

The Mediating Effect of Innovation between Total Quality Management (TQM) and Business Performance

Ang Wei Shan^{1,a}, Mohd Fauzi Ahmad^{2,b}, Nik Hisyamudin Muhd Nor^{3,b}

Department of Production and Operation Management, Faculty of Technology Management and Business, Universiti Tun Hussien Onn Malaysia (UTM), Parit Raja, Batu Pahat, Johor, Malaysia

^a gp150072@siswa.uthm.edu.my, ^b mohdfauzi@uthm.edu.my,

Abstract. Both TQM and Innovation are the competitive key factors that intensely embedded into organizational products, service and process. In order to achieve higher business performance, organizations are needed to adopt both quality and innovation. Therefore, the main objective of this paper is to identify the relationship between TQM and business performance with a mediator's effect of Innovation. After detailed review the extensive literature, a new TQM model is presented. The proposed model integrates the TQM practices and different type of innovation attempt to develop a theoretical knowledge to help academicians and manufacturers to understand the relationship that design quality in product and service and engaging innovation in the activities. To this end, the SEM-PLS (Structural Equation Modelling – Partial Least Squares Structural) is used to identify and evaluate the relationship among TQM, Innovation and business performance in establishing a new TQM model.

1. Introduction

Nowadays, all developing and developed countries in manufacturing sectors are facing an unprecedented competition and difficult for them to directly compete in both international and domestic competition. This is mainly due to intense competitive environment with rapidly changed in technology and globalization trade. Therefore, both quality and innovation play a crucial part to secure the organization in order to gain sustainable competitive advantages. However, most of the researchers are lacked of concerning the mediator effect in their research. The research is exploring the relationship among the quality management, innovation and business performance and based on these three factors. It is indicated that quality is necessary but still insufficient in today's business [1]. Furthermore, the fundamental component of organizations to obtain the sustainable competitive advantage has been changed from quality to innovation [2]. Therefore, innovation as one of the important element to achieve TQM implementation [3]. In both technology and human dimension, TQM practices help to develop cultures and environment that support innovation [2]. Hence, it is important to implement TQM practice to create an environment for innovation to launch and develop new products and services to achieve customer's requirement [2]. Therefore, it is necessary to analyse the innovation as the potential mediators between TQM practices and business performance to compete in global market. Moreover, this research attempts to explore insights into the relationship between TQM and business performance by determining the effects of innovation mediator. To



determine the proposed mediator effect, a Structural Equation Modelling (SEM) technique is used for analyzing the collected data from Malaysia E&E industry.

2. Literature Review

2.1. Total Quality Management

Quality plays an important role in an organization from all over the world [4]. Quality always acts as a key issue for manufacturing in their product and services [5]. Based on the literatures, TQM is mostly based on anecdotal evidence, case study and personal experience from people such as Juran, Deming, Ishikawa and Feigenbaum. [6, 7]. Quality management plays a vital role in any organization, where it has the significant impact to the increase of business performance over the past 20 years [8]. Hence, TQM gurus had provided many key elements to implement and evaluate TQM in manufacturing industry [6]. The formulations of TQM approach were associated with quality management [9]. Besides that, quality gurus had also promoted the development of quality improvement activities in business performance consistently. The literature of TQM concurs that its practices and concept have been shaped by numerous quality gurus such Deming [10], Juran [11], Crosby [12], Ishikawa [13] and Feigenbaum [14]. The definitions of TQM are form and further presented in Table 1 from several TQM gurus, to insight the importance of the subject:-

Table 1. The literature review of the Quality Gurus

<i>Guru(s)</i>	<i>Definition/ Concept</i>
Deming (1986)	<ul style="list-style-type: none"> a. Father of quality management b. Focus on management philosophy and system c. Developed Deming 14 points for management to assist TQM, to enhance the organizational quality and competitiveness d. Developed Deming's cycle (PDCA) to identify problem and continuous quality improvement
Juran (1988)	<ul style="list-style-type: none"> a. The quality should fit in for usage in term of safety, conformance, available and design. b. Develop Juran's trilogy quality planning: planning, control and improvement, to implementing the quality plan into the process or product, it minimize the cost of poor quality c. Created 10 steps to improve quality by cooperates closely with customers in order to know their needs
Crosby (1979)	<ul style="list-style-type: none"> a. Aims to conformance to specification or requirement of customer need b. Introduce zero defect philosophy to minimize errors and defect (Do the things right at the first time) c. Introduce 14 steps for quality improvement, to push employee limit to improve business performance by participating in top management and entire organization [15]
Ishikawa (1985)	<ul style="list-style-type: none"> a. Developed 7 basic quality tools: Pareto chart, Cause and effect diagram, Stratification chart, Scatter diagrams, Check sheet, Histograms, Control chart. b. Approximately 90% of the problem can be solved by using seven quality tools.
Feigenbaum (1991)	<ul style="list-style-type: none"> a. Pioneer in TQM/ TQC b. TQM as a system for combining quality development, maintenance and improvement of different group in an organization to enable provide product and service at economic level for customer satisfaction

A part from that, organizations were also needed to handle the demands of high quality product from overseas and local market. They must improve their quality operations constantly [16]. Most of the businesses are interested in the TQM implementation due to practical and universal technique, across the countries, industries and firms [17]. Despite of culture that differs based on country to countries and types of industrial, certain important principles can still apply in business to maintain the market share, minimize costs and increase profit [18]. Thus, TQM required implementation for new

business management and working culture that involving the participation of all employees and resources allocation of an organization [19]. Besides that, TQM practices also seek to build up a culture in which doing the things right along the process rather than rework or reprocess [12]. Furthermore, quality should design in each stage rather than just focusing on inspection in the finish goods [20]. Consequently, TQM is a way of continuous improvement [21]. This principle contributed to continuous improvement and waste reduction in order to achieve customer satisfaction [22]. The spirit to pursue continuously improvement not only depend on the market demand, but also to gain the sustainable competitive advantage to survive in global market [16].

2.2. Innovation

Generally, innovation can help firms to create a new market segment, improve the production tools and methods to innovate new product and service to improve human's daily lifestyle [17]. Innovation can classify into two categories which are product innovation and process innovation [23]. Product innovation is defined as a form of introduction of improved in new products or service [24]. The launching of a new product can through customer pull and technology-push to well understand regarding to the customer demand and thus, to find a creative idea [25]. Customers' expectation can easily fulfil when organization produced a high-quality and innovative product [26]. Organization product innovation can be determinant for internal factors (such the types of strategies, leadership, performance system, company, structure, human resource management and communication) or external factors (such regional environment and industry) [27] However, majority of the organization failed to manage innovation are due to lack of consistency and convincing manner with reliable and acceptable explanation to the workers [26]. The compensation system as one of the important system to human resource practices to focus on innovation through reward in fair manner [26]. This is due to employees have the opportunity to voice out and provide new idea which could lead the organization overcomes the barrier.

Whereas, the process innovation can be defined as implementation and changes in method producing products or services [28]. Process innovation attempt to redesign or improve the business process in order to boost business efficiency and customer satisfaction [29]. Thus, it included new and improved work methods in the processes [24]. This could lead the firm to maximize their benefits by improving the delivery method or production through the changes in device, software or technique [30]. Besides that, it also seek to modify the current or creation of a new process [31]. This could focused on improving the effectiveness and efficiencies of production [32]. Which encourage to focus on small improvement on efficiency, employees' satisfaction, bottom line, productivity or minimize the cost without totally changing the way of the employees performing work [33].

On the other hands, Innovation plays a crucial element for an organizational learning in this new century [34]. Process innovation as a vital role in the management of an organization [35]. However, there are limited studies investigate on the potential power of the process innovation to improve and create competitive advantage for business performance [36]. Although process innovation play a critical role in improving working methods, somehow, some of the firm failure to operate new process, lead to produce low quality goods and service to client [35]. The practices of quality management is not directly impact the process innovation, but technological capabilities and learning is completely mediate the relationship [36].

3. Methodology

This paper reviews a range of extensive literature that related to TQM published. The used of database references were from ProQuest, Emerald, Science Direct, Scopus, Springer, Taylor & Francis, Elsevier, IEEE and Google Scholar. The keyword search were related to the practices or implementation of TQM and innovation. Some other related papers were also used to review the references listed in literature. The process of review is studied and identified in the research design of TQM model.

4. Research Hypotheses

4.1. *The Relationship between TQM and Business Performance*

Most of the researchers found that, TQM practices were significantly correlated with business performance [37, 38]. TQM is a management approach that concern on quality issues and encourage employees' participation to gain a long term success in their business [39]. The implementation of TQM played an essential role to improve business effectiveness and efficiency [39]. There are several critical factors during the implementation of TQM practices namely, top management commitment, employee involvement, customer focus, suppliers management, information and analysis, strategic planning, process management and communication [40, 41].

In contract, some empirical research found that the relationship between TQM and business performance are still ambiguous [39, 42]. Thus, organizations are needed to find and implement a suitable TQM practices in order to sustain for excellent performance. Therefore, it is important for deeper understanding in the relationship among TQM and business performance and to create a further bridge between them. Based on the discussion above, the hypothesis of this study at below:-

H₁: TQM practices is positively correlated with business performance

4.2. *The Relationship between TQM and Innovation*

Based on previous results, there are positive relationships between TQM and innovation [2, 43, 44]. The relationships between both TQM and innovation had raise the interest among researchers in the management field [17, 45, 46]. The variables were investigated by researcher between TQM practices and innovation which included innovation performance [17, 26], product and process innovation [25, 47, 48], and process design and improvement [49]. Quality and innovation were generally two different discipline, but both have similar importance towards business performance. Previously, innovation is mainly focused on technology, cost and quality control [50]. Today, researchers are attempting to link with human resource skills [51]. Due to TQM developed an advantageous environment to build better human resource skills in innovation. Organizations are needed to be prosperous in innovation in order to produce a standard quality of products [9]. The relationship of both quality and innovation can be determined by business performance and development [52]. Therefore, during the development and creation of new products or services, organization are needed to base on the customers' requirement [9]. Meanwhile, a new product launching it is needed to base on the market demand [11].

However, there are different arguments related with TQM and innovation that were indicated in a partial co-relationship between TQM and innovation [9, 45, 53]. There are several reasons that causes the inconsistency result of TQM and innovation that TQM culture has a direct influence on the product design capabilities and process improvement but not product innovation [45]. Besides that, some previous research result showed that the relationship between quality and innovation indicated a strong connections with innovation performance and weak connection with product innovation [9]. Therefore, the failure implementation in innovation can be divided into two which are internal and external factors. The internal factors are included poor communication, employees' participation, empowerment and leadership [54]. Whereas, the external factors are included the divergence of innovator and customer view, competitiveness, imitation of idea and government policy [55]. As a result, there is an inconsistency between TQM and innovation, that unable to prove whether TQM practices are consistently positive to innovation performance [26, 56]. Based on the discussion above, the hypothesis of this study suggested at below:-

H_{2a}: TQM practices is positively correlated with Innovation

4.3. The Relationship between Innovation and Business Performance

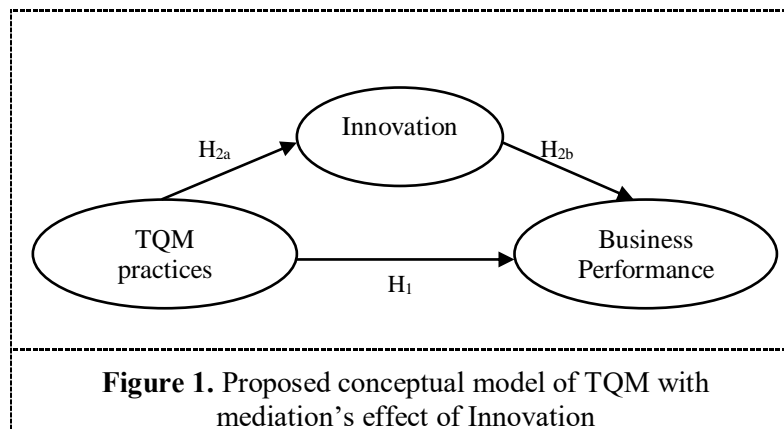
Innovation as one of the important element that concern in business or business research [25]. Innovation practices is significantly related to the business performance [2, 44, 57]. Most of the research on innovation is too centered on identifying the various innovations such as the novelty of the merchandise, the speed of launching, the used of technological innovation in new products [28, 43]. The success of product innovation and the ability of companies to improve their innovation processes had rapidly became an essential requirements for competitive advantage and long-term growth [56, 58]. The research between innovation and performance creates benefit such as increased in profit margin, market leadership, productivity, market share, effectiveness and efficiency [59]. Whereas, the implementation of process innovation shows a positive impact on elimination of quality error in process and waste, reduction customer complaints and number of process activities [35].

However, there are not unanimous of literature declare the relationship between innovation and business performance [59, 47]. Based on [60], found that the relationship between innovation and performance is context dependent. Factors such as firm age, innovation type and cultural context would impact the innovation on business performance to a large scope [60]. Therefore, it is important for deeper identification in the relationship among innovation and business performance. Based on the discussion, therefore hypothesis is suggested at below:-

H_{2b}: Innovation is positively correlated with business performance

5. Development of Conceptual Framework

The research conceptual model is present in Figure 1. The model has been developed based on literature review on innovation between TQM and Business performance. Innovation as a supporting practices for TQM associated to business performance. A structural equation modelling (SEM) techniques are employed to examine the relationships between various model latent.



6. Conclusion

The relationship of TQM and Innovation is important to provide a practical platform for Malaysia's industrial player for better perspective and deeper insight to the variables. The purpose of this model is to determine how Malaysia's E&E industry gains the sustainable competitive advantages through mediator effect of Innovation between TQM and BP. Based on the previous study, the relationship between TQM and BP indicated inconsistent. Therefore, there are needs to identify the mediator for the relationship between TQM and BP. Thus, the main objective of this study is to integrate and identify Innovation as a mediator between TQM and business performance as a conceptual framework. There are three hypotheses regarding to the relationship among the specified variables. The conceptual framework has been proposed for future work to provide researchers an understanding of the importance of TQM-Innovation and promote manufacturers to build their competitiveness and competence through innovation and last but not least, to obtain a greater sustainable competitive advantage in the contemporary global market.

Acknowledgements

Appreciation to MOHE and ORRIC, Universiti Tun Hussein Onn Malaysia for supporting this research (vot:U429).

References

Use the "Insert Citation" button to add citations to this document.

- [1] Hoang D T, Igel B and Laosirihongthong T 2006 The impact of total quality management on innovation: Findings from a developing country *International Journal of Quality & Reliability Management* **23** 1092–117
- [2] Soreshjany G A and Dehkordi H J 2014 Cost of total quality management (TQM), innovation and improvement of financial performance *Uma Ética Para Quantos? XXXIII* 81–7
- [3] Al-Swidi 2016 The impact of Total Quality Management and Entrepreneurial Orientation on Organizational Performance *International Journal of Quality & Reliability Management* **33**
- [4] Ahire S L, Landeros R and Golhar D Y 2012 Total quality management: a literature review and an agenda for future research *Production and Operations Management* **4** 277–306
- [5] Mahmood K, Mahmood Ahmad Qureshi I and Nisar A 2014 An empirical study on measurement of performance through TQM in Pakistani aviation manufacturing industry *International Journal of Quality & Reliability Management* **31** 665–80
- [6] Valmohammadi C and Roshanzamir S 2015 The guidelines of improvement: Relations among organizational culture, TQM and performance *International Journal of Production Economics* **164** 167–78
- [7] Zakuan N, Yusof S M, Saman M Z M and Shaharoun A M 2010 Confirmatory Factor Analysis of TQM Practices in Malaysia and Thailand Automotive Industries *International Journal of Business and Management* **5** 160–75
- [8] Fallahnejad M and Lori E S 2015 A framework for connection between Total Quality Management and Innovation Processes **36**
- [9] Deming WE 1986 *Out of crisis* Cambridge, Mass: MIT Center for Advanced Engineering study
- [10] Juran J M 1988 *Juran on Planning for Quality* (New York: The Free Press)
- [11] Crosby P B 1979 *Quality Is Free* (New York: McGraw-Hill).
- [12] Ishikawa K 1985 *What is total quality control? The Japanese way* (London: Prentice Hall)
- [13] Feigenbaum A V 1991 *Total Quality Management* 3rd ed. (New York: McGraw-Hill).
- [14] Demirbag M, Tatoglu E, Tekinkus M and Zaim S 2006 An analysis of the relationship between TQM implementation and organizational performance: Evidence from Turkish SMEs *Journal of Manufacturing Technology Management* **17** 829–47
- [15] Agus A and Hassan Z F 2011 Enhancing Production Performance and Customer Performance Through Total Quality Management (TQM): Strategies For Competitive Advantage *Procedia - Social and Behavioral Sciences* **24** 1650–62
- [16] Ooi K B, Lin B, The P L and Chong A Y L 2012 Does TQM support innovation performance in Malaysia's manufacturing industry? *Journal of Business Economics and Management* **13** 366–93
- [17] Kanji G K and Wallace W 2000 Business excellence through customer satisfaction *Total Quality Management* **11** 979-98
- [18] Santos-vijande M and Alvarez-gonzalez L 2007 TQM and firms performance: An EFQM excellence model research based survey *Int. Journal of Business Science and Applied Management* **2** 21–42
- [19] Liao S H, Chang W J and Wu C C 2010 Exploring TQM-Innovation relationship in continuing education: A system architecture and propositions *Total Quality Management & Business Excellence* **21** 1121–39
- [20] Abdullah A 2010 Measuring TQM implementation: a case study of Malaysian SMEs *Measuring Business Excellence* **14** 3–15
- [21] Ramesh N and Ravi A 2013 TQM tools and techniques in promoting team working culture in

- the manufacturing organisations *International Journal of Productivity and Quality Management* **12** 466
- [22] Kirner E, Kinkel S and Jaege, A. 2009 Innovation paths and the innovation performance of low-technology firms - an empirical analysis of German industry *Research Policy* **38** 447–58
- [23] Hipp C, Thether B S and Miles I 2000 The incidence and effect of innovation in services *International Journal of Innovation Management* **4** 417-53
- [24] Thi T, Hanh H, and Siengthai S 2014 The impact of BPR , TQM , OL and ownership structure on product innovation in Vietnamese equitized firms, **4** 361–77
- [25] Long C, Abdul Aziz M, Kowang T and Ismail W K 2015 Impact of TQM Practices on Innovation Performance Among Manufacturing Companies in Malaysia *South African Journal of Industrial Engineering* **26** 75–85.
- [26] Damanpour F 1991 Organizational innovation: a meta analysis of effects of determinants and moderators *Academy of Management Journal* **34** 555–90
- [27] Kafetzopoulos D, Gotzamani K and Gkana V 2015 Relationship between quality management, innovation and competitiveness. Evidence from Greek companies *Journal of Manufacturing Technology Management* **26** 1177 – 200
- [28] Harrington H J 1991 Business process improvement: The breakthrough strategy for total quality, productivity and competitiveness (New York: McGraw-Hill)
- [29] Bi K X, Sun D H, Zheng R F and Li B Z 2006 The Construction of Synergetic Development System of Product Innovation and Process Innovation in Manufacturing Enterprises| *Proceedings of the International Conference on Management Science and Engineering (ICMSE)* (P.R. China)
- [30] Leonard J A and Waldman C 2007 An empirical model of the sources of innovation in the U.S. manufacturing sector *Business Economics* **42** 33-45
- [31] Fotopoulos C and Psomas E 2009 The use of quality management tools and techniques in ISO 9001:2000 certified companies: the Greek case *Int. J. Productivity and Performance Management*. **58** 564–80
- [32] Štefanić N, Tošanović N, and Hegedić M 2012 Kaizen workshop as an important element of continuous improvement process *International Journal of Industrial Engineering and Management* **3** 93–98.
- [33] Dahlgaard-Park S M and Dahlgaard J J 2010 Organizational learnability and innovability: a system for assessing, diagnosing and improving innovations *International Journal of Quality and Service Sciences* **2** 153-74.
- [34] Suárez-Barraza M F and Smith T 2014 The Kaizen approach within process innovation : findings from a multiple case study in Ibero-American countries *Total Quality Management* **25** 1002–25
- [35] Camisón C and Puig-Denia A 2015 Are quality management practices enough to improve process innovation? *International Journal of Production Research* **7543** 1–20
- [36] Corredor P and Goñi S 2011 TQM and performance: Is the relationship so obvious? *Journal of Business Research* **64** 830–38
- [37] Witjaksono A D 2012 The Differences of TQM Practice and Organization Performance Between TQM Firms and Non TQM Firms *2nd International Conference on Management, Economics and Social Sciences* 139–43
- [38] Tasie G O 2016 An Exploratory Review of Total Quality Management and Organizational Performance *International Journal of Business and Law Research* **4** 39–45.
- [39] Kaur M, Singh K, and Singh Ahuja I 2012 An evaluation of the synergic implementation of TQM and TPM paradigms on business performance *International Journal of Productivity and Performance Management* **62** 66–84
- [40] Zehir C, Ertosun Ö G, Zehir S, and Müceldilli B 2012 Total Quality Management Practices

Effects on Quality Performance and Innovative Performance *Procedia - Social and Behavioral Sciences* **41** 273–80

- [41] Changiz Valmohammadi 2011 The impact of TQM implementation on the organizational performance of Iranian manufacturing SMEs *The TQM Journal* **23** 496-509
 - [42] Lee V, Ooi, K, Tan B and Chong A Y 2010 A structural analysis of the relationship between TQM practices and product innovation *Asian Journal of Technology Innovation* **18** 73–96
- Use the "Insert Citation" button to add citations to this document.
- [43] *The 8th International Conference for Entrepreneurship, Innovation and Regional Development* 365-76
 - [44] Miranda Silva G, J Gomes P, Filipe Lages L and Lopes Pereira Z 2014 The role of TQM in strategic product innovation: an empirical assessment *International Journal of Operations & Production Management* **34** 1307–37
 - [45] Feng J, Prajogo D I, Tan K C and Sohal A S 2006 The impact of TQM practices on performance: A comparative study between Australian and Singaporean organizations *European Journal of Innovation Management* **9** 269-278
 - [46] Augusto M G, Lisboa J V and Yasin M M 2014 Organisational performance and innovation in the context of a total quality management philosophy: an empirical investigation *Total Quality Management & Business Excellence* 1–15
 - [47] Terziovski M and Guerrero J -L 2014 ISO 9000 quality system certification and its impact on product and process innovation performance *International Journal of Production Economics* **158** 197–207
 - [48] Miranda Silva G, J Gomes P, Filipe Lages L and Lopes Pereira Z 2014 The role of TQM in strategic product innovation: an empirical assessment *International Journal of Operations & Production Management* **34** 1307–37
 - [49] Moreno-Luzon M D and Valls-Pasola J 2011 Ambidexterity and quality management: towards a research agenda *Management Decision* **49** 927-47
 - [50] O'Connell D 2011 *Harvesting external innovation: managing external relationships and intellectual property* (England: Gower Publishing Limited)
 - [51] Bon A T, and E M A Mustafa 2013 Impact of Total Quality Management on Innovation in Service Organizations: Literature Review and New Conceptual Framework *Procedia Engineering* **53** 516–29
 - [52] Prajogo D, and Sohal A 2001 TQM and innovation: a literature review and research framework *Technovation* **21** 539-58
 - [53] Aoun M and Hasnan N 2013 Lean production and TQM: Complementary or Contradictory Driving Forces of Innovation Performance? *International Journal of Innovation Science* **5** 237–52
 - [54] Khurana V 2007 *Management of Technology and Innovation* (Delhi: Ane Books India) ISBN: 978-81-8052-187-4
 - [55] Perdomo-Ortiz J, González-Benito J and Galende J 2009 The intervening effect of business innovation capability on the relationship between total quality management and technological innovation *Int J Prod Res* **47** 5087–107
 - [56] Prajogo D I 2015 The strategic fit between innovation strategies and business environment in delivering business performance *International Journal of Production Economics* 1–9.
 - [57] López-Mielgo N, Montes-Peón J M and Vázquez-Ordás C J 2009 Are quality and innovation management conflicting activities? *Technovation* **29** 537-45
 - [58] Laforet S 2013 Organizational innovation outcomes in SMEs: Effects of age, size, and sector *Journal of World Business* **48** 490–502
 - [59] Rosenbusch N, Brinckmann J and Bausch A 2011 Is innovation always beneficial? A meta-analysis of the relationship between innovation and performance in SMEs *Journal of Business Venturing* **26** 441–57