SIPOC Model in Measuring The Competency of ISO 21001:2018 Management System Auditors

Muhammad Rosiawan[1], Juliani Dyah Trisnawati[2*]

[1] *Department of Industrial Engineering, University of Surabaya, Surabaya, Indonesia*
[2] *Department of Management, University of Surabaya, Surabaya, Indonesia*
[*]*Corresponding author. Email: Juliani@staff.ubaya.ac.id*

ABSTRACT
This action research aims to measure the competency of auditors from the ISO 21001:2018 Management System certification body in Indonesia, starting from training, implementation, and evaluation of audit implementation. We use the Source-Input-Process-Output-Customer (SIPOC) model approach to measure the competency of trainee auditors. First, we design a training curriculum based on the requirements of interested parties, train, measure exam results, and receive feedback from National Accreditation Committee (NAC) assessors when conducting witness audits at certification institutions. The research results show that the SIPOC model can be used to measure and provide feedback on participant competency on an ongoing basis.

Keywords: *SIPOC Model, ISO 21001, Auditor Competency, Outcome based Training, Educational Organization.*

1. INTRODUCTION

In 2018, ISO released ISO 21001 as a management system standard for educational organizations. This standard enables educational organizations to demonstrate their capacity to consistently create student competencies and increase their satisfaction. To obtain certification, educational organizations invite management system certification bodies to evaluate the effectiveness of their implementation in the organization.

The certification body assigns a qualified auditor to conduct the certification audit. The auditor's responsibility is to compare the performance of educational processes, systems, products, and services with the requirements of the adopted management system (Cheng et al., 2009). Auditors must have competence regarding principles, methods, audit techniques, legal requirements, regulations, quality management standards, risk management, business processes, operations, and performance management, as well as report writing to interpret management system standard requirements accurately and increase the significance of audit results (Ab Wahid & Grigg, 2021; Kannan & Garad, 2021).

Auditors can achieve competency through training with an appropriate curriculum (Boiral et al., 2020; Hassall et al., 1996; Ocak et al., 2022). The audit training curriculum must include competencies relevant to audit methodology and related technical competencies, such as understanding management system standards, quality assurance systems, and educational accreditation.

In 2019, the National Accreditation Committee (NAC) launched an accreditation scheme for Certification Institutions - the SNI ISO 21001 Education Organizational Management System (CB-EOMS) for the scope of higher education. Since the implementation of this scheme, several certification bodies have prepared to request accreditation from NAC for the scheme, including the need for training for their auditors regarding compliance with the requirements of the NAC.

This research discusses the Supplier-Input-Process-Output-Customer (SIPOC) model approach to measuring auditor competency. The in-house training program lasts two days (16 hours) at each management system certification body that will apply for accreditation at NAC. At the end of the program, the training provider administers a test to determine the participant's level of proficiency and receives feedback from a review of the Certification Body's audit results by NAC assessors.

2. SIPOC MODEL IN DEVELOPING AUDITOR COMPETENCY

The SIPOC model is a diagrammatic representation of critical elements through process mapping and improvement (Assis de Souza et al., 2022). Figure 1 provides the components of the SIPOC model and illustrates the interaction of

its aspects in determining training effectiveness, namely increasing trainees' competency. Monitoring and measurement points of inspection are carried out in each process, which is necessary for process control, building connections, and expanding sources of opportunity to improve process performance.

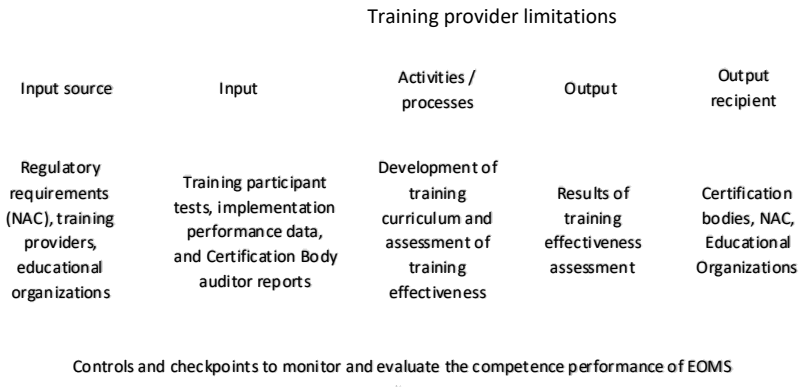

Figure 1 Assessment of the effectiveness of the competence of the EOMS auditor.

The first process in SIPOC is determining training stakeholders (input sources). Three stakeholders are identified: the regulator represented by NAC, the certification body (auditor from the certification body), and the educational organization (client). Each party provides requirements (input), such as the NAC providing requirements that the CB-EOMS auditor is competent in according to the requirements of SNI ISO 17021 and additional requirements from the NAC. CB-EOMS provides requirements related to case-based training delivery methods. Meanwhile, educational organizations provide requirements that CB-EOMS auditors must provide added value in the audit process in creating competency for students and graduates.

Training providers prepare training programs (activities/processes) following the requirements of interested parties, such as determining graduate competencies and developing training curricula. The profile of this auditor training graduate is: a. Auditors know the requirements of ISO 21001:2018, ISO 19011, and additional requirements of the NAC; b. They have skills in creating audit programs, implementing audits, preparing reports, and audit follow-up. Furthermore, from the graduate profile, the training provider determines the learning outcomes.

1. Knowledge of education (K1),
2. Knowledge of Laws, Regulations, and other requirements regarding Educational organizations (K2),
3. Knowledge of educational organizational context (K3),
4. Knowledge of education risk assessment (K4),
5. Knowledge of the education process (K5),
6. Knowledge of ISO 21001, and ISO 19011(K6), dan
7. Skills in creating audit programs, implementing audits, preparing reports, and audit follow-up (S1).

The training provider measures learning outcomes 1-6 through assignments and tests (Output). Meanwhile, in skill number 7, the training provider analyzes the results of feedback from NAC assessors regarding the performance of certification body auditors when carrying out audits at higher education institutions (output recipient).

In addition to processes and their interactions, SIPOC diagrams provide control and checkpoints for each process. Control and inspection points aim to ensure compliance with requirements and objectives. For example, training organizers prepare training programs and evaluate training success based on feedback from interested parties. Curriculum development requires determining the competency level of training participants and preparing training materials. The service provider then performs training and assessment based on the results of these various activities. The certification body then appoints an auditor for the education organization to conduct a certification audit.

Meanwhile, as audited clients, educational institutions assess whether the audit process from the certification body provides added value to the study program in creating student competency and improving performance. Next, the NAC assessors evaluate the effectiveness of creating auditor competency as a result of training by evaluating whether the audit implementation by the certification body's auditors complies with NAC requirements. Finally, training providers must monitor, measure, analyze, and assess the effectiveness of training services at each stage of the evaluation and

continuously improve performance to evaluate the effectiveness of this training. We call the SIPOC approach to assessing the effectiveness of EOMS auditor competency Outcome-based Training (OBT).

3. RESEARCH METHODS

The flow diagram in Figure 2 explains the stages of action research.

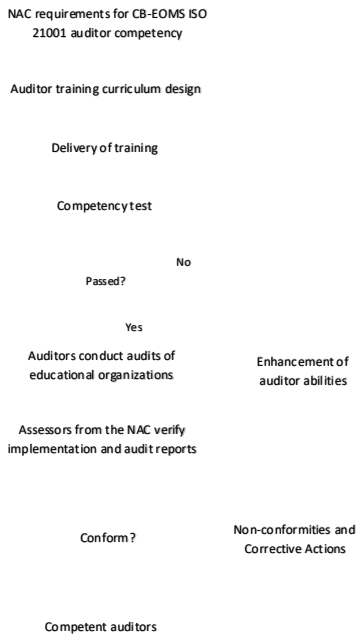

Figure 2 Research Steps

3.1. Develop EOMS auditor training curriculum in accordance with NAC requirements

Table 1 describes the curriculum development for auditor training by NAC requirements.

Table 1. Developing a curriculum for EOMS auditor training

LO	Knowledge	Training Methods	Training hours	Competency assessment
K1	Knowledge of education, such as theoretical educational concepts and the education system in Indonesia under the scope of operation.	Learning delivery: Asynchronous. Method: Case-Based-Teaching, where training participants analyse teaching materials about the National Education System.	1	Test: Multiple choice questions (Score weight: 30%)
K2	Knowledge of Laws, Regulations, and other requirements regarding Educational organizations. Other requirements, for example, facilities for students with special needs.	Learning delivery: Asynchronous. Method: Case-Based-Teaching, where the trainees do analysis of teaching materials on statutory requirements related to educational organizations.	1	

Table 1. Developing a curriculum for EOMS auditor training (cont.)

LO	Knowledge	Training Methods	Training hours	Competency assessment
K3	Knowledge of organizational context and business processes, including current internal and external issues, interested parties, organizational service business processes, information systems, and online learning/ blended learning.	Learning delivery: Asynchronous. Method: Case-Based-Teaching, where training participants analyze teaching materials on external and internal issues of educational organizations, identify stakeholder requirements, and learning systems with Online/blended Learning	2	Exercises: • identify external and internal issues, develop a SWOT matrix, define stakeholder requirements, • develop an annual development program
K4	Knowledge of education risk assessment includes analysis of risks and opportunities related to education products and services to improve the abilities and satisfaction of learners and other beneficiaries. The feasibility of implementing education includes operational permits, student capacity, human resources, learning facilities, and financial governance.	Learning delivery: Asynchronous. Method: Case-Based-Teaching, where training participants analyze teaching materials on risk and opportunity analysis that impact the suitability of educational services, and the ability to increase the satisfaction of students and other beneficiaries.	2	Exercise: make a risk analysis related to achieving the objectives of the development program.
K5	Knowledge of the education process, such as learning control, quality assurance, and performance evaluation systems.	Learning delivery: Asynchronous. Method: Case-Based-Teaching, where training participants analyze teaching materials on educational process control, quality assurance systems, and performance evaluation.	2	Test: case study questions (Score weight: 40%)
K6	Knowledge of educational organization management system requirements - ISO 21001.	Learning delivery: Asynchronous. Method: Case-Based-Teaching, where training participants analyze teaching materials related to the requirements of an educational organization's management system - ISO 21001.	8	Test: Case study questions related to ISO 21001 clauses (Score weight: 30%).

The training method uses asynchronous learning because training is ongoing during the Covid-19 outbreak. Using CBT techniques, trainers teach topics per session while participants analyze each teaching material presented.

3.2. Implementation of training

In 2021 and 2022, the training provider will hold in-house training related to ISO 21001 audits at five management system certification institutions operating in Indonesia (as research samples). This presents a unique opportunity for the certification agency training participants, who are auditors with at least five years of experience in educational institutions, to enhance their knowledge and skills in ISO audits.

3.3. Competency test

The trainer conducts training according to the curriculum and administers a test at the end of the session to evaluate the trainee's understanding of the content covered. The following are the types of exam questions:

1. Part A questions: 20 questions about the national education system, laws, and regulations in the fields of National Education and Higher Education;
2. Part B Questions: 2 essay questions (case studies) about educational business processes and the implementation of ISO 21001;
3. Part C Questions: case study questions related to participants' understanding of ISO 21001 clauses.

3.4. Verify performance and auditor's report by NAC assessor

According to NAC standards, management certification bodies that wish to obtain accreditation for educational organization management system schemes must have qualified auditors. As a result, to apply for initial accreditation, the NAC assessor conducts a testimonial audit when the certification body auditor audits the educational institution (client) to verify the auditor's ability in audit activities (S1). Furthermore, NAC assessors communicate their assessment results at the technical committee meeting to provide the first accreditation recommendation to the certification body for the SMOP scheme. Certification bodies use the verification results of NAC assessors to improve the competence of their auditors by completing all findings from NAC assessors.

4. RESULTS AND DISCUSSION

4.1. Results

Of the five certification bodies, 36 auditors (trainees) took part in the training. The average results and standard deviation of scores for each type of test and the total are as follows (see Table 2).

Table 2. Average results and standard deviation of scores for each type of test and total

Test type	Average of scores	Standard deviation of scores
A	22,53	6.15
B	29,16	6,04
C	25,28	4,92
Total	76,97	16,3

From test type A, trainees got an average score of 22.53 out of 30. For test type B, trainees got an average score of 29.16 out of 40; for test type C, trainees got an average -average score of 25.28 out of 30. Thus, the total score for test types A, B, and C is 76.97, and all training participants were declared to have passed.

4.1.1. Verification by NAC assessors

During 2021-2022, NAC assessors provide feedback through nonconformity findings to auditors from the EOMS-ISO 21001 certification body who conduct university audits. The author groups the discrepancy findings according to each type of question as follows.

Part A: There is still a gap in auditor knowledge related to understanding a) performance requirements and lecturer certificates, b) requirements for the minimum number of permanent lecturers in study programs, and functional levels of lecturer positions.

Part B:

1. There are still gaps in auditor knowledge related to understanding: a) identification of significant changes that impact the organization in delivering Education products and services; b) understanding relevant external and internal issues at the university, faculty, and study program levels.
2. There are still gaps in auditor knowledge related to understanding: a) lecturer governance and competency, lecturer and student adequacy ratios, certification and lecturer positions, b) output control such as productivity, cumulative GPA, alum employment careers, c) plagiarism prevention methods and malpractice, intellectual property management, methods for protecting and transparency of student data, and d) information about graduate learning outcomes, and lecturer publications.

Part C: There is still a gap in auditor knowledge related to understanding a) discussion of management review meeting agendas, b) verification of corrective actions from audit findings, and c) stakeholder satisfaction analysis methods.

4.2. Discussion

Based on the training test results, auditors from the Certification Institute already can understand the requirements of management system standards. With this capability, it is hoped that auditors can provide more meaningful audit results and added value for educational organizations (Kannan & Garad, 2021).

Furthermore, the results of NAC assessor feedback indicated gaps in the certification body auditors' understanding of educational process controls, educational system rules, regulations, and educational organizational context and

business processes. In addition, NAC assessors advised auditors to study business processes in educational organizations in more detail, such as regulations related to learning and assessment processes, performance indicators relevant to academic organizations, the use of measuring tools to measure monitoring of learning processes, related issues to the latest regulations from regulators such as matching funding programs, quality assurance systems, and accreditation of institutions and study programs.

In addition, to overcome auditors' shortcomings in understanding educational organizations' output/results, auditors can adopt an approach to study program accreditation criteria at national and international levels (ABET, AACSB, AASIIN, etc.). By including several of these criteria, organizations can improve their national and global performance and competitiveness (Hassan et al., 2020). The use of the SIPOC method in assessing the effectiveness of training results and the competency of EOMS auditors makes it possible for certification bodies to evaluate gaps in the knowledge of their auditors.

5. PROVISIONAL RESULT PROVIDED

We use the SIPOC method to measure the effectiveness of this training on an ongoing basis, and we call it Outcome Based Training (OBT). The results of competency development through training are then measured again during the certification audit in the client organization. Feedback from NAC serves as a template for further development of training materials. The training materials consider recommendations from NAC evaluators and add value to the client organization. In addition, certification bodies require verification of NAC assessors (as the institution authorized to accredit management system certification institutions in Indonesia) to ensure that the auditor's qualifications meet the requirements. The certification body can then use its findings and recommendations to develop ongoing auditor education and training programs.

5.1. Research Contribution

This paper's theoretical contribution is to develop the SIPOC model for measuring trainee competency on an ongoing basis. Training service providers and certification bodies can use this model to develop training curricula and measure the competency of training participants during and after training.

5.2. Limitations and prospects for future research

This research is limited to universities in Indonesia because it concerns the requirements of the scope of the EOMS certification body scheme by NAC. Apart from that, this research only discusses the development of auditor competency for ISO 21001. Further research can consider other ISO management system standards or integrate the ISO 21001 standard with national and international accreditation criteria.

REFERENCES

Ab Wahid, R., & Grigg, N. P. (2021). QMS external quality auditors' education framework: findings from an iterative Delphi study. *TQM Journal*. https://doi.org/10.1108/TQM-03-2021-0091

Assis de Souza, T., Alcântara Pinto, G., Rodrigues Antunes, L. G., & Grützmann, A. (2022). SIPOC-OI: a proposal for open innovation in supply chains. *Innovation and Management Review*. https://doi.org/10.1108/INMR-12-2020-0182

Boiral, O., Heras-Saizarbitoria, I., & Brotherton, M. C. (2020). Professionalizing the assurance of sustainability reports: the auditors' perspective. *Accounting, Auditing and Accountability Journal*, *33*(2), 309–334. https://doi.org/10.1108/AAAJ-03-2019-3918

Cheng, Y. S., Liu, Y. P., & Chien, C. Y. (2009). The association between auditor quality and human capital. *Managerial Auditing Journal*, *24*(6), 523–541. https://doi.org/10.1108/02686900910966512

Hassall, T., Dunlop, A., & Lewis, S. (1996). Internal audit education: Exploring professional competence. *Managerial Auditing Journal*, *11*(5), 28–36. https://doi.org/10.1108/02686909610120514

Hassan, N. A., Mohamad Zailani, S. H., & Hasan, H. A. (2020). Integrated internal audit in management system: A comparative study of manufacturing firms in Malaysia. *TQM Journal*, *32*(1), 110–126. https://doi.org/10.1108/TQM-03-2019-0077

Kannan, K. S. P. N., & Garad, A. (2021). Competencies of quality professionals in the era of industry 4.0: a case study of electronics manufacturer from Malaysia. *International Journal of Quality and Reliability Management*, *38*(3), 839–871. https://doi.org/10.1108/IJQRM-04-2019-0124

Ocak, M., Ozkan, S., & Can, G. (2022). Continuing professional education and audit quality: evidence from an emerging market. *Asian Review of Accounting*, *30*(4), 432–464. https://doi.org/10.1108/ARA-12-2021-0235