



Meta-Analysis of Total Quality Management Excellence

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Abstract

The challenge posed by global competition has increased pressure on organizations to enhance their skills, capabilities, and the quality of products and services. Therefore, the present study aims to conduct a meta-analysis of Total Quality Management (TQM) excellence. This research is classified as an applied study in terms of its purpose and, due to the application of the meta-analysis method, falls under the category of quantitative research. The statistical population under investigation includes all articles and dissertations related to the research topic, both domestically and internationally. Articles and dissertations published in reputable national and international journals serve as scientific sources utilized in this study. In this meta-analysis, only studies meeting the necessary statistical criteria were included. To answer the research questions, the required variables were extracted from checklists, and calculations were performed using Stata and Comprehensive Meta-Analysis (CMA) software. The results indicated that the observed value in the fixed-effects model was -0.18439, which was equal to the adjusted or corrected value under the fixed-effects model. Similarly, the observed value in the random-effects model was -0.18614, which also equaled the adjusted or corrected value under the random-effects model. This finding suggests that the present study does not require additional studies for completion. The results of this table confirm that the model does not suffer from publication bias and does not require further studies to correct biases or create symmetry on both sides of the mean effect size line in the funnel plot. The findings of the analysis demonstrated that components such as resources and partners, work processes, employees, customers, planning, leadership, strategy and policy, and information are significantly associated with TQM excellence. However, the degree of impact of each component and the homogeneity of studies in each section varied. Ultimately, this study emphasizes that TQM excellence is a multidimensional phenomenon influenced by various factors. To achieve TQM excellence, organizations must consider all components and adopt integrated models that account for contextual and methodological differences. Additionally, it is recommended that organizations focus on improving key components, such as employees, planning, and leadership, and leverage modern technologies to attain TQM excellence.

Keywords: Excellence, Total Quality Management, Meta-Analysis

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1. Introduction

In recent years, numerous studies have been conducted on service quality, its evaluation, and customer satisfaction. Researchers strive to develop conceptual models for measuring service quality across various industries to enhance product quality and capture a larger share of customer satisfaction [1, 2]. The philosophy of Total Quality Management (TQM) emerged after World War II through the contributions of experts such as Deming and Juran,

emphasizing continuous improvement and the participation of all employees [3-5].

Today, organizations in competitive environments prioritize customer satisfaction rather than solely focusing on production. Improving quality and delivering appropriate services to customers are among the primary priorities of organizations. Excellence models such as EFQM (European Foundation for Quality Management) assist organizations in evaluating and improving their performance. These models



serve as comprehensive tools for performance measurement, facilitating control and enhancement processes [6-8].

However, many Iranian organizations, despite achieving high scores in national excellence awards, have not yet fully implemented all aspects of the EFQM model. This study seeks to examine the interrelated impact of EFQM model criteria and identify priorities for its more effective implementation. The main objective is to provide a systematic review of the existing literature and to develop a Total Quality Management Excellence Model as a benchmark for improving organizational productivity and performance [9-11].

The key research issue is that, despite the existence of a structured and internationally recognized framework such as the EFQM Excellence Model, which has been evaluated from various perspectives and is widely used globally, most Iranian organizations, even after obtaining high scores in the National Organizational Excellence Award and receiving various awards and trophies, still struggle to fully implement all dimensions of the model [12-14]. Furthermore, organizations that have successfully embarked on the path of excellence and attempted to implement the model face numerous challenges in both implementation and maintaining their current status [15, 16].

One of the factors that require further investigation is the implementation method of the model within organizations. How is the model being implemented? To what extent do the criteria influence one another? Answering these questions will guide organizations in identifying the most influential criteria and prioritizing their implementation accordingly.

This study aims to analyze the interrelationships among the nine EFQM criteria to determine whether each criterion is influenced by the other eight. By establishing these relationships, priorities can be identified, helping organizations to implement the most critical criteria first. For instance, how do strategy, employees, and partnerships affect the leadership criterion? Understanding these interactions will facilitate a more structured and effective implementation process.

This type of analysis has rarely been observed in previous research. Most researchers have focused on examining the overall level of organizational excellence, identifying factors influencing specific criteria, conducting comparative analyses of EFQM with other models, or localizing the model for specific organizations.

Therefore, the present study seeks to conduct a systematic review of the existing literature in the field of Total Quality Management Excellence Model development, positioning it

as a key benchmark for organizational productivity and performance improvement, and ultimately refining the Total Quality Management Excellence Model itself.

2. Methodology

This study is classified as an applied research in terms of its purpose, and due to the application of meta-analysis, it falls under the category of quantitative research.

The statistical population of this study includes all articles and dissertations related to the research topic, both domestically and internationally. The data sources were extracted from reputable national databases such as ensani.ir, noormags.com, civilica.com, irandoc.ir, and sid.ir, as well as international databases such as Elsevier, ScienceDirect, and EBSCO.

The selection criteria for studies included:

1. Research must have been conducted in developing or less developed countries.
2. Studies must include quality management or excellence-related variables.
3. The study must provide sufficient information for calculating effect size.

Ultimately, the sample for this study includes 35 selected studies, which are analyzed in detail in the subsequent sections.

To gather information related to the literature review and research background, books, articles, and relevant websites were utilized. Additionally, to collect data pertinent to the research objectives and questions, a coding form was employed.

For identifying relevant dissertations in the field of excellence models and quality management, data from the Iranian Research Institute for Information Science and Technology (IranDoc) were reviewed. An initial list of relevant studies was compiled, and dissertations that met the required inclusion criteria for meta-analysis were coded accordingly.

3. Findings and Results

To address the research questions, the required variables were extracted from checklists, and calculations were performed using Stata and Comprehensive Meta-Analysis (CMA) software. Given the nature of this study, which focuses on the Total Quality Management (TQM) Excellence Model, research studies with similar topics were collected. The characteristics of these studies are as follows:

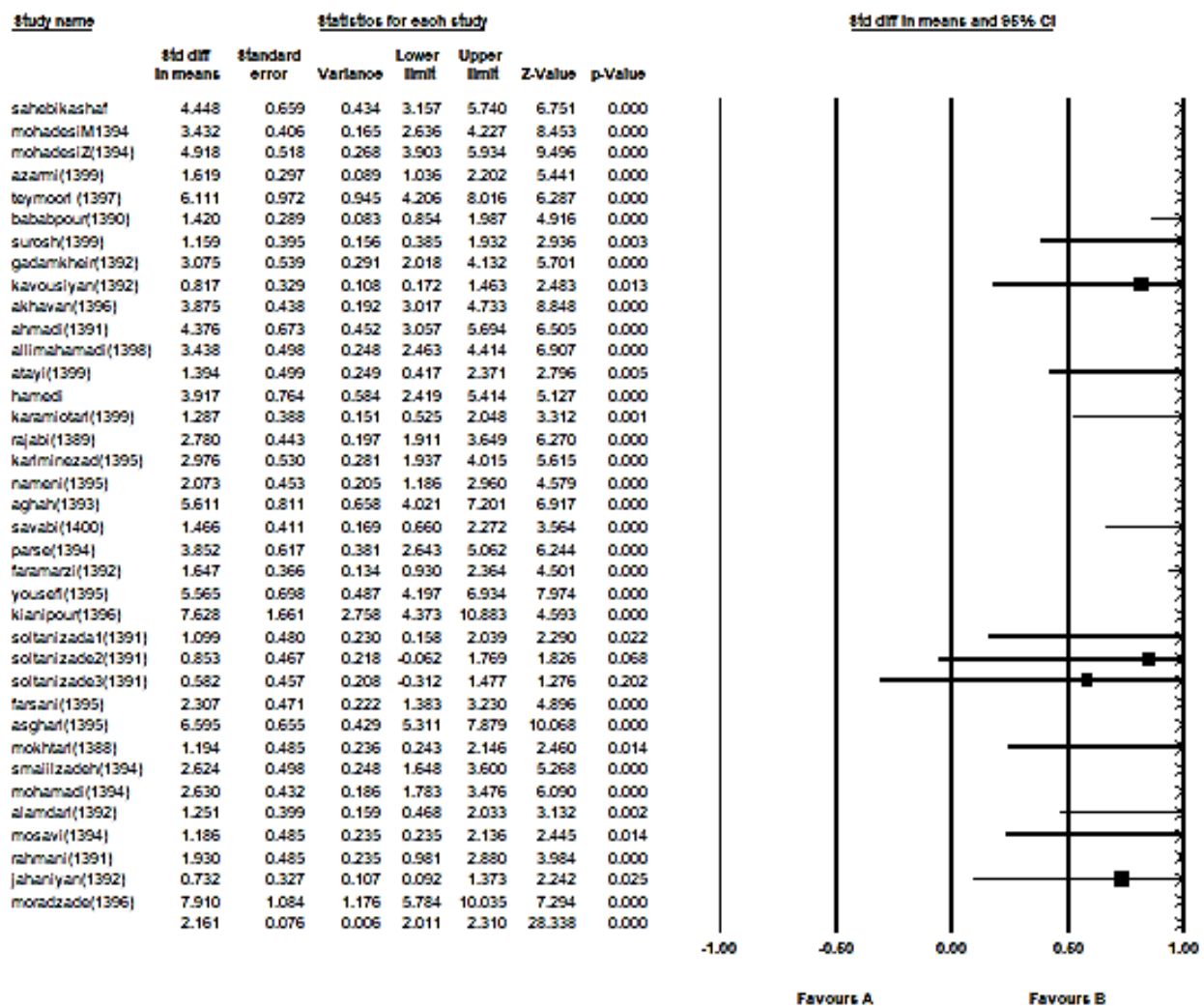
Table 1. Type and Number of Studies Used

Type	Frequency
Dissertations	6
Articles	29
Total	35

As shown below, the effect sizes of most studies are above the mean, and there is limited overlap among them.

Therefore, observing a high level of heterogeneity among the studies is not unexpected.

Meta Analysis

**Figure 1.** Cumulative Chart Derived from 35 Effect Sizes

This section presents the research findings based on the results of the meta-analysis conducted on the extracted components from previous studies. The following table consolidates the findings, and the final model is provided for

each variable. The table reports the meta-analysis results for all studies related to each variable, categorized by study type.

Table 2. Consolidated Meta-Analysis Results

Component	Number of Studies	Mean Z	Confidence Interval (Lower - Upper)	Homogeneity Test (H)	Critical Value (χ^2 k-1)
Resources and Partners	3	0.046	0.019 - 0.073	15.487	15.507
Work Processes	6	0.013	0.018 - 0.069	16.232	16.301
Employees	5	0.019	0.002 - 0.023	17.637	17.227
Customers	1	0.022	0.007 - 0.038	81.135	24.995
Planning	2	0.001	0.003 - 0.023	60.179	21.026
Leadership	2	0.014	0.024 - 0.051	13.099	7.814
Strategy and Policy	3	0.047	0.0002 - 0.093	14.282	9.487
Information	2	0.015	0.001 - 0.033	23.229	18.221

The confidence intervals provided in the table above indicate whether the relationships between each component and TQM excellence are statistically significant.

1. Resources and Partners: The confidence interval (0.019 - 0.073) and the negative Z^2 value indicate a significant relationship between resources and partners and TQM excellence. However, the homogeneity test (15.487) suggests high heterogeneity among the studies.
2. Work Processes: The confidence interval (0.018 - 0.069) and the Z^2 value confirm a significant relationship between work processes and TQM excellence. The homogeneity test (16.232) also shows high heterogeneity among the studies.
3. Employees: The confidence interval (0.002 - 0.023) and the positive Z^2 value indicate a significant positive relationship between employees and TQM excellence. The homogeneity test (17.637) reveals high heterogeneity among the studies.
4. Customers: The confidence interval (0.007 - 0.038) and the negative Z^2 value indicate a significant positive relationship between customers and TQM excellence. However, the homogeneity test (81.135) suggests high heterogeneity among the studies.
5. Planning: The confidence interval (0.003 - 0.023) and the positive Z^2 value confirm a significant positive relationship between planning and TQM excellence. The homogeneity test (60.179) suggests good homogeneity among the studies.
6. Leadership: The confidence interval (0.024 - 0.051) and the positive Z^2 value confirm a significant positive relationship between leadership and TQM excellence. However, the homogeneity test (13.099) shows high heterogeneity among the studies.
7. Strategy and Policy: The confidence interval (0.0002 - 0.093) and the positive Z^2 value indicate a significant positive relationship between strategy and policy and TQM excellence. The homogeneity test (14.282) suggests high heterogeneity among the studies.
8. Information: The confidence interval (0.001 - 0.033) and the positive Z^2 value confirm a significant positive relationship between information and TQM excellence. The homogeneity test (23.229) shows high heterogeneity among the studies.

This section addresses publication bias and methods to detect it. Publication bias occurs when a meta-analysis does not include all related studies, as some studies may remain unpublished for various reasons. If publication bias exists, the final results of the meta-analysis may be biased and inaccurate.

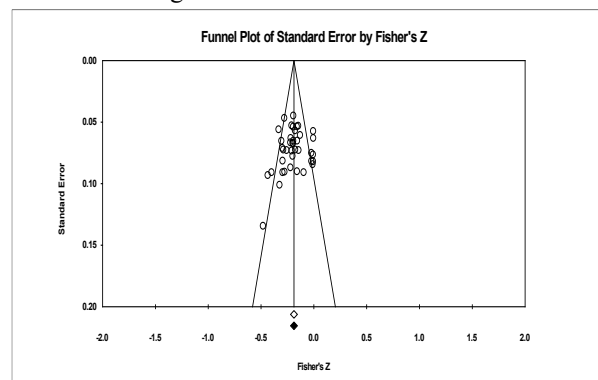


Figure 2. Funnel Plot

Interpretation of funnel plots shows that studies with low standard error, which accumulate at the top of the funnel, do not exhibit publication bias. However, as studies are distributed toward the lower part of the funnel, their standard error increases, and publication bias is more likely.

Since figure above demonstrates that effect sizes are symmetrically distributed, there is no evidence of publication bias in this meta-analysis. Furthermore, no effect size falls outside the -0.5 to +0.5 range, which confirms the absence of publication bias.

The meta-analysis results indicate that all examined components, including resources and partners, work processes, employees, customers, planning, leadership, strategy and policy, and information, have a significant relationship with TQM excellence.

However, the impact magnitude of each component varies, and heterogeneity levels differ across studies. The findings underscore that TQM excellence is a multidimensional phenomenon that requires organizations to consider all key components rather than focusing on a single factor.

The analysis also confirms that no publication bias exists in the meta-analysis results, which strengthens the validity and reliability of the findings.

4. Discussion and Conclusion

This study aimed to examine the impact of various components on Total Quality Management (TQM) Excellence through meta-analysis. The results of the analyses demonstrated that each of the examined components, including resources and partners, work processes, employees, customers, planning, leadership, strategy and policy, and information, are significantly associated with TQM excellence. However, the magnitude of each component's impact and the homogeneity of studies in each section varied. For instance, components such as planning and employees showed a significant positive correlation with TQM excellence, whereas high heterogeneity was observed in studies related to work processes and leadership. This heterogeneity could be due to differences in research methodologies, study contexts, or varying definitions of variables across different studies. Overall, the findings emphasize that TQM excellence is a multidimensional phenomenon influenced by multiple

factors, and achieving it requires organizations to consider all of these components.

Based on the findings of this study, several key recommendations are proposed for organizations and researchers. First, it is essential to develop integrated models that account for contextual and methodological differences. These models can help reduce heterogeneity among studies and enhance the comparability of results. Second, examining the influence of cultural and organizational contexts on the relationship between different components and TQM excellence could lead to a better understanding of these relationships. For example, cultural differences may impact the role of employees or leadership in achieving TQM excellence. Third, future research should employ mixed methods approaches (qualitative and quantitative) to gain a deeper understanding of the relationship between different components and TQM excellence. Such approaches can help identify qualitative factors affecting TQM excellence, which might be overlooked in quantitative studies.

Additionally, developing standardized indicators for measuring different components can help reduce heterogeneity among studies and enhance comparability of results. Standardized indicators can assist researchers and managers in accurately assessing the impact of each component. Furthermore, given technological advancements, investigating the impact of emerging technologies, such as artificial intelligence (AI) and the Internet of Things (IoT), on TQM excellence is recommended. These technologies can contribute to improving work processes, enhancing precision in planning, and advancing information systems.

On the other hand, employee training and development is also recommended as a key component. Organizations should design training and development programs to enhance employees' skills and capabilities, preparing them for active participation in achieving TQM excellence.

Active customer participation is another critical recommendation of this study. Given the role of customers in TQM excellence, organizations should engage customers in quality improvement processes. This engagement can help identify customer needs and expectations, leading to continuous product and service improvements.

Finally, examining the impact of transformational leadership on TQM excellence is suggested. Transformational leadership can drive positive

organizational changes and motivate employees to achieve long-term goals.

This study demonstrated that various components are significantly related to TQM excellence, but the high heterogeneity of studies highlights the need for further investigation and the development of integrated models. Based on the results, it is recommended that organizations focus on improving key components such as employees, planning, and leadership and utilize emerging technologies to achieve TQM excellence. Furthermore, considering cultural and organizational contexts, developing standardized indicators, and adopting mixed methods approaches can contribute to a more comprehensive understanding of TQM excellence. Finally, active customer participation and the development of transformational leadership can help organizations continuously improve quality and move closer to achieving TQM excellence.

Authors' Contributions

Authors equally contributed to this article.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

All procedures performed in this study were under the ethical standards.

References

- [1] W. Mahmood, S. N. Ismail, and M. N. Omar, "Mediating role of school climate and job satisfaction in total quality management and school performance," *Malaysian Journal of Learning and Instruction*, vol. 21, no. 2, pp. 117-146, 2024, doi: 10.32890/mjli2024.21.2.5.
- [2] A. D. Istiqomah, D. Pratiwi, and A. Kholiq, "Exploring the influence of work commitment and total quality management (tqm) on teacher performance: The mediating role of self-efficacy," *Improvement: Jurnal Ilmiah untuk Peningkatan Mutu Manajemen Pendidikan*, 2024, doi: 10.21009/improvement.v11i1.44678.
- [3] E. Menteşoğulları, "Total Quality Management in Education: A Strategic Approach for Continuous Improvement and Success," *Uluslararası Sosyal Bilimler Dergisi*, vol. 7, no. 29, pp. 184-198, 2023, doi: 10.52096/usbd.7.29.10.
- [4] H. C. Liu, R. Liu, X. Gu, and M. Yang, "From total quality management to Quality 4.0: A systematic literature review and future research agenda," *Frontiers of Engineering Management*, vol. 10, no. 2, pp. 191-205, 2023, doi: 10.1007/s42524-022-0243-z.
- [5] J. Abbas and K. Kumari, "Examining the relationship between total quality management and knowledge management and their impact on organizational performance: a dimensional analysis," *Journal of Economic and Administrative Sciences*, vol. 39, no. 2, pp. 426-451, 2023, doi: 10.1108/JEAS-03-2021-0046.
- [6] L. Dezi, X. Hysa, M. Calabrese, and F. Mercuri, "Open Total Quality Management in the Circular Economy age: A social enterprise perspective through the case of Patagonia," *Total Quality Management & Business Excellence*, pp. 1-15, 2022, doi: 10.1080/14783363.2022.2051698.
- [7] U. Karimah and S. Tamin, "Total Quality Management (TQM) and Basic Education: Its Application to Islamic Education in Muhammadiyah Elementary Schools," *Jurnal Pendidikan Agama Islam*, vol. 20, no. 2, pp. 215-232, 2021, doi: 10.14421/jpai.v20i2.8015.
- [8] N. V. K. Jasti, V. Venkateswaran, S. Kota, and K. S. Sangwan, "A literature review on total quality management (models, frameworks, and tools and techniques) in higher education," *The TQM Journal*, vol. 34, no. 5, pp. 1298-1319, 2021, doi: 10.1108/TQM-04-2021-0113.
- [9] M. Jamshidi and A. Kohsari, "Designing an Academic Excellence Model with Emphasis on the European Foundation for Quality Management (Case Study: Comprehensive State Universities in Tehran)," *Journal of Educational Management*, vol. 16, no. 2, p. 89, 2022.
- [10] S. Shams and M. Losar, "Field Evaluation of the EFQM Organizational Excellence Model as a Comprehensive Quality Management Framework," *Journal of Quality Management*, vol. 15, no. 1, pp. 45-60, 2021.
- [11] M. Azar, A. Rezaei, and M. Hosseini, "The Impact of Total Quality Management on Competitive Advantage with the Mediating Role of Innovation Performance in Exporting Companies in the Clothing Industry," *Journal of Industrial Management*, vol. 14, no. 2, pp. 112-130, 2020.
- [12] M. Mousazadeh, A. Rezaei, and M. Hosseini, "The Impact of Total Quality Management on Human Resource Productivity in the Headquarters of Naja Prevention Police (Case Study: Naja Employees in Tehran)," *Journal of Human Resource Management*, vol. 12, no. 3, pp. 45-60, 2019.
- [13] A. Mohaghar, A. Rezaei, and M. Karimi, "Investigating the Impact of Total Quality Management Practices on Innovation Performance Through Organizational Learning Capability in the Banking Industry," *Journal of Innovation Management*, vol. 7, no. 1, pp. 34-50, 2019.
- [14] M. Kazazi, *Development and Application of Total Quality Control*. Tehran: Elm Publishing, 2019.
- [15] M. Shoaibi, "Total Quality Management and Service Innovation (A Review in Research Literature)," *Journal of Service Management*, vol. 8, no. 3, pp. 78-92, 2020.
- [16] R. Sharma, "Extending the information systems success model," *Journal of Business Research*, vol. 120, pp. 567-582, 2020.