 12 of 2021. Procurement actors in government procurement include Budget User Authorities (Kuasa Pengguna Anggaran or KPA), Commitment-Making Officials (Pejabat Pembuat Komitmen or PPK), Working Groups (Kelompok Kerja or Pokja), and providers. Further guidelines on procurement implementation through providers are regulated in LKPP Regulation No. 12 of 2021. Furthermore, to ensure the realization of construction safety, the government, through the Regulation of the Minister of PUPR No. 10 of 2021 concerning SMKK, explains that SMKK is part of the management system for implementing construction work. According to this regulation, clients are owners or employers who use construction services.

The maturity model is used as an approach to investigate safety performance in the construction, oil and gas, and healthcare sectors (Goncalves Filho & Waterson, 2018). The results of maturity-level identification are then followed up through safety performance improvement (Ayob et al., 2022). The higher the maturity level of clients, the more tangible their contribution is at each stage of construction work (Indrayana et al., 2023).

In Indonesia, a study on maturity levels conducted among national private contractors showed that the results were not yet at a sufficient level to ensure the success of the safety system (Santoso et al., 2018). The maturity level of construction companies was at the reactive level (Machfudiyanto et al., 2022)(Rachma Sari et al., 2022), and, in general, Indonesian construction is currently between the compliant and proactive levels (Machfudiyanto et al., 2026). Efforts to increase maturity levels among contractors include leadership, safety behavior, safety planning, individual competence, and reporting and evaluation (Rachma Sari et al., 2022). However, contractor safety performance is highly dependent on the safety leadership of clients (Indrayana et al., 2023). Therefore, this study aims to identify the role and maturity level of clients, as well as improvement strategies, so that the implementation of SMKK can be enhanced.

METHOD

The variables in this study consisted of independent and dependent variables. The independent variables were criteria adopted from the audit form attached to Permen PUPR No. 10 of 2021, while the dependent variable was the implementation of SMKK. The fifteen independent variables were: (1) leadership concern for internal and external issues; (2) construction safety commitment; (3) hazard identification, risk assessment, control, and

opportunity (Identifikasi Bahaya, Penilaian Risiko, Pengendalian Risiko, dan Peluang or IBPRP); (4) action plans, including objectives and programs; (5) standards and regulations; (6) resources; (7) competence; (8) awareness; (9) communication; (10) documented information; (11) construction safety planning; (12) contract control; (13) monitoring, measurement, and evaluation; (14) internal audit; and (15) management review.

The indicators used in this study consisted of five maturity levels: basic, reactive, compliant, proactive, and resilient. The validation of variables and indicators was conducted using the Delphi technique to ensure that they could be used to measure the maturity level of clients. Seven experts contributed to this study, consisting of one academic who also served as the Associate Secretary of the Indonesian Construction Safety Experts Association, one academic who served as the Head of the Rating Center at the quality assurance institution of a university in Indonesia, two government clients, two private-sector clients, and one intermediate-level construction service coach from the Ministry of Public Works. In the first Delphi round, all experts agreed that the fifteen variables could be used to measure the maturity level of clients. The Delphi process continued to a second round to validate the indicators used to measure the fifteen variables.

Respondents were selected using purposive sampling, with the criteria of active employees serving as KPA, PPK, or Working Group members in the procurement of construction goods and services. A total of 20 respondents, consisting of 5 KPA, 8 PPK, and 7 Working Group members, were given a questionnaire survey link that could only be accessed through employee accounts. The number of respondents, namely 20 participants, was considered sufficient to ensure comprehensive issue coverage and achieve data saturation (Galvin, 2015, as quoted in Boadu et al., 2022). The questionnaire consisted of 15 questions representing the fifteen variables based on the audit form attached to Permen PUPR No. 10 of 2021. Clients were asked to assess their maturity level by selecting the indicators that best described the implementation of the Construction Safety Management System.

The questionnaire data were measured using an assessment scale, with a score of 1 representing basic, 2 representing reactive, 3 representing compliant, 4 representing proactive, and 5 representing resilient. To measure questionnaire consistency, a reliability test was conducted using Cronbach's alpha. The data were then processed using statistical frequency analysis to calculate the total scores from the questionnaire data. The score for each maturity level was measured and mapped using a radar chart.

Based on the average score and the score of each variable, the maturity level of the clients was determined. The results of the client maturity-level identification became the basis for formulating strategies to improve client maturity. The strategies were derived from several previous studies and were then validated by experts. The experts involved in the strategy validation stage were the same experts involved in the validation of variables and indicators

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RESULTS AND DISCUSSION

Variables and indicators

The variables and indicators generated from the experts through the two rounds of Delphi are shown in Table 1.

Table 1. Variables and Indicators

		Basic	Reactive	Compliant	Proactive	Resilient
Leadership's concern for internal and external issues	It is the main driver of the effectiveness of SMKK. The strategic decisions of the leadership determine safety performance.	No concern for internal and external issues	Clients show concern after an accident	client's Monitoring is minimum for the fulfillment of administrative requirements.	Consistently demonstrate safety-first leadership	Clients become a model of leadership. The commitment remains consistent despite the change of leadership.
Construction safety commitment	Not only as a *paper commitment.* It is clearly shown through adequate budget allocation, the establishment of strict K3 competency standards.	There is no commitment to prioritizing work safety.	Commitment is shown after an accident.	Clients provide resources to comply with SMKK regulations.	Clients consult with experts in applying job descriptions and IBPRP	Commitment is realized through policies that prioritize safety, provision of resources, and socialization to the level of workers in the field.
Hazard Identification, Risk Assessment, Control, and Opportunity	IBPRP from the planning stage as a basis for determining the accuracy of SMKK cost allocation and construction methods.	No IBPRP	IBPRP is carried out after an accident.	The IBPRP is prepared according to the format of Permenpupr 10/2021 concerning SMKK.	IBPRP is comprehensive, evaluated periodically and/or whenever there are significant changes	The IBPRP analysis aims for *zero accidents*. IBPRP is socialized to the level of project workers.
Action Plan (Goals and Programs)	Service users develop goals and programs and are lowered to the level of implementation in the field.	No Construction Safety Goals and Programs.	Goals and programs are carried out after an accident.	Clients verify the completeness and suitability of the contractor's program goals.	Goals and programs are comprehensive, and are downgraded to the project implementation level.	The realization of goals, objectives and programs becomes the learning input of the next project.
Standards and Regulations	Service users ensure compliance with the implementation of SMKK with integrated	The requirements of the SMKK are administrative in nature and are not in	There is an examination of the suitability of the implementation of SMKK	Ensure that construction safety plan documents are prepared by providers in accordance	Proactive clients facilitate training/socialization to service providers	Clients contribute to providing input on the drafting/improvement of regulations.

		Basic	Reactive	Compliant	Proactive	Resilient
	regulations to all stages of procurement.	accordance with the project risks.	after an accident.	with regulations.		
Resources	Resources are essential. The commitment of client leaders is evidenced by the provision of resources to support the implementation of SMKK	There is a SMKK fee but it has not accommodated all components because the project cost is limited	There is a cost allocation and resources added through the CCO or contract addendum, after an accident.	Clients determine and check the completeness of resources for the implementation of SMKK in accordance with regulations but have not adjusted project risks.	Costs and resources are determined based on valid IBPRP with technical justification. Costs are maintained and not cut.	Costs and resources for SMKK are the top priority, maximally maintained. Clients invest in K3 supporting technology.
Competencies	Safety training is provided to clients so that they have the same understanding. Clients are the center of excellence in the implementation of SMKK.	Clients do not review the planning documents because there are no competent personnel.	The client consults with a construction safety expert, after an accident.	Clients have personnel who have SKK Konstruksi K3 certification.	Both contractor and client have qualified personnel for occupational safety	Clients compile training programs and implement them according to the schedule and type of work. K3 certified client and periodically upgraded
Concern	Clients play an active and concrete role, not passive care and only receive reports conceptually.	does not show concern for the implementation of SMKK.	Attention to the implementation of SMKK exists after an accident.	Clients are *document-based* and have not been actively involved in direct observation in the field.	Consult with experts to provide direction, appreciation, and corrections to the implementation of SMKK.	Concern is distributed to all levels of the organization. Workers feel safe conveying *unsafe conditions*.
Communication	Smooth and effective communication is two-way, there are communicatio	Poor communication or no communication. SMKK is	Communication is formed after an accident, and fault-	The Occupational Safety Plan must be implemented and	Quickly identify safety issues and find solutions through effective	Safety topics are the priority of each meeting. The induction of the

		Basic	Reactive	Compliant	Proactive	Resilient
	n procedures.	limited to signs.	finding (*blame culture*).	discussed at the project's weekly meeting.	communicatio n channels.	implementati on of SMKK targets all parties.
Documented information	Clients obtain and review reports on the implementatio n of SMKK periodically. Documentatio n is the basis for accountability to external auditors	There is no documenta tion regarding the implement ation of occupation al safety or there is documenta tion but it is modest.	Documents are partial and created after an accident	There are daily, weekly, monthly, final reports that document and store data on the implementati on of SMKK	Clients receive and conduct follow-up analysis, there is feedback to the contractor.	Data on the implementati on of SMKK as part of the SMKK is integrated and available in realtime.
Construction Safety Planning	From the initiation stage, safety is a consideration for clients so that contractors can work on construction in safe conditions.	Constructi on Safety Plan (RKK) is not a requiremen t in procureme nt.	RKK is prepared to respond to certain risks and/or after an accident.	Clients require contractors to provide RKK in accordance with regulations.	RKK is integrated with the work implementatio n schedule, there is an evaluation of RKK, RKK is denounced according to the latest conditions in the field.	The RKK is updated every time there is a change in scope or working method. RKK is socialized from top management to the field.
Contract Handling	Contract control is the strongest instrument that clients have to enforce SMKK. *The goal* of the contract that we want to achieve together is the safety of construction, not the existence of resources (PPE, APK).	There is a Constructi on Safety Manageme nt System (SMKK) in the contract but clients do not review.	The review of SMKK in the contract is carried out after an accident.	The contract document contains the provisions for the implementati on of the SMKK. The SMKK clause is a template, it has not been reviewed whether it is in accordance with the RAB and the risk profile of the project.	There are special clauses for the implementatio n of SMKK (duties and responsibilitie s of the parties, sanctions, provisions for incident reporting).	Collaboration and synergy in the implementati on of SMKK. Proportional sharing of risks and rewards between clients and contractors.

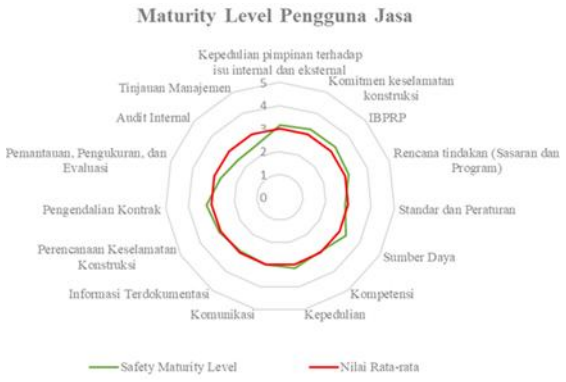
		Basic	Reactive	Compliant	Proactive	Resilient
Monitoring, measurement, and evaluation	Coordination of the person in charge (PPK, field directors, supervisors) in conducting monitoring. The results of the evaluation are for joint learning (knowledge management) and become inputs for the performance evaluation of contractors.	there is no monitoring or inspection of the implementation of SMKK.	monitor or inspection of clients on the implementation of SMKK, not only related to the cost of SMKK, after an accident.	Clients demand the conformity of SMKK documents with implementation in the field.	Clients receive documentation of monitoring and measurements carried out by clients. The findings were dealt with immediately.	Active participation of all construction work organizers. The results of findings and evaluations are the basis for decision-making (data-based track record).
Audit internal	Audits are important to audit the implementation of SMKK by clients and self-audit the role and performance of clients.	No audits.	Audits are incidental investigations, not systematic.	There is an audit plan according to the set schedule.	The Audit Results Report as a proof-of-work indicator in the Construction Safety Performance Key Indicator Sheet, is made by the contractor, inspected by the supervisor, and approved by the clients.	Periodic audits are on schedule. The audit results are input for the Management Review, submitted to the authorities as input in policy making.
Management Review	Effective management reviews result in documented strategic decisions, not just reporting formalities.	Clients only review the volume but do not see the implementation method.	The client reviews the volume and execution method, after an accident.	There is a schedule for the implementation of the management review.	Management reviews produce strategic decisions, there are improvement targets. There is a periodic review to ensure the implementation of the RKK	The results of the management review resulted in socialized policy outputs (*best practice*). *Zero accidents* as a *common goal*.

Assessment of the maturity level of service users

After expert validation was carried out and followed by a pilot survey, respondents were selected *purposively* to measure the maturity level of clients. All selected respondents are employees of Ministry X who have worked for more than 10 years and have experience serving as KPA, PPK, or Working Group in the procurement of construction goods and services. This ensures that the respondents can provide insight and perspective to this research. Respondents were asked to answer 15 questions by choosing the indicator that was closest to the implementation of SMKK. Each option is given the following values: one for basic indicators, two for reactive, three for compliant, four for proactive, and five for resilient. To measure the consistency of the questionnaire answers, a *Cronbach Alpha statistical test* was carried out and a score of 0.933 was obtained. The reliability coefficient of 0.8 to 1.00 is in the very high reliability category (Guilford, 1956 as cited (Pomantow et al., 2023). Thus, the questionnaire answers can be continued for statistical frequency analysis. Each variable value is calculated on average from the scores given by the respondents.

Table 2. The value of the maturity level of service users in the implementation of SMKK

Yes	Variabel	Average score
1	Audit Internal	2,45
2	Management Review	2,5
3	Monitoring, Measurement, and Evaluation	2,7
4	Competencies	2,8
5	Documented Information	2,85
6	Standards and Regulations	2,9
7	Communication	2,95
8	Construction Safety Planning	3,05
9	Concern	3,1
10	Leadership's concern for internal and external issues	3,1
11	Contract Handling	3,15
12	Action plan (Goals and Programs)	3,15
13	Resources	3,2
14	IBPRP	3,25
15	Construction safety commitment	3,25



Picture 1. *Radar chart* of the maturity level of service users

Several variables are already at the *compliant level*, including the construction safety commitment variable and IBPRP (value 3.25). It is followed by resource variables (value 3.2), action plan variables (goals and programs) and contract control variables (both of which get a value of 3.15). Furthermore, the variables of leadership's concern for internal and external issues and the variables of concern (both of which received a score of 3.1) and the variable of construction safety planning (a value of 3.05). This shows the efforts of clients to comply with laws and regulations related to *SMKK*.

On the other hand, there are some variables that have not reached a value of 3 or *compliant*. Communication variables (2.95), standards and regulations variables (2.9), documented information variables (2.85), and competency variables (2.8), as well as monitoring, measurement, and evaluation (2.7) are headed to the *compliant level*. The variables of internal audit (2.45) and management review (2.5) are at the reactive level, indicating that clients have not or will not carry out internal audits and management reviews in the event of an accident.

From the results of the maturity level research, a strategy was then developed for clients to increase the level of maturity, especially in the variables that received the lowest scores. The strategy is based on several previous studies that were then validated by experts. The experts involved in the strategy validation stage are the panel members involved in the validation stage of variables and indicators in the early stages of the research.

Strategies for service users to increase the implementation of SMKK

The results of the measurement of the maturity level of clients in Ministry X with a value of 2.96 show that the maturity level of clients is at the level of reactive towards compliant. There are efforts from clients to actively participate in the implementation of SMKK but it is not yet at the level as the results of research that assess that clients in Indonesia are generally considered at the *compliant* level towards *proactive* (Machfudiyanto et al., 2026). Of the fifteen variables, seven are at the reactive level and eight are at the compliant *level*.

In this study, the internal audit of clients in the implementation of SMKK is one of the variables that gets the lowest score. An internal audit of 2.45 and a management review of 2.5 indicate that clients do not have an audit or management review procedure. Audits and management reviews will be carried out in the event of an accident. In general, clients do not carry out work safety audits (Umeokafor, 2018).

Audits can be used to ensure the implementation of the safety management in accordance with the contract (Umeokafor, 2018) while management reviews of field conditions can effectively prevent accidents by preventing workers from unsafe behaviors and habits (Indrayana et al., 2023). Clients must pay attention to the significance of problems or findings so that attention and resources are allocated appropriately according to priorities (Lingard & Pirzadeh, 2025). Thus, to improve the implementation of SMKK, clients need to establish clear procedures related to audit and management review.

The audit carried out can be in the form of an informal audit or a formal audit. Informal audits can be in the form of checking and rechecking whether construction safety plan documents have been implemented in the field. Meanwhile, formal audits are carried out by asking for certified auditors. A structured and detailed audit can indirectly improve the practice of SMKK by contractors. Contractors improve safety performance not only because they avoid *fatalities* but also as a follow-up to clients audits (Lingard & Pirzadeh, 2025), so that continuous

improvement can be implemented.

Management review by clients is generally divided into three stages. The first is before construction (assessment, design planning, and supplier selection). The second is at the time of construction, and the third is at the time of an accident. The results of the management review must be decisive. If the working conditions are unsafe, then the work must be stopped for investigation and follow-up steps (Indrayana et al., 2023). These follow-up steps are decisions taken by clients, so that the repair loop is closed.

CONCLUSION

Clients, as owners or employers who use construction services, have roles and responsibilities in the implementation of *SMKK*. Using criteria based on the audit form attached to *Permen PUPR* No. 10 of 2021, this study assessed the maturity level of clients and developed strategies for clients to improve the implementation of *SMKK*. The results of the study showed that the maturity level of clients in *SMKK* implementation was between the reactive and compliant levels. Clients showed efforts to actively participate in SMKK implementation when accidents occurred and/or to comply with regulatory provisions. Clients need to be encouraged to move toward proactive and even resilient levels, which represent higher levels of maturity.

This study showed that clients had not yet scheduled or established procedures for conducting audits and management reviews. Audits can be used by clients to ensure that SMKK is implemented in accordance with the contract. Audits conducted by clients may take the form of informal or formal audits. Informal audits may include checking and rechecking whether construction safety plan documents have been implemented, while formal audits may be conducted with the assistance of certified auditors. Structured and detailed audits can indirectly improve SMKK practices among contractors. Contractors improve safety performance not only to prevent fatalities but also as a follow-up to client audits, thereby supporting continuous improvement.

Management reviews conducted by clients based on field conditions can effectively prevent accidents by reducing unsafe behaviours and habits among workers. The results of management reviews must lead to firm decisions. If working conditions are unsafe, the work must be stopped for investigation and follow-up action. These follow-up actions are decisions made by clients so that the improvement cycle can be completed. Therefore, to improve SMKK implementation, clients need to establish clear procedures as references for conducting audits and management reviews.

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