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EXPLORING AND VALIDATING CRITICAL SUCCESS FACTORS (CSFS) FOR THE SUCCESSFUL IMPLEMENTATION OF ISO 9001 QMS IN MALAYSIAN PUBLIC UNIVERSITIES

Wan Salmuni Wan Mustaffa^{1*}, Rafiduraida Abdul Rahman¹, Siti Zubaidah Mohd Ariffin¹,
Hariyaty Ab Wahid¹, Ahmad Mahmood¹, Rosfizah Md Taib¹

¹Department of Business Management and Entrepreneurships, Faculty of Management and Economics,
Universiti Pendidikan Sultan Idris.



wan.salmuni@fpe.upsi.edu.my*
rafiduraida@fpe.upsi.edu.my
zubaidah.ariffin@fpe.upsi.edu.my
hariyaty@fpe.upsi.edu.my
ahmad@fpe.upsi.edu.my
rosfizah@fpe.upsi.edu.my



<https://orcid.org/0000-0002-4838-8353>
<https://orcid.org/0000-0001-8225-188X>
<https://orcid.org/0000-0001-6416-8601>
<https://orcid.org/0000-0002-9751-9014>
<https://orcid.org/0009-0005-5950-6377>
<https://orcid.org/0000-0001-9638-6662>

*Corresponding Author

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Abstract:

ISO 9001 is the world's most widely adopted Quality Management System (QMS) standard, providing a systematic framework for improving organizational processes, enhancing service quality, and strengthening institutional performance. Despite its widespread adoption, empirical evidence on the critical factors contributing to the successful implementation of ISO 9001 in Malaysian public universities remains limited. Therefore, this study aimed to explore and validate the Critical Success Factors (CSFs) for the successful implementation of ISO 9001 QMS in Malaysian public universities. A mixed-methods research design was employed. In the qualitative phase, the CSFs were explored through a systematic literature review and focus group interviews with university employees. In the quantitative phase, the identified CSFs and their corresponding indicators were validated using survey data collected from university employees selected through proportionate stratified sampling. A total of 358 valid responses were analyzed using Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). The findings identified five key CSFs: Top Management Commitment, Employee Empowerment, Teamwork, Training and Education, and Employee Involvement. Collectively, these factors explained 66.699% of the total variance and were represented by 22 measurement indicators. The validated measurement model

demonstrated satisfactory construct validity and good model fit, confirming the robustness of the proposed CSF framework. The findings provide practical guidance for university administrators and policymakers in strengthening ISO 9001 implementation and offer a validated framework that advances the quality management literature within the higher education sector.

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Keyword:

Critical Success Factors (CSFs), ISO9001, Malaysian Public Universities, Soft TQM, Quality Management System (QMS)



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Introduction

Quality Management Systems (QMS) have become an important strategic mechanism for enhancing organizational efficiency, service quality, and long-term sustainability. Among the internationally recognized standards, ISO 9001 provides a structured framework for managing organizational processes through principles such as customer focus, leadership, process management, risk-based thinking, evidence-based decision-making, and continual improvement (International Organization for Standardization (ISO), 2015). Research has consistently shown that effective adoption of ISO 9001 contributes to standardized processes, greater employee engagement, and enhanced stakeholder satisfaction across diverse sectors, including higher education (Gremyr et al., 2021; Ozsen et al., 2023; Ochieng, Muturi & Njihia, 2015). Consequently, universities worldwide have increasingly embraced ISO 9001 to strengthen governance, improve administrative and academic processes, and respond to growing expectations for accountability, transparency, and institutional excellence (Sheoran & Thakur, 2023, Abdelaziz, 2024). However, achieving these benefits depends on embedding quality management principles into organizational practices rather than merely obtaining certification (Camango & Cândido, 2023).

In Malaysia, public universities have adopted ISO 9001 as part of broader efforts to strengthen institutional governance and support continuous quality improvement in line with national quality assurance initiatives. Despite considerable progress, sustaining the effectiveness of the system remains a significant challenge. Studies have identified barriers such as inadequate leadership support, limited staff empowerment, insufficient training, resistance to organizational change, and low employee participation in quality initiatives, which collectively reduce the effectiveness of quality management practices (Ab Wahid, 2019; Basir et al., 2019). Although previous research has reported positive associations between ISO 9001 certification and institutional performance, relatively little attention has been given to identifying and

empirically validating the Critical Success Factors (CSFs) that enable successful implementation within higher education settings (Marnnoi, Jehma & Marn-In, 2024; Dagdag, Bete, & Galiza, 2022). Moreover, existing CSF frameworks are largely derived from manufacturing and private-sector organizations, limiting their applicability to Malaysian public universities (Veena & Prabhushankar, 2020; Al Balushi, 2024). These practical and theoretical gaps underscore the need for a context-specific and empirically validated CSF framework.

To address these practical and theoretical gaps, this study aims to explore and validate the Critical Success Factors (CSFs) for the successful implementation of the ISO 9001 QMS in Malaysian public universities. Specifically, the study pursues two research objectives. First, it explores the CSFs and their underlying indicators through a systematic literature review and focus group interviews involving employees from Malaysian public universities. Second, it validates the identified CSFs using quantitative data collected from university employees through Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). By integrating qualitative exploration with quantitative validation, this study develops and empirically validates a context-specific framework of CSFs for ISO 9001 QMS implementation in Malaysian public universities. The findings are expected to enrich the quality management literature by providing empirical evidence on the critical determinants of successful ISO 9001 implementation in higher education institutions. Furthermore, the validated CSFs framework is expected to provide practical guidance for university leaders, policymakers, and quality practitioners in strengthening quality management practices and enhancing institutional performance.

Literature Review

QMS ISO 9001 and Higher Education

A Quality Management System (QMS) based on ISO 9001 is an internationally recognised framework for managing quality. It enables organisations, including higher education institutions, to systematically manage and continuously improve their processes to consistently meet stakeholder requirements and enhance satisfaction (Midor & Wilkowski, 2021; Ibtissam et al., 2023). Higher education institutions, including universities, colleges, and research institutes, engage with diverse stakeholders such as students, academic staff, administrative personnel, and external partners. The implementation of ISO 9001 can support these institutions in enhancing and assuring the quality of academic programmes and support services (Cao, 2021). By adopting ISO 9001, higher education institutions can establish structured processes for programme development, curriculum design, student admission, faculty recruitment, and other essential academic and administrative functions (Basir et al., 2019). The standard promotes a process-oriented approach to quality management, enabling institutions to identify areas for improvement, establish measurable objectives, and systematically monitor progress towards their achievement.

However, the implementation and maintenance of an ISO 9001-based QMS can present various challenges. During the initiation phase, only a limited number of individuals were familiar with the requirements of the standard, making the lack of knowledge and awareness a major obstacle to its effective development and implementation (Nasir & Omar, 2024). In addition, the cost of maintaining ISO 9001 certification was substantial for the university, and limited financial resources contributed to the eventual discontinuation of some certifications (Abdelaziz, 2024). These challenges indicate that adequate knowledge, awareness, and financial resources are

important for supporting the effective implementation and sustainability of ISO 9001 in higher education institutions.

Further challenges may arise during the alignment and improvement phases. During the alignment phase, the introduction of an integrated QMS was affected by inadequate communication regarding the implementation process, insufficient training on both systems, complex documentation requirements, and limited staff cooperation (Cheah, Cheng, & Ngoo, 2025). During the improvement phase, the transition to ISO 9001:2015 also presented significant challenges due to the substantial changes introduced in the revised standard. One of the main difficulties was ensuring that staff adequately understood and adapted to the new requirements (Serrano, Gonzalez, & Mourato, 2025). These findings suggest that effective communication, training, staff cooperation, and employee understanding are important considerations in the successful implementation and continual improvement of an ISO 9001-based QMS.

Total Quality Management (TQM) Paradigm and Critical Success Factors (CSFs)

Soft Total Quality Management (TQM) refers to a management approach that emphasises the human dimension of quality management. It integrates traditional TQM principles with a strong focus on employee involvement in quality improvement processes (Ahmed & Idris, 2021; Saha et al., 2022). Soft TQM emphasises the development of a quality-oriented organisational culture through effective communication, teamwork, and employee engagement to support continuous improvement initiatives. It also recognises that quality improvement is not limited to specific departments or individuals but requires the collective involvement and commitment of all organisational members (Anu & Satish, 2019; Hamdan & Alheet, 2021).

Key Principles of Soft TQM

1. **Leadership commitment:** Top management plays a critical role in fostering a quality-oriented culture by demonstrating strong commitment, establishing clear quality objectives, and providing adequate resources to achieve them.
2. **Employee involvement:** Employees at all organisational levels should be actively encouraged to participate in quality improvement initiatives. Their knowledge, skills, and experience can contribute to identifying problems and developing effective solutions.
3. **Teamwork and collaboration:** Achieving quality objectives requires effective collaboration across departments and functional areas. Cross-functional teams can be established to address specific quality-related challenges and implement improvement initiatives.
4. **Continuous improvement:** Soft TQM promotes a philosophy of continuous improvement in which organisational processes are regularly evaluated and refined. Monitoring performance, measuring outcomes, and analysing key performance indicators (KPIs) can help identify opportunities for improvement.
5. **Customer focus:** Soft TQM places strong emphasis on understanding and fulfilling customer needs and expectations. Customer feedback can be systematically collected and utilised to support quality improvement efforts.
6. **Training and development:** Soft TQM recognises the importance of continuous training and professional development in strengthening employees' competencies in quality

management and enabling them to contribute effectively to quality improvement initiatives.

In summary, soft TQM emphasises the human dimension of quality management by fostering a supportive and collaborative organisational environment that encourages continuous improvement and enhances organisational performance.

Methodology

Research Design

This study employed a mixed methods approach to develop and validate a QMS CSFs model for ISO 9001 certified Malaysian public universities. In Phase 1, a systematic literature review (SLR) was conducted to identify and critically examine key scholarly studies related to QMS CSFs and their indicators for the successful implementation of ISO 9001 QMS in Malaysian public universities. The SLR followed five established steps: scoping, planning, identification, screening, and eligibility, as proposed by Khan, Kunz, Kleijnen, and Antes (2003). Following the SLR, three focus group interviews were conducted with higher education managers, academic staff, and administrative staff to obtain context-specific insights into the critical success factors (CSFs) and indicators relevant to ISO 9001 QMS implementation in Malaysian public universities. The focus group discussions were intended to complement the findings from the SLR by identifying additional indicators that may not have been sufficiently captured in the existing literature and by assessing their relevance within the higher education context. The findings from the focus groups were subsequently integrated with the SLR findings to develop the indicators used in the quantitative phase. In Phase 2, quantitative data analysis techniques were employed to validate the proposed QMS CSFs model. Face validity, Exploratory Factor Analysis (EFA), and Confirmatory Factor Analysis (CFA) using Structural Equation Modelling (SEM CFA) were conducted based on a split half approach to assess the validity and measurement properties of the developed model (Hair et al., 2010).

Population and Sampling Technique

This study was conducted in Malaysian public universities that had obtained ISO 9001 certification. The target population comprised all employees of ISO 9001 certified Malaysian public universities, including academic and administrative staff. According to the Ministry of Higher Education Malaysia (MOHE, 2024), the total number of employees in Malaysian public universities with ISO 9001 certification was 31,877. As it would be impractical and time consuming to collect data from the entire population, a representative sample was selected for the study. The required sample size was determined using the sample size table developed by Krejcie and Morgan (1970). Based on a population of 31,877 employees, a minimum sample size of 379 respondents was required to achieve an acceptable level of statistical confidence and representativeness.

To ensure adequate representation of the different categories of Malaysian public universities, a proportionate stratified sampling technique was employed. Stratified sampling is a probability sampling technique in which a population is divided into relatively homogeneous subgroups, known as strata, based on characteristics relevant to the study. In this study, the population was stratified into three categories of Malaysian public universities: research universities, comprehensive universities, and focused universities. Employees from different

categories of universities may experience different organisational environments, quality management practices, leadership approaches, and operational structures. Therefore, stratifying the population according to university category helped enhance the representativeness of the sample and minimise potential sampling bias.

A proportionate allocation approach was subsequently used to determine the number of respondents required from each stratum based on the proportion of employees within each university category. Of the total population of 31,877 employees, 7,969 were from research universities, 6,376 were from comprehensive universities, and 17,532 were from focused universities. Accordingly, the sample was proportionately allocated across the three categories, resulting in 95 respondents from research universities, 76 respondents from comprehensive universities, and 208 respondents from focused universities. The total allocated sample was therefore 379 respondents, corresponding to the minimum sample size recommended by Krejcie and Morgan (1970).

Instrumentation

The CSFs for ISO 9001 QMS implementation and their respective indicators were developed through a combination of literature review and focus group interviews. The literature review provided the initial theoretical basis, particularly the six principles of Soft TQM, from which relevant CSFs and indicators were identified. Subsequently, three focus group interviews involving higher education managers, academic staff, and administrative staff were conducted to contextualise, refine, and identify additional indicators relevant to ISO 9001 QMS implementation in Malaysian public universities. The findings from both sources were then consolidated to develop the measurement indicators and questionnaire items for the quantitative phase.

The questionnaire was divided into two sections. Section A obtained information on the respondents' demographic characteristics, including gender, age, educational level, salary, and job position. Section B contained indicators designed to measure the CSFs for ISO 9001 QMS implementation. The construct comprised 22 indicators representing key principles and practices of Soft TQM. The items in Section B were measured using a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The seven-point scale was selected to provide respondents with a broader range of response options and to capture variations in their perceptions of quality management practices. This scale therefore allowed for a more detailed assessment of respondents' levels of agreement with each statement. To establish content validity, the questionnaire was evaluated by a panel of experts with relevant knowledge and professional experience in quality management, organisational behaviour, and higher education management. The experts assessed each item in terms of its relevance, clarity, and appropriateness for measuring the intended constructs. Their feedback was used to refine the questionnaire, particularly in terms of item wording, clarity, and suitability, before the final version was administered to the respondents.

Findings and Discussion

Based on the proportionate allocation, a total of 379 questionnaires were targeted for distribution across the three categories of Malaysian public universities. A total of 358 completed questionnaires were subsequently obtained and included in the data analysis, representing a response rate of 94.46%. The remaining 21 questionnaires accounted for 5.54%

of the targeted sample and were not included in the analysis. The achieved sample of 358 respondents was considered adequate for the subsequent statistical analyses. Although the study achieved a high response rate, potential non-response bias cannot be completely ruled out.

The demographic profile indicated that 43.82% of the respondents were male and 56.18% were female. The majority of respondents (59.00%) were aged between 40 and 45 years, while approximately 36% had more than 10 years of working experience. In terms of institutional characteristics, 54.88% of the respondents were employed in focused universities, and 63.12% were academicians. These demographic characteristics indicate that the respondents possessed substantial organisational and professional experience, enabling them to provide informed assessments of the CSFs associated with the successful implementation of ISO 9001 QMS in Malaysian public universities.

Prior to conducting factor analysis, the data were assessed for normality based on skewness and kurtosis values. The results showed that the skewness and kurtosis values were within the acceptable thresholds of ± 2 and ± 7 , respectively, indicating that the data did not exhibit substantial departures from normality. Therefore, the data were considered suitable for subsequent multivariate statistical analyses, including Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modelling (SEM). Table 1 presents the results of the EFA conducted to identify the underlying factor structure of the CSFs for the successful implementation of ISO 9001 in Malaysian public universities.

The EFA results revealed a five-factor structure, comprising top management commitment, employee empowerment, teamwork, training and education, and employee involvement. All retained items demonstrated factor loadings above the recommended threshold of 0.50, with values ranging from 0.612 to 0.889. Top management commitment recorded the strongest factor loadings, ranging from 0.799 to 0.889. In particular, the item *“Top management views quality as being as important as cost”* recorded the highest factor loading (0.889), indicating that prioritising quality alongside cost considerations was a strongly represented aspect of top management commitment. Employee empowerment recorded factor loadings ranging from 0.668 to 0.707, while teamwork demonstrated loadings ranging from 0.615 to 0.749. The training and education factor recorded loadings ranging from 0.716 to 0.789, whereas employee involvement demonstrated loadings ranging from 0.612 to 0.754. These findings indicate that the items provided satisfactory representation of their respective factors.

As presented in Table 1, the five factors collectively explained 66.699% of the total variance, exceeding the commonly recommended minimum of 60% in social science research. The cumulative variance explained suggests that the extracted factors adequately represent the variance in the observed indicators. Taken together, the satisfactory factor loadings and cumulative variance provide preliminary evidence supporting the proposed factor structure of the QMS-CSFs. Nevertheless, further validation through Confirmatory Factor Analysis (CFA) is required to confirm the adequacy of the measurement model and establish the convergent and discriminant validity of the identified constructs.

Although the literature identified six key principles of Soft TQM, the EFA results revealed five empirical factors. This difference does not necessarily contradict previous literature, as theoretical dimensions may not emerge as distinct factors in every organisational context. In this study, the 22 indicators were empirically grouped into five factors: top management

commitment, employee empowerment, teamwork, training and education, and employee involvement. Notably, employee empowerment emerged as a distinct factor, while continuous improvement and customer focus did not emerge as separate factors. Thus, the five-factor structure represents a context-specific empirical refinement of the Soft TQM framework in Malaysian public universities.

Table 1 EFA Results

Indicators	QMS-CSFs				
	Top Management Commitment	Employee Empowerment	Teamwork	Training and education	Employee Involvement
1. Top management views quality as being as important as cost.	0.889				
2. Top management allocates adequate resources toward efforts to improve quality.	0.850				
3. Top management is visibly and explicitly committed to quality.	0.815				
4. Top management often discusses the importance of quality.	0.799				
5. I am provided with substantial autonomy and responsibility.		0.707			
6. I am encouraged to develop new ways to provide better products and services.		0.704			
7. I am not punished for quality improvement ideas that are unsuccessful.		0.671			
8. I am provided with sufficient information to arrive at good quality suggestions.		0.668			
9. My work unit uses teams to solve problems.			0.749		
10. The university has adopted the team concept.			0.708		
11. Many work problems are now being solved through team meetings.			0.661		
12. During team meetings, we make an effort to get all team members' opinions and ideas before making a decision.			0.615		
13. Employees are encouraged to job training programs.				0.789	
14. Resources are available for employee education and training in our university.				0.753	
15. Most employees in our university are trained on how to use quality management methods (tools).				0.724	
16. Quality awareness education is given to employees.				0.732	

17. Employees are regarded as valuable, long-term resources worthy of receiving training and education throughout their career.				0.716	
18. Cross-functional teams are often used in our university.					0.754
19. All employee suggestions are evaluated in our university.					0.711
20. Most employee suggestions are implemented in our university.					0.682
21. Employees are encouraged to give suggestions.					0.687
22. In our university, there is a credible system for submitting suggestions.					0.612
Eigenvalue	9.748	5.206	4.897	3.549	1.433
% Variance	24.018	18.891	10.150	4.736	3.194
% Cumulative variance					66.699

Next, Confirmatory Factor Analysis (CFA) was conducted to assess whether the observed indicators adequately represented their respective latent constructs as specified in the measurement model. As illustrated in Figure 1, all retained indicators demonstrated factor loadings above the recommended threshold of 0.50. The measurement model demonstrated an acceptable but borderline overall fit, with a χ^2/df ratio of 2.160, TLI of 0.920, CFI of 0.903, and RMSEA of 0.080. The CFI and TLI values exceeded the recommended threshold of 0.90, while the RMSEA was at the commonly accepted upper boundary of 0.08. Collectively, these fit indices provide sufficient evidence to support the adequacy of the measurement model and its representation of the observed data.

Based on these findings, the measurement model demonstrated an acceptable factor structure for the CSFs construct. The validated model comprised five first-order factors: top management commitment (4 items), employee empowerment (4 items), teamwork (4 items), training and education (5 items), and employee involvement (5 items). Collectively, these five first-order factors represent the higher-order construct of CSFs for the successful implementation of ISO 9001 QMS in Malaysian public universities. The CFA results therefore provide empirical support for the proposed multidimensional structure of the CSFs construct and confirm that the observed indicators adequately represent their respective latent factors.

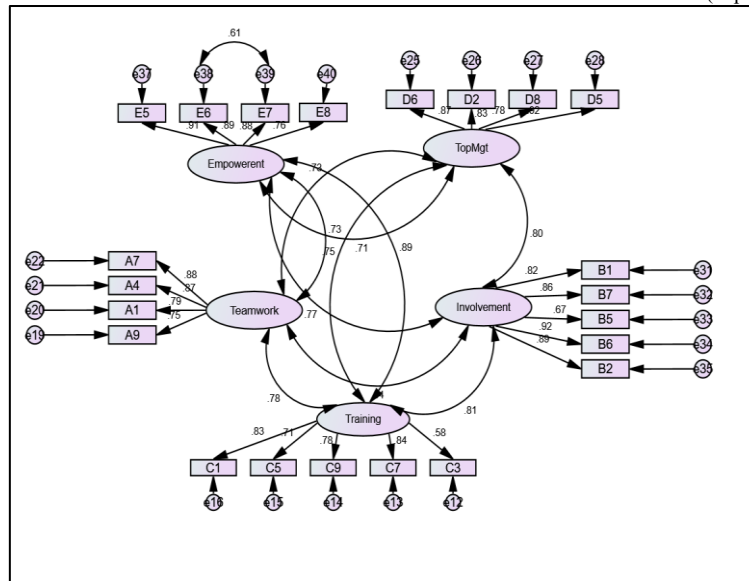


Figure 1: The Measurement Model

Conclusion

This study aimed to identify and validate the Critical Success Factors (CSFs) for the successful implementation of ISO 9001 in Malaysian public universities. Based on 358 completed questionnaires, the Exploratory Factor Analysis (EFA) revealed a five-factor structure comprising top management commitment, employee empowerment, teamwork, training and education, and employee involvement. The factor loadings ranged from 0.612 to 0.889, and the five factors collectively explained 66.699% of the total variance, indicating that the identified factors provided a substantial representation of the CSFs associated with ISO 9001 implementation.

The Confirmatory Factor Analysis (CFA) further supported the proposed five-factor measurement model. All observed indicators demonstrated factor loadings above 0.50, while the model achieved an acceptable overall fit ($\chi^2/df = 2.160$, TLI = 0.920, CFI = 0.903, RMSEA = 0.080). The findings provide empirical support for the multidimensional structure of the CSFs construct, with the five first-order factors collectively representing the higher-order CSFs for ISO 9001 implementation. Notably, top management commitment demonstrated the strongest factor loadings, highlighting the important role of management's commitment to quality within the university context.

Overall, the study contributes empirical evidence to the understanding of CSFs for ISO 9001 QMS implementation in Malaysian public universities. The validated five-factor structure provides a useful framework for university management and quality practitioners to strengthen QMS implementation by emphasising management commitment, employee empowerment, teamwork, training and education, and employee involvement. The findings also suggest that effective ISO 9001 implementation should extend beyond compliance with standard requirements by fostering organisational practices that support employee participation and continuous quality improvement. Nevertheless, this study is subject to certain limitations. As the study focused specifically on Malaysian public universities, the findings may have limited generalisability to private universities, other higher education institutions, or organisations in

different national contexts. Future studies could therefore examine the identified CSFs across different types of higher education institutions and contexts to further validate and extend the proposed framework.

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