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Integration model of total quality management and six sigma in hospital quality management

Guspianto[a], Al Asyary[b*] and Ismi Nurwaqiah Ibnu[a]

[a]*Study Program of Public Health Science, Faculty of Medicine and Health Sciences, Universitas Jambi, Muaro Jambi, Indonesia*
[b]*Department of Environmental Health, Faculty of Public Health, Universitas Indonesia. Depok, Indonesia*

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A B S T R A C T

Implementation of quality management is very important for hospitals to improve processes, solve problems, and reduce variations and errors in service, including through the implementation of popular Total Quality Management (TQM) and Six Sigma (SS) as new quality management strategies to increase profitability, effectiveness and efficiency of the organization's operations to meet customer's needs. This study aims to develop an integrated hospital quality management model from the practice of TQM and SS to provide synergy in improving hospital performance. The study design was cross sectional through a survey using a questionnaire on 863 respondents, namely all employees ranging from doctors to administrative personnel at 8 hospitals. The TQM and SS practice integration model identified as "Quality Management Alliance Model (QMA)" consists of 6 variable constructs, namely: Management Practice (MP); TQM Infrastructure Practice (IPTQM); SS Infrastructure Practice (IPSS); Core Practice TQM (CPTQM); Core Practice SS (CPSS); and Hospital Performance (KRS) with 12 structural equations hypothesized. Data analysis are performed using Structural Equation Model through 2 tests, namely analysis of measurement models using confirmatory factor analysis (CFA) second order approach and structural model analysis. The results of the first order confirmatory factor analysis (CFA) analysis, after issuing invalid indicators (SLF≤0.5 and t≤1.96), obtained constructs of latent variables with models fit, valid, and reliable. Then in the second order CFA analysis on the overall model after being simplified through LVS (latent variable score) the study obtained construct model fit, valid and reliable. The results of the structural model analysis obtained a model fit with 11 structural equations that are positively and significantly related (t> 1.96). This study proves that the QMA model is feasible and can be applied to measure the implementation of hospital quality management. Hospital management is recommended to implement the QMA Model optimally to improve performance.

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1. Introduction

The importance of implementing quality management in hospitals, especially in Indonesia, is driven by several issues, including: the low quality of hospital services; frequently of medical errors; increased financing for health services; and the existence of a National Health Insurance program. Organizations in the world including hospitals have implemented various quality management programs to maintain competitive advantage and improve performance, including through Total Quality Management (TQM) and Six Sigma initiatives. Many studies have examined the effect of TQM and Six Sigma initiatives on hospital performance, both of which have been shown to have positive and significant effects. TQM practices affect the performance of hospitals in Iran's Isfahan Province (Rad, 2005), hospital operational flexibility in Jordan (Alolayyan et al., 2011), and the quality of hospital performance in South India (Manjunath et al., 2007). Meanwhile, Six Sigma which has grown and developed as a new quality management strategy is also proven to be able to improve hospital performance such

* Corresponding author. Tel./Fax: +62-21-7863479

E-mail address: al.asyary@ui.ac.id (Al Asyary)

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as services/care, administration and finance, and hospital operations (Sehwail & DeYong, 2003), reduce cycle times in emergency units, increase bed capacity, reduce medication errors and increase patient satisfaction (Bowerman et al., 2007). Although they are still being debated by experts, both have been proven empirically capable of being a method of continuous quality improvement that improves hospital performance, where TQM is more focused on addressing improvements at the system (macro) level, while Six Sigma produces improvements at the operational (micro) level. The integration of the two is considered to be very strategic so that the organization achieves a high level of operational performance through Six Sigma practices to improve the overall performance of the organization through the TQM system. This study aims to develop an integrated hospital quality management model of TQM and Six Sigma to provide synergy in improving hospital performance in Jambi Province.

2. Material and Methods

This study was designed cross sectionally through a survey using a questionnaire. The study was conducted at eight hospitals in Jambi Province that were selected purposively. The study population was all hospital employees who had worked for at least six months (inclusion criteria), except for Director/Deputy Director and junior high school education or below (exclusion criteria). The number of analysis samples were 863 respondents selected proportionally randomly. The questionnaire instrument was a list of questions using the Likert scale answer options with graded scores, i.e. "never" (value 1) to "always" (value 7). Statistical tests use Structural Equation Model (SEM) analysis through the Lisrel 8.70 application that produces measurement models through second-order Confirmatory Factors Analysis (CFA) and structural models. The TQM and SS practice integration model identified as "Quality Management Alliance Model (QMA)" consists of 6 variable constructs, namely: 1) Management Practice (MP) include leadership; 2) TQM Infrastructure Practice (IPTQM) includes strategic planning, customer focus, staff focus; 3) Six Sigma Infrastructure Practice (IPSS) includes quality infrastructure, selection and priority of activities; 4) Core Practice TQM (CPTQM) includes focus on processes and information systems, performance measurement; 5) Core Practice Six Sigma (CPSS) include quality improvement procedures, focus on quality measures; 6) Hospital Performance (KRS) (Fig. 1).

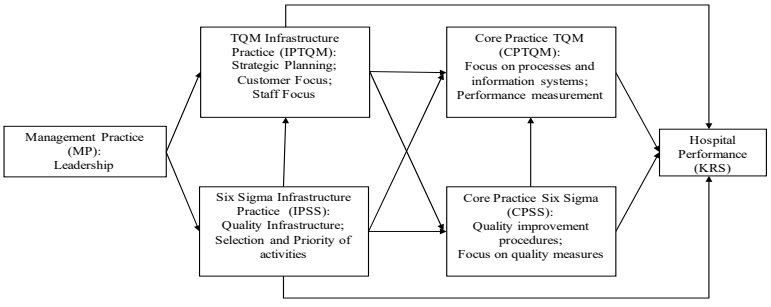

Fig. 1. Quality Management Alliance Model

Instrument Development

In this study, TQM practice is based on Malcolm Baldrige's model with seven criteria, namely leadership; strategic planning; customer focus; measurement, analysis, and knowledge management; workforce focus; focus of operation; and outcomes (Manjunath et al., 2007), and Six Sigma is based on typical practices and distinguishes it from TQM, namely the involvement of leaders, quality improvement infrastructure, selection and priority of activities, structured improvement procedures, and focus on performance measures (Coronado & Antony, 2002; Feng et al., 2006; Gaspersz & Fontana, 2011; Haikonen et al., 2004; Lakhal et al., 2006; Schroeder et al., 2009; Zu et al., 2008). Furthermore, hospital performance was developed into 6 indicators, namely effectiveness, efficiency, staff orientation, service responsiveness, safety, and patient focus adapted from the Performance Assessment Tool for Quality Improvement in Hospital/PATH criteria (World Health Organization, 2007) and six health service quality domains (Institute of Medicine (IOM), 2006). The development of this instrument was also carried out through discussions with hospital quality management experts to obtain input on appropriate and appropriate indicators to be used in assessing hospital quality management practices and performance.

3. Results

3.1 Measurement Model

Analysis of the measurement model is by using the 2nd order confirmatory factor analysis (CFA). The results of the analysis of the CFA 1st order model obtained a fit test of the model fit with valid and reliable indicators in each latent variable, after invalid indicators (SLF≤0.5 and t≤1.96) were excluded from the model. The results of the analysis of the second order CFA model obtained by the fit test model fit, with all indicators which are valid (SLF> 0.5; t> 1.96) and reliable (CR> 0.7; VE> 0.5). It was concluded that the QMA model is good, feasible, and reliable (Fig. 2). The structural model evaluation results obtained fit model (GoF) fit, with 11 structural equations that have a positive and significant relationship (t> 1.96) from the 12 structural equations hypothesized (Fig. 3). Based on the calculation of the total effect value, it was concluded that the IPTQM variable had the greatest influence on hospital performance in Jambi Province with a total effect = 0.55 (Table 1).

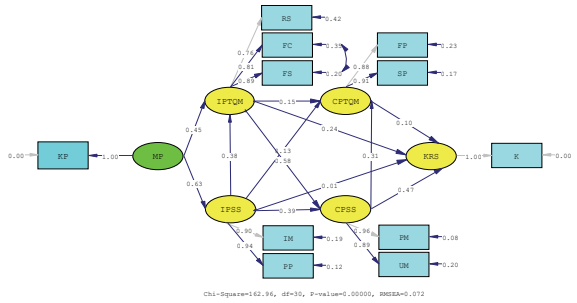

Fig. 2. CFA Model Path Chart 2nd order (Standardize Loading)

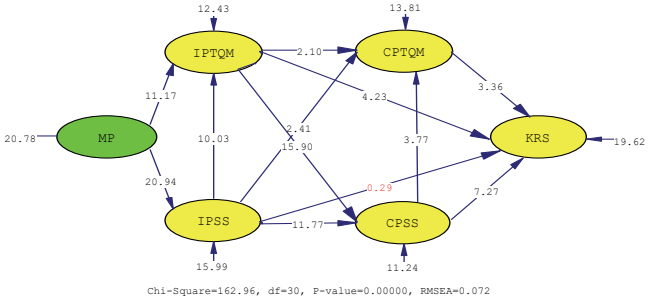

Fig. 3. Hospital QMA Model Path Diagram (t-value)

Table 1
Effect of Total Variable QMA Model on Hospital Performance in Jambi Province

Description	*Direct Effect*	*Indirect Effect*	*Total Effect*
Effect of MP[1] on Hospital Performance	-	0,51	0,51
Effect of of IPTQM[2] on Hospital Performance	0,24	0,31	0,55
Effect of IPSS[3] on Hospital Performance	0,01*	0,42	0,43
Effect of CPTQM[4] on Hospital Performance	0,10	-	0,10
Effect of CPSS[5] on Hospital Performance	0,47	0,03	0,50

Adj : [1]Management Practice, [2]Infrastructure Practice Total Quality Managemen, [3]Infrastructure Practice Six Sigma, [4]Core Practice Total Quality Management, [5] Core Practice Six Sigma * not significant

4. Discussions

This study proves that IPTQM influences CPTQM (t-value = 2.10), and supports that infrastructure practices influence core practices (Lakhal et al., 2006; Zu et al., 2008). Effective strategic planning provides information about strategies for managing work processes and is needed to develop performance measurements (Fening, 2012). Customer-driven hospitals will build work processes to achieve customer satisfaction, provide information systems and performance measurements that begin and end at the customer. Furthermore, staff management supports the improvement of processes, encourages information systems and data analysis, and supports the measurement of performance on an ongoing basis (Wardhani et al., 2009). IPTQM influences CPSS (t-value = 15.9), in line with the study of Lakhal, et al. (2006) and Zu, et al. (2008). The strategic plan is how the organization is able to implement its vision and mission through continuous improvement (Nabitz et al., 2000), establishing quality improvement procedures and quality measures as indicators of performance evaluation (Fening, 2012). The customer-focused hospital underpins the implementation of the improvement procedures and quality indicators to address the problem of service to patients. The organization must establish procedures for improvement and clear quality measures according to the wishes of the customer. The organization must also manage staff to build competence, motivation and participation in implementing improvement procedures and applying performance indicators. Staff-focused organizations create participation in continuous improvement efforts and use measures as quality indicators (Kaynak, 2003). IPTQM influences Hospital Performance (t-value = 4.23), meaning that the optimal implementation of strategic plans, customer focus and staff focus will contribute to improving hospital performance. Strategic planning is one of the success factors in implementing TQM in hospitals that guides the implementation of all operations to improve performance (Rad, 2005). Hospitals must understand patient expectations by providing suggestion boxes, satisfaction surveys, etc., as well as meeting those patient expectations through responsive services to achieve patient satisfaction that impacts on hospital performance. In addition, attention to staff also needs to be done to increase motivation, participation and job satisfaction through education and technical training, job description, clarity of reward and punishment systems, supervision and evaluation, all of which encourage increased productivity. IPSS has an effect on CPSS (t-value = 11.77), meaning the existence of a quality team and priority activities will encourage the application of procedures and quality measures for improving service in hospitals. One of the keys to the success of hospital quality management is to form a board or quality team to develop procedures and measures that are important for quality improvement and control. IPSS also influences IPTQM (t-value = 10.03), where the presence of a quality team and selection and priority activities support the achievement of a strategic plan, patient satisfaction by minimizing variation and service errors, and staff satisfaction by clarifying roles and responsibilities in improving quality service. IPSS has been proven to have an effect on CPTQM (t-value = 2.41) which means the presence of a quality team in hospitals is needed to manage the service process, develop information systems, and assess service performance (Fening, 2012). Quality infrastructure in hospitals supports the improvement of service processes. The selection and priority of activities plays a role in managing processes, developing information systems and measuring performance. Every activity in a hospital must start from the most important priority for continuous improvementt (Rad, 2005). The results of this study prove that IPSS has no significant effect on KRS (t-value = 0.67). This result corroborates previous research that infrastructure practices do not directly influence performance, but are mediated by core practices (Ho et al., 2001). The existence of a quality team and the efforts to select and prioritize activities in hospitals tend to contribute more to the improvement of the service process and have not been effective in influencing hospital performance. Study of Lee et al. (2002) in Korea proved that the formal structure of quality improvement in hospitals is not always needed to improve performance, as long as all quality management functions can be clearly and precisely distributed throughout the entire hospital structure (Lee et al., 2002).

5. Conclusions

The Quality Management Alliance Model (QMA Model) is a model with a construct that is fit, valid and reliable, with eleven positive and significant relationship frameworks out of the twelve hypothesized relationship frameworks. This proves that the QMA model is feasible and reliable to measure the implementation of quality management and effectively improve hospital performance.

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