

# Infrastructure and Core Quality Management Practices in Higher Education Performance

Ahmed Hani Mohammed <sup>#1</sup>, Che Azlan Bin Taib <sup>\*2</sup>, Santhirasegaran a/l S.R. Nadarajan <sup>\*3</sup>

<sup>#1</sup> *Industrial management department, Administration and Economic College, University of Mosul, Mosul, Iraq,  
School of Technology Management & Logistics, Universiti Utara Malaysia  
06010 Sintok, Kedah, MALAYSIA*

<sup>1</sup>[ahmedhani1982@gmail.com](mailto:ahmedhani1982@gmail.com)

<sup>\*2,3</sup> *School of Technology Management and Logistics, Universiti Utara Malaysia  
06010 Sintok, Kedah, MALAYSIA*

<sup>2</sup>[c.azlan@uum.edu.my](mailto:c.azlan@uum.edu.my)

<sup>3</sup>[santhirasegaran@uum.edu.my](mailto:santhirasegaran@uum.edu.my)

**Abstract-** The literature differs by choosing the quality management practices depending on the organization's activities or the type of sector. Meanwhile, there is a differentiation in selecting the best practices, even in the same sector. Malcolm Baldrige National Quality Award has resonated with researchers as the best practices that can conform to the higher education activities. Moreover, the literature discusses the impact of quality management practices on performance through being divided into Core and infrastructure practices. This study proposes methodological framework to discuss any of these practices concerned with the Core-QMPs or Infrastructure-QMPs, influencing the possible relationship between Infrastructure QMPs, Core QMPs, and organizational performance in a clear signal that it has not been studied before, especially in Higher Education context. This study considered a starting point for further studies that related to Infrastructure and Core QMPs in Higher Education.

**Key words:** *Quality management practices, Core-QMPs, Infrastructure-QMPs, Higher education, Performance.*

## 1. Introduction:

The development of economic and international society has resulted in both an expansion and the growth of new types of higher educational institution. There has been an increase in communication among these institutions and the adoption of the new rules that govern their work.

Therefore it is important to enhance cooperation between departments within the institution and to develop ways to determine the best technique for evaluation [1, 2].

From this standpoint, quality and excellence should be the vision of every higher education institution. Acquisition of quality and excellence is the great challenge faced by all higher education institutions [3]. On the other hand, the organization must achieve the maximum benefit through the understanding of the mechanics of the application of quality management. To achieve this point, scholars tried to find one approach that can achieve the maximum benefit by finding a combination of practices that achieves the best organizational performance [4].

In addition, Quality management practices (QMPs) classified either infrastructure or core practices [5]. The first categorizations of QMPs proposed by Flynn, this study categorized the QMPs to core QMPs, and infrastructure QMPs. Core QMPs are all practices that direct implementation to improve the quality, while, infrastructure QMPs are all practices that create the best environment and support for core practices [6].

## 2. The Infrastructure and Core QMPs.

A series of studies is conducted on quality management in Higher education institutes (HEIs), some are theoretical and empirical studies [e.g., 2, 7, 8-11], whereas, others focus on QMPs in HEIs [e.g., 3, 12, 13-18]. QMPs are universal concept. For example, there are studies classified.

QMPs depending on MBNQA [6, 12, 19], in same time, other study classified QMPs into four practices: Human resource, Information analysis, Operation management, and Stakeholders requirement [15] (for more details see Table 1).

**Table 1.** Quality management practices in HEIs

| No. | practices                        | Authors |   |   |   |   |   |   |   |   |    |    |    |
|-----|----------------------------------|---------|---|---|---|---|---|---|---|---|----|----|----|
|     |                                  | 1       | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 1   | Top management (leadership)      | √       | √ |   | √ | √ | √ | √ | √ | √ | √  | √  | √  |
| 2   | Human resource development       | √       | √ | √ | √ | √ | √ |   |   | √ | √  | √  | √  |
| 3   | Customer focus                   | √       |   |   | √ | √ | √ |   |   | √ | √  | √  | √  |
| 4   | Information analysis             | √       |   | √ |   | √ | √ |   |   | √ | √  | √  | √  |
| 5   | Strategic planning               | √       |   |   |   | √ | √ | √ | √ | √ | √  | √  | √  |
| 6   | Management of process quality    | √       | √ |   |   | √ | √ |   |   | √ | √  | √  | √  |
| 7   | Operational result               | √       | √ |   |   | √ | √ | √ | √ | √ | √  | √  | √  |
| 8   | Vision                           |         | √ |   |   |   |   |   |   |   |    |    |    |
| 9   | Program design                   |         | √ |   |   |   |   |   |   |   |    |    |    |
| 10  | Quality system improve           |         | √ |   |   |   |   |   |   |   |    |    |    |
| 11  | Recognition and reward           |         | √ |   |   |   |   |   |   |   |    |    |    |
| 12  | Education and training           |         | √ |   | √ |   |   |   |   |   |    |    |    |
| 13  | Operation management             |         |   | √ | √ |   |   |   |   |   |    |    |    |
| 14  | Stakeholders requirement         |         |   | √ |   |   |   | √ | √ |   |    |    |    |
| 15  | Process management               |         |   |   | √ |   |   | √ | √ |   |    |    |    |
| 16  | Continuous improvement           |         |   |   | √ |   |   |   |   |   |    |    |    |
| 17  | Partnership and resource         |         |   |   |   |   |   | √ | √ |   |    |    |    |
| 18  | Customer, people, society result |         |   |   |   |   |   | √ | √ |   |    |    |    |

1) [12] ; 2) [14]; 3) [15]; 4) [13]; 5) [19]; 6) [20]; 7) [21]; 8) [22]; 9) [23]; 10) [24]; 11) [25]; 12) [26].

After reviewing the practices studied by researchers in the educational institutions and determining the differences among them to unify the standards of measurement and optimal selection, Malcolm Baldrige National Quality Award (MBNQA) was selected as the gold standard for understanding the quality management [27]. According to [28], QMPs is a tool utilized to help educational institutions in the world to get high level of quality management.

Furthermore, the literature focuses on QMPs and its effects, whereas, few studies focused on the classification of these practices to the infrastructure, and core practices [e.g., 29, 30]. Similarly, QMPs examined through core and infrastructure in the U.S. industry. They identified three practices as core QMPs: statistical control and feedback, process flow management, and product design process, in addition to five infrastructure QMPs: top management support, customer relationship, supplier relationship, work-force management, and work attitudes [6].

In a related study, top management support, customer focus, supplier management, human resources, and organizational cooperation as infrastructure QMPs to examine the manufacturing industry in Thailand. They also employed three core QMPs namely process control usage, statistical

design, and process management. The study identified human resources as an infrastructure QMPs and process control as a core QMPs [31].

Other study illustrated three core practices (quality information, product design, and process management) and four infrastructure practices (top management support, customer relationship, supplier relationship, and work-force management) in the U.S. manufacturing industry [30]. this study reports three reasons to classify QMPs as core and infrastructure QMPs -first, the differentiation among authors when classifying QMPs, second, the measurement level, for example, some studies measured it based on the organization level, while others measured it according to its effect on the quality level. The final reason is the different statistical tools used to measure the relationships.

Additionally, some other studies focused on core and infrastructure QMPs in manufacturing industries of developed countries [32, 33]. Sometimes core and infrastructure QMPs are called as soft and hard practices respectively [34-37]. The Table 2 summarized the studies that focused on core and infrastructure QMPs.

**Table 2.** Summary of studies that focused on core and infrastructure QMPs

| No. | Authors | Sector of study and sample  | Core QMPs  | Infrastructure QMPs   |
|-----|---------|---|--|---|
| 1   | [33]    | Manufacturing , USA, 42 plants  |  | - Human resource management<br>- JIT<br>- Strategic management/ organizational characteristics  |
| 2   | [6]     | Manufacturing, USA 75 plants  | - Statistical control and feedback<br>- Process flow management<br>- Product design process.   | - Top management support<br>- Customer relationship<br>- Supplier relationship<br>- Work-force management<br>- Work attitudes.                            |
| 3   | [29]    | Plastic transforming , Tunis 133 companies  | - Quality system improvement<br>- Information and analysis<br>- Statistical quality techniques use   | - Organization of quality<br>- Employee training<br>- Employee participation<br>- Supplier quality management<br>- Customer focus<br>- Continuous support |
| 4   | [32]    | Manufacturing , Sweden, United States, Japan, Finland, South Korea, and Germany. 189 big plants | - Quality information<br>- Process management<br>- Product design  | - Top management support<br>- Work-force management<br>- Supplier involvement<br>- Customer involvement   |
| 5   | [30]    | Manufacturing , USA, 226 plants   | - quality information<br>- Product design<br>- Process management  | - Top management support<br>- Customer relationship<br>- Supplier relationship<br>- Work-force management   |
| 6   | [31]    | Manufacturing , Thailand 188 companies  | - Process control usage<br>- Statistical design<br>- Process management  | - Top management support<br>- Customer focus<br>- Supplier management<br>- Human resource<br>- Organizational cooperation                                 |
| 7   | [38]    | Manufacturing , Malaysia 255 electronics firms  | - Quality tools and techniques<br>- Benchmarking<br>- The ISO 9001 standard and process management,<br>- Measurement<br>- Product/ service design. | - Leadership<br>- People management<br>- customer and supplier relationships,<br>- quality planning,  |

The studies explained the importance of the above practices and the importance of the classification into core and infrastructure QMPs. It is evident from the table that most of the studies were carried out in the manufacturing sector, as well as, in industrialized countries, while measurement in higher education sector has largely been neglected.

For the above reason, the present study focuses on MBNQA as practices divided into four practices of infrastructure QMPs namely leadership [6, 30-32], work-force [6, 29-32], strategic planning [33, 39], customer focus [29, 31]. Added to there are two practices related to core QMPs namely : measurement, analysis, and knowledge management [29, 30, 32], and process management [30, 31].

### 3. Model proposed

To further understanding of the relationship among QMPs, the literature is divided into different categories, for instance, infrastructure practices and core practices [6, 32, 40]. To adopt the infrastructure and core QMPs classification in building our research model to direct implementation, infrastructure practices pertain to all practices that create the best environment and support for core practices QMPs, whereas core practices relate to direct implementation to improve the quality, see Figure 1.

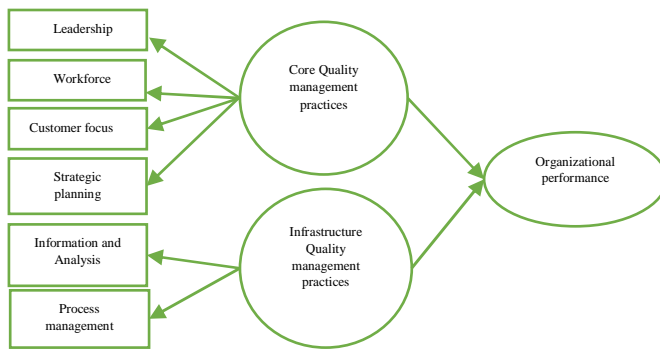


Figure 1. Model proposed

### 3.1 The relationship between Core Quality Management Practices and Organizational Performance.

The previous studies related to QMPs examined the effect of Core QMPs to Organizational performance. The majority of studies mentioned the positive and direct relations between the Core QMPs and Organizational Performance [29, 30, 38, 41], in contrast to, some studies which refer to no significant relationship between the Core QMPs and performance [32]. However, the studies differed in determining factors Core QMPs, and depending on the approved practices and adopted by the organization. This study adopts two practices as Core QMPs are process management, and Information and analysis.

On one hand, the variables that adopted by the study as the Core QMPs depended on some other previous studies which brought the existence of a positive relationship between it and the performance. According to [30] study, there are significant relationships between process management and quality information as a core QMPs and quality performance. Meanwhile, there is agreement that process management (process control) is one of key variable in core QMPs, and has a significant effect with key performance results [31, 34]. On the other hand, there is direct and significant relationship between “information and analysis” as a core QMPs and performance (financial, organizational, and quality product). However, there are positive direct effects of Core QMPs on organizational performance [29].

### 3.2 Relationship between Infrastructure quality management practices and organizational performance.

The previous studies focused on infrastructure QMPs as an important practice carried out by the organizations management. This literature identifies many practices that are infrastructure QMPs. This paper adopts the four infrastructure QMPs for MBNQA standards that: leadership, workforce, customer focus, and strategic planning.

The previous studies mentioned a variation in the relationship between infrastructure and performance. Some studies have confirmed that relationship is not direct, and that is done through Core QMPs [29, 30, 34]. other study further confirmed the existence of a direct and significant relationship between Infrastructure and performance [32].

There are several studies which tested the relationship between each practice separately with the performance. The relationship between the leadership and performance have been tested and results varied as significant and direct such as [32, 38, 42, 43], and other non-significant [30, 44]. Similarly some studies have found significant and direct relationship between customer focus and performance [32, 38, 42, 43], and other non-significant [29, 30]. This is the way how it works between workforce practice and performance, where the studies that highlighted positive effect between them [32, 42, 45]. While some studies have found negative effects [30, 34]. Finally, there are direct relationship between strategic planning and performance [42, 43], and indirect relation between it [34]. The conclusion is, there are positive direct effects of Infrastructure QMPs on organizational performance.

## 4. Conclusion

This paper has discuss the relationships between the variables represented by core QMPs and infrastructure QMPs as independent variables, and their relationship to organizational performance as a dependent variable. In a review of the literature found, there is a relationship between the practices and performance in general. The lack of studies that tested the effect of infrastructure QMPs, and Core QMPs. this paper provided an opportunity and justifications to propose new form to test the relationship depending on two independent variables are the practices of infrastructure, and Core quality management, based on the Malcolm Baldrige national quality award with the Organizational performance as a dependent variable.

## References

1. Pounder, J., "Institutional performance in higher education: is quality a relevant concept?", *Quality Assurance in Education*, 1999. **7**(3): p. 156-165.
2. Csizmadia, T., J. Enders, and D.F. Westerheijden, "Quality management in Hungarian higher education: Organisational responses to governmental policy", *Higher Education*, 2008. **56**(4): p. 439-455.
3. Prasad, V., "Best practices in higher education for quality management", NAAC for Quality and Excellence in Higher Education, 2005. **6**: p. 2.
4. Zhang, D., K. Linderman, and R.G. Schroeder, "The moderating role of contextual factors on quality management practices", *Journal of Operations Management*, 2012. **30**(1): p. 12-23.
5. Sousa, R. and C.A. Voss, "Quality management revisited: a reflective review and agenda for future research", *Journal of operations management*, 2002. **20**(1): p. 91-109.
6. Flynn, B.B., R.G. Schroeder, and S. Sakakibara, "The impact of quality management practices on performance and competitive advantage", *Decision Sciences*, 1995. **26**(5): p. 659-691.
7. Campatelli, G., P. Citti, and A. Meneghin, "Development of a simplified approach based on the EFQM model and Six Sigma for the implementation of TQM principles in a university administration", *Total Quality Management & Business Excellence*, 2011. **22**(7): p. 691-704.
8. Roszak, M., "Systemic approach to problems of the quality in education", *Journal of Achievements in Materials and Manufacturing Engineering*, 2009. **37**(2): p. 751-758.
9. De Santisteban, A.V., "Sanctions, war, occupation and the de-development of education in Iraq", *International review of education*, 2005. **51**(1): p. 59-71.
10. Sharabi, M., "Managing and improving service quality in higher education", *International Journal of Quality and Service Sciences*, 2013. **5**(3): p. 309-320.
11. Chong, S., "Academic quality management in teacher education: a Singapore perspective", *Quality Assurance in Education*, 2014. **22**(1): p. 53-64.
12. Badri, et al., "The Baldrige Education Criteria for performance excellence framework: Empirical test and validation", *International Journal of Quality & Reliability Management*, 2006. **23**(9): p. 1118-1157.
13. Tam, L.W., "Quality management theory and practice: some observations of practices in Australian academic libraries", *Library management*, 2000. **21**(7): p. 349-356.
14. Bozbura, T., E. Bayraktar, and E. Tatoglu. "A causal model of quality management practices and stakeholder interests in higher education institutions: Comparison of public and private universities", *Technology Management in the Energy Smart World (PICMET), 2011 Proceedings of PICMET'11*. 2011. Portland, OR: IEEE.
15. Dick, G.P. and J.J. Tari, "A Review of Quality Management Research in Higher Education Institutions", Kent Business School Working Paper Series, 2013. **274**.
16. Becket, N. and M. Brookes, "Quality management practice in higher education—what quality are we actually enhancing", *Journal of Hospitality, Leisure, Sport & Tourism Education*, 2008. **7**(1): p. 40-54.
17. Magutu, P.O., et al., "Quality management practices in Kenyan educational institutions: the case of the University of Nairobi", *African Journal of Business & Management (AJBUMA)*, 2010. **1**: p. 14-28.
18. Mohammed, A.H., C.A.B. Taib, and S.a.l.S.R. Nadarajan, "Mapping the Relationship among Quality Management Practices, Organizational Learning, Organizational Culture, and Organizational Performance in Higher Education: A Proposed Framework", *American Journal of Industrial and Business Management*, 2016. **6**(04): p. 401.
19. Lee, S., et al., "Strategy formulation framework for vocational education: integrating SWOT analysis, balanced scorecard, QFD methodology and MBNQA education criteria", *Managerial Auditing Journal*, 2000. **15**(8): p. 407-423.
20. Islam, R., "MBNQA criteria in education: assigning weights from a Malaysian perspective and proposition for an alternative evaluation scheme", *International transactions in operational research*, 2007. **14**(5): p. 373-394.
21. Bou-Llusar, J.C., et al., "An empirical assessment of the EFQM Excellence Model: Evaluation as a TQM framework relative to the MBNQA Model", *Journal of Operations Management*, 2009. **27**(1): p. 1-22.
22. Ernest Osseo-Asare, A. and D. Longbottom, "The need for education and training in the use of the EFQM model for quality management in UK higher education institutions", *Quality Assurance in Education*, 2002. **10**(1): p. 26-36.
23. Harer, J.B. and B.R. Cole, "The importance of the stakeholder in performance measurement: critical processes and performance measures for assessing and improving academic library services and programs", *College & Research Libraries*, 2005. **66**(2): p. 149-170.
24. Sondari, M.C., "Examining Job Description to Develop Job Performance Indicators for Higher Education Institution Based on MBNQA Education Criteria", *Journal of Education & Vocational Research*, 2013. **4**(4).
25. Honnutagi, A.R., R. Sonar, and S. Babu, "Criterion Weights for Knowledge Management Integrated Quality Accreditation System for Indian Engineering Education Using Analytical Hierarchy Process", *World*, 2011. **1**(5): p. 159-174.
26. Veenstra, C.P. "Work in progress-Innovation using the baldrige process. in *Frontiers In Education Conference-Global Engineering: Knowledge Without Borders, Opportunities Without Passports*", 2007. *FIE'07. 37th Annual*. 2007. IEEE.

27. Dew, J.R., "Quality issues in higher education", Journal for Quality and Participation, 2009. **32**(1): p. 4.
28. Ahmad, H., A. Francis, and M. Zairi, "Business process reengineering: critical success factors in higher education", Business Process Management Journal, 2007. **13**(3): p. 451-469.
29. Lakhal, L., F. Pasin, and M. Limam, "Quality management practices and their impact on performance", International Journal of Quality & Reliability Management, 2006. **23**(6): p. 625-646.
30. Zu, X., "Infrastructure and core quality management practices: how do they affect quality?", International Journal of Quality & Reliability Management, 2009. **26**(2): p. 129-149.
31. Laohavichien, T., L.D. Fredendall, and R.S. Cantrell, "Leadership and quality management practices in Thailand", International Journal of Operations & Production Management, 2011. **31**(10): p. 1048-1070.
32. Naor, M., et al., "The Role of Culture as Driver of Quality Management and Performance: Infrastructure Versus Core Quality Practices", Decision Sciences, 2008. **39**(4): p. 671-702.
33. Flynn, B.B., "The relationship between quality management practices, infrastructure and fast product innovation", Benchmarking for Quality Management & Technology, 1994. **1**(1): p. 48-64.
34. Calvo-Mora, A., et al., "The relationships between soft-hard TQM factors and key business results", International Journal of Operations & Production Management, 2013. **34**(1): p. 115-143.
35. Rahman, S.-u. and P. Bullock, "Soft TQM, hard TQM, and organisational performance relationships: an empirical investigation", Omega, 2005. **33**(1): p. 73-83.
36. Mathews, B.P., et al., "European quality management practices: The impact of national culture", International Journal of Quality & Reliability Management, 2001. **18**(7): p. 692-707.
37. Prajogo, D.I., "Progress of quality management practices in Australian manufacturing firms", The TQM Magazine, 2006. **18**(5): p. 501-513.
38. Abdullah, M.M.B. and J.J. Tari, "The influence of soft and hard quality management practices on performance", Asia Pacific Management Review, 2012. **17**(2): p. 177-193.
39. Samson, D. and M. Terziovski, "The relationship between total quality management practices and operational performance", Journal of Operations management, 1999. **17**(4): p. 393-409.
40. Cua, K.O., K.E. McKone, and R.G. Schroeder, "Relationships between implementation of TQM, JIT, and TPM and manufacturing performance", Journal of Operations management, 2001. **19**(6): p. 675-694.
41. Kim-Soon, N. and M. Jantan. "Quality management practices in Malaysia: Perceived advancement in quality management and business performance", in *Management of Innovation and Technology (ICMIT), 2010 IEEE International Conference on*. 2010. Proceedings of the 2010 IEEE ICMIT.
42. Fening, F.A., G. Pesakovic, and P. Amaria, "Relationship between quality management practices and the performance of small and medium size enterprises (SMEs) in Ghana", International Journal of Quality & Reliability Management, 2008. **25**(7): p. 694-708.
43. Jaafreh, A.B. and A.Z. Al-abedallat, "The Effect of Quality Management Practices on Organizational Performance in Jordan: An Empirical Study", International Journal of Financial Research, 2013. **4**(1): p. p93.
44. Su, Q., et al., "The impacts of quality management practices on business performance: an empirical investigation from China", International Journal of Quality & Reliability Management, 2008. **25**(8): p. 809-823.
45. Sabella, A.R., et al., "Quality management practices and their relationship to organizational performance", International Journal of Operations & Production Management, 2014. **34**(12).