Available online at www.sciencedirect.com

SciVerse ScienceDirect

Procedia - Social and Behavioral Sciences 40 (2012) 141 – 145

Procedia
Social and Behavioral Sciences

The 2012 International Conference on Asia Pacific Business Innovation and Technology Management

# The Moderator Effects of ISO/TS16949 Certification in Thailand Automotive Industry

Norhayati Zakuan[a*], Sha'ri Mohd Yusof[b], Muhamad Zameri Mat Saman[b], Awaluddin Mohd Shaharoun[b] and Tritos Laosirihongthong[c]

[a]Faculty of Management and Human Resource Development, Universiti Teknologi Malaysia, 81300 Skudai, Malaysia
[b]Faculty of Mechanical, Universiti Teknologi Malaysia, 81300 Skudai, Malaysia
[c]Faculty of Engineering, Thammasat University, Thailand

**Abstract**

In this paper, the relationship among TQM implementation, organizational performance measures and ISO/TS16949certification as moderator variable is studied. It is often claimed that ISO certification generates an improvement in the performance of organizations. This research aims to find out whether ISO/TS16949 certification indeed results in better performance outcomes for organizations in automotive industry. To test the hypothesis, an instrument is developed to measure the level of TQM implementation and organizational performance. Data were obtained from 150 Thailand automotive companies with 21% response rates and analyzed through structural equation modeling (SEM). The result indicates that ISO/TS16949 certification does not moderate the relationship between TQM implementation and organizational performance.

*Keywords:* Total Quality Management; Organizational Performance; ISO/TS16949 certification; Automotive and Moderator

## 1. Introduction

The importance of quality management in business organizations has increased significantly over the past 20 years. TQM from an international perspective require studying different countries and aims at understand TQM in a global context. The concept of international serves as the motivation for developing a global TQM standard for evaluating TQM practices within countries [1]. The practice of TQM also affects from the national level to the international level which helps organizations to compete internationally and gain a competitive edge in the global market.

Meanwhile, ISO/TS16949 is a new specification and also new to the automotive industry. Before the introduction of ISO/TS16949, the disadvantage to being in the automotive business was working to multiple quality standards [2]. That meant manufacturers had to adhere to processes and management systems to comply with each one of automotive standards. The effort to maintain compliance brought on


doi:10.1016/j.sbspro.2012.03.173

paperwork redundancies and overall system inefficiencies. Many automotive suppliers were in this situation, thus, during the 1980's, the three giants in automotive, Chrysler, Ford and General Motors, known as the "big three", came under increasing pressure from their suppliers to look at ways to solve this problem [2]. Thus, to standardized quality certification requirements, the automotive original equipment manufacturers (OEMs) have requested their suppliers to obtain ISO/TS16949 registration.

However, it is still questionable that the relationship between TQM and organizational performance will depend on ISO/TS16949 certification. Having a quality system in place and obtaining ISO/TS16949 registration does not ensure that organizational performance will improve. There is no guarantee of business after completing quality certification, but failure to do so may results in loss of business opportunity.

This study therefore attempts to provide additional insights into the relationship between TQM and organizational performance by examining the effects of ISO/TS16949 certification as a moderating variable. To investigate the effects of the proposed moderator, the authors used structural equation modeling (SEM) and multi-group analysis of a data collected from Thailand automotive industry.

## 2. Literature Review

Moderators have been described as the third variable in research studies since they change the associations of the independent variables and dependent variables [3, 18]. In this study, the authors will investigate the relationship between TQM implementation, organizational performance and ISO/TS16949 as a moderating variable.

Numerous studies have examined what constitutes quality management, what the common barriers to quality management implementation are, and what factors are critical for the success of quality management [4,5,6,7,8]. Although these studies have provided different results such as critical factors, they have identified a common set of practices considered essential to the success of a quality management implementation. To generate distinct generic construct, a list of constructs proposed from numerous articles were analyzed. Each construct was then analyzed whether it was different or similar to the constructs previously analyzed. This process resulted with a proposed set of eight constructs which are: quality leadership, customer focus and satisfaction, quality information and analysis, human resource development, strategic planning management, quality results, and quality assurance.

In this study, organizational performance will be measured in two categories, which are satisfaction level, and business result following Lin *et al*. [9]. Satisfaction level defined in organizational performance comprised of two items namely, employee satisfaction, and customer satisfaction. While business results for organizational performance comprised four items: productivity, number of successful new product, cost performance, and profitability.

## 3. Validity and Reliability

Exploratory factor analysis (EFA) with varimax rotation was performed on the TQM constructs and organizational performance (OP) measures. At a minimum, a 0.4 loading of each item on its respective factor are considered adequate for that factor [10]. While, a minimum of 0.5 loading for items that cross-load on multiple factors are considered adequate [11].

The EFA of 53 items of TQM constructs have yielded in eight factors explaining 57.92% of the total variance. The result indicates that eight TQM constructs have been identified with 40 items as compared to original questionnaire which are 53 items. Next, the EFA of 14 items of organizational performance were loaded on two factors explaining 51.70% of the total variance. No items were recommended to be omitted.

The Cronbach's α measure of reliability for TQM constructs and organizational performance was between 0.851 and 0.730. According to Aamadi [12], the generally accepted minimum value of α is

0.70, however, Nunnally [13] allowed a slightly lower minimum limit, such as 0.6 for exploratory work involving the use of newly developed scales. Since, Cronbach's α value for each factors is above 0.70, all factors are accepted as being reliable for the research.

## 4. Result and Analysis

The structural equation modeling (SEM) approach and multi-group analysis was applied to test the proposed model and the effect of ISO/TS16949 certification for Thailand automotive industry. The structural equation modeling approach is a multivariate statistical technique for testing structural theory (Tan, 2001). This approach incorporates both observed and latent variables.

### *4.1 The Effect of ISO/TS16949 Certification in Thailand Automotive Industry*

This analysis is to study the effect of ISO/TS16949. The question addressed was whether the impact of relationship between TQM and organizational performance (OP) is moderated by ISO/TS16949 certification in Thailand automotive. This is to analyze the hypothesis *H1* below.

*H1*: ISO/TS16949 certification will moderate the relationship between TQM and organizational performance (OP) in Thailand

i. None ISO/TS16949 certification companies (n = 43)

The chi-square value ($\chi^2$) of 33.469 (degrees of freedom = 27, p < 0.182), with the $\chi 2$/df ratio having a value of 1.240 that is below than 2.0. The Goodness of Fit Index (GFI) is 0.868, the value of adjusted goodness of fit index (AGFI) is 0.779, which is close to 1.0 and thus, it is considered as a good indicator of an adequate model fit.

In this model, the root mean square error of approximation (RMSEA) for the model was 0.077. The values of CFI and TLI indices are 0.971 and 0.961, which is more than 0.9 shows very good fit. All of the model fit criteria for the path model are highly satisfactory such that this model was accepted to fit the data. Figure 1 shows the structural relationships between TQM and OP for "None ISO/TS16949 certification companies" in Thailand automotive industry.

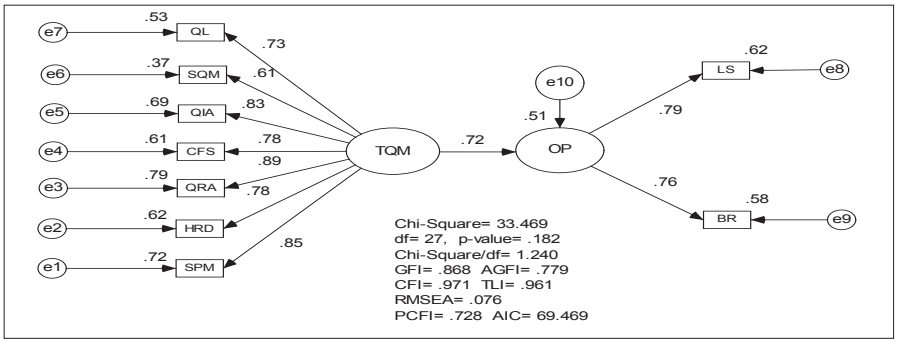


Fig. 1 The structural analysis for "None ISO/TS16949 certification companies" in Thailand

ii. ISO/TS16949 certification companies (n=103)

The chi-square value ($\chi^2$) of 36.033 (degrees of freedom = 26, p = 0.91), with the $\chi 2$/df ratio having a value of 1.386 that is less than 2.0. The Goodness of Fit Index (GFI) is 0.931, the value of

adjusted goodness of fit index (AGFI) is 0.881, Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI) is 0.978 and 0.969 which is close to 1.0. The Root Mean Square Error of Approximation (RMSEA) is also indicator of model fit. RMSEA for the model was 0.062 which is less than 0.08.

All of the model fit criteria for the path model are highly satisfactory such that this model was accepted to fit the data. Figure 2 shows the structural relationships between TQM and OP for "ISO/TS16949 certification companies" in Thailand.

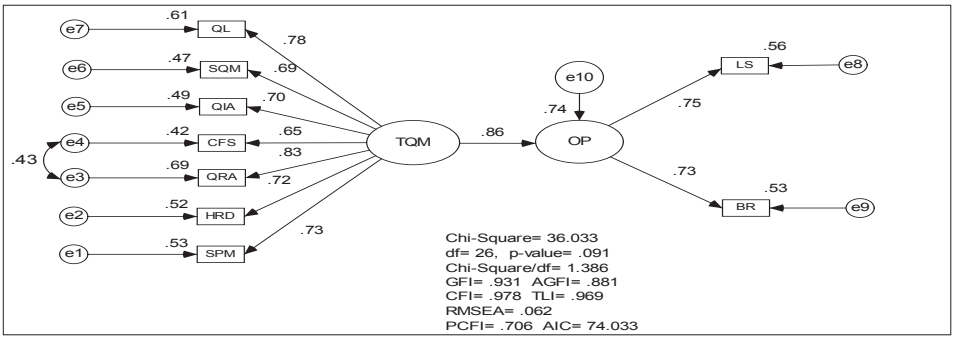


Fig. 2. The structural relationship between TQM and OP for "None ISO/TS16949 certification companies" in Thailand.

Based on the result of the above model, the p-values for both tests are less than 0.001. Thus, it can be concluded that ISO/TS16949 certification does not moderate on the relationship between TQM and organizational performance (OP) in Thailand automotive industry which lead us to reject *H1*.This research findings support Terziovski *et al.* [14] finding that ISO 9000 certification does not have positive impact on organizational performance. The results of this study also agree with Anderson *et al.* [15] who indicated that quality systems and regulatory compliance are not the only reasons for the widespread adoption of ISO 9000 in North American manufacturing companies. They found that managers adopt ISO 9000 as a means of achieving quality improvement and global competitiveness. Sun [16] found that TQM implementation cannot guarantee enhance performance however ISO certification are partially related to TQM which to lead to improvement in business performance.

Research into the relationship between TQM, ISO certification and the performance of organizations is scarce. A danger for quality systems certification is that a company may regard certification as a substitute for TQM and does not continue the journey after being registered to ISO/TS16949. Tsiotras and Gotzamani [17] also warn that certified with quality standards alone must not be the aim of an organization. The ultimate target must be the development of a solid total quality system which will lead to the future development.

## 5. CONCLUSIONS

This paper has provided an empirical justification for a research model that identifies the relationship among TQM implementation, ISO/TS16949 certification and organizational performance. Data for the study were collected from a sample of 150 Thailand automotive industry and the research model was tested using structural equation modeling. Based on exploratory factor analysis and reliability analysis, all factors are accepted as being valid and reliable for the research. Finally, the result of this study shows that ISO/TS16949 certification alone does not moderate the relationship between TQM implementation and organizational performance. Future research will focus on investigating whether ISO/TS16949 efforts mediate the relationship between TQM and organizational performance.

**ACKNOWLEDGEMENT**

The authors would like to thank to the Faculty of Management and Human Resource Development, GUP research grant Vot.Q.J130000.7129.03J72 (MOHE) and UTM Johor Bahru.

**REFERENCES**

[1] Rao, S.S., L.E. Solis, and Raghu-Nathan. (1999). A framework for international quality management research: Development and validation of a measurement. *Total Quality Management* **Vol. 10** No.7, 1047-1075.
[2] Reid, R.D. (2005). TS16949: Where did it come from? *Quality Progress*. 38(3), pp. 31-39.
[3] Baron, R.M. and Kenny, D.A. (1986). "The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations." *Journal of Personality and Social Psychology*, **Vol. 51** No. 6, pp. 1173-1182.
[4] Saraph, J.V., Benson, P.G. and Schroeder, R.G. (1989). An instrument for measuring the critical factors of quality management. *Decision Science*. **Vol. 20,** pp 810-829.
[5] Flynn, B.B., Schroeder, R.G. and Sakakibara, S. (1994). A framework for quality management research and an associated measurement instrument. *Journal of Operations Management,* **Vol. 11**, pp 339-366.
[6]Ahire, S.L., Golhar, D.Y., Waller, M.A., (1996). Development and validation of TQM implementation constructs. *Decision Science*. **Vol. 27** No.1, pp 23-56.
[7] Yusof, S.M. and Aspinwall, E., (2000). Critical success factors for total quality management implementation in small and medium enterprises, *Total Quality Management,* **Vol. 10** No. 4, 5, pp. 803-809.
[8] Sila, I. (2007). Examining the effects of contextual factors on TQM and performance through the lens of organizational theories: An empirical study. *Journal of Operations Management.* **Vol. 25,** pp 83-109.
[9] Lin, C., Chow, W.S., Madu, C.N., Kuei, C.H., and Yu, P.P. (2005). A structural equation model of supply chain quality management and organizational performance. *International Journal of Production Economics.* **Vol. 96**, pp 355-365.
[10] Hatcher, L. (1994). "A Step-by-step Approach to Using the SAS system for Factor Analysis and Structural Equation Modeling." Cary, NC: SAS institute, Inc.
[11] Ngai, E.W.T., Cheng, T.C.E., and Ho, S.S.M. (2004). "Critical success factors of web-based supply chain management systems: An exploratory study." *Production Planning and Control*, **Vol. 15**, pp. 622-630.
[12] Aamadi, A. (2002). *Mathematic and Statistic*. Tehran Universities Publications Centres: Tehran.
[13] Nunnally, J.C. (1978). "Psychometric Theory." 2nd ed., McGraw-Hill, New York, NY.
[14] Terziovski, M., Power, D., and Sohal, A.S. (2003). "The longitudinal effects of the ISO 900 certification process on business performance." *European Journal of Operational Research*, **Vol. 146** No. 3, pp. 580-95.
[15]Anderson, J., Rungtusanatham, M., Schroeder, R. and Devaraj, S. (1995). "A path analytic model of a theory of quality management underlying the Deming management method: preliminary empirical findings." *Decision Sciences*, **Vol. 26** September/October, pp. 637-658.
[16] Sun, H. (2000). "Total quality management, ISO 9000 certification and performance improvement." *International Journal of Quality & Reliability Management*, **Vol. 17** No. 2, pp. 168-179.
[17] Tsiotras, G. and Gotzamani, K. (1996). "ISO 9000 as an entry key to TQM: the case of Greek industry." *International Journal of Quality & Reliability Management,* **Vol. 13** No. 4, pp. 64-76.
[18] Tseng, M.L. (2010). An *assessment of cause and effect decision making model for firm environmental knowledge management capacities in uncertainty.* Environmental Monitoring and Assessment161, 549-564