CHAPTER V

DISCUSSIONS

This chapter is divided into the following two sections: (1) summary of research findings; and (2) discussion of the main findings from the research models. In each section, both findings and suggestions will be presented in a brief summary.

5.1 Summary of Research Findings

The summary of the quantitative research findings of the study is about the testing results from the research hypotheses: **Hypothesis 1**—determining fifty items related to TQM implementation could be extracted (classified) into six of critical factors of quality management practices; **Hypotheses 2a-f—**determining six critical factors of quality management practices have positive impacts on world-class company practice. **Hypotheses 3a-f**—determining four critical factors of quality management practices have positive impacts on operational excellence practice. **Hypothesis 4**—world-class company practice and company non financial performance partially mediate the impact of critical factors of quality management practices on company financial performance. **Hypothesis 5**—operational excellence practice and company non financial performance partially mediate the impact of critical factors of quality management practices on company financial performance. **Hypothesis 6**—company non financial performance has a strong positive impact on company financial performance.

5.1.1 Summary of Critical Factors of Quality Management Practices

The QMPs are determined based on the EFA, (Goodhue, 1998; Grandzol and Gershon, 1998 cited in Lakhal *et al*, 2006). The designated quantitative (statistical) analysis to test the first hypothesis of this study, as previously analyzed, suggested that the final measurement instrument consisted of six QMPs that may be identified respectively as quality improvement program (QMP1), supervisory leadership (QMP2), supplier involvement (QMP3), top management commitment (QMP4), training to improve products/services (QMP5), and cross functional team relationships among strategic business units or SBUs (QMP6).

5.1.2 Summary of Research Findings

The researcher used SEM, which provides a method of dealing with multiple relations simultaneously with statistical efficiency. Overall, the results of SEM indicate that six QMPs (quality improvement, supervisory leadership, supplier involvement, top management commitment, training to improve products/services, and cross functional relationships among strategic business units or SBUs) significantly and positively are related to WCC. Four of QMPs (quality improvement, supervisory leadership, top management commitment, and training to improve products/services) are significantly associated with OE. Furthermore, WCC and OE significantly affect CNFP, which in turn has a strong significant effect on CFP.

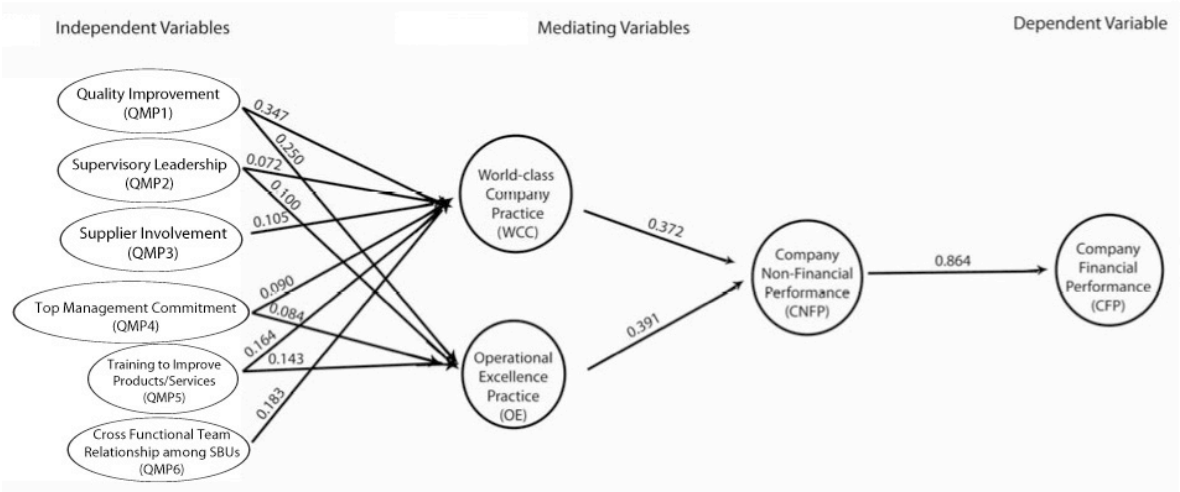

Figure 5.1
The Research Findings

Figure 5.1 also shows the final structural relations model that is related to hypotheses H_2 and is provided in the following equations.

(1) $WCC = 0.347\ QMP_1 + \zeta_1$

(2) $WCC = 0.072\ QMP_2 + \zeta_1$

(3) $WCC = 0.105\ QMP_3 + \zeta_1$

(4) $WCC = 0.090\ QMP_4 + \zeta_1$

(5) $WCC = 0.164\ QMP_5 + \zeta_1$

(6) $WCC = 0.183\ QMP_6 + \zeta_1$

(7) $OE = 0.250\ QMP_1 + \zeta_2$

(8) $OE = 0.100\ QMP_2 + \zeta_2$

(9) $OE = 0.084\ QMP_4 + \zeta_2$

(10) $OE = 0.143\ QMP_5 + \zeta_2$

(11) $CNFP = 0.372\ WCC + \zeta_3$

(12) $CNFP = 0.391\ OE + \zeta_3$

(13) $CFP = 0.864\ CNFP + \zeta_4$

The structural relations model of the study has one endogenous variable (dependent variable), labeled as CFP; six exogenous variables (independent variables), labeled as critical factors of quality management practices (QMP1-6); and three mediating variables labeled as WCC, OE, and CNFP.

From the equations (1)-(6), the standardized regression weights were found to be 0.250; 0.100; 0.105; 0.090; 0.164; and 0.183, which are significant at 0.01 level indicating mediocre supports for H2a-f that six QMPs have impacts on WCC.

From the equations (7)-(10), the standardized regression weights were found to be 0.347; 0.072; 0.084; 0.143, which are significant at 0.01 level indicating mediocre supports for H3a, b, d, e that four QMPs have impacts on OE.

Equations (11) and (12) show that the standardized regression weights were found to be 0.372 and 0.391, which are significant at 0.01 level indicating strong supports for H4. Equation (13) at last shows that the standardized regression weight was found to be 0.864, which is significant at 0.01 level indicating a strong support for H5. Therefore, a good deal of support has been provided to H1-6 that the study offered empirical evidence on the strength of the structural relations among QMPs, WCC, OE, CNFP, and CFP of oil and gas industry that have adopted TQM. With respect to the hypothesis 6, it was found that CNFP had a significant (very strong) positive impact on CFP.

5.2 The Main Findings from the Research Hypotheses

5.2.1 Critical Factors of Quality Management Practices

The finding of QMPs is supported by existing researchers studying QMPs (e.g. Saraph *et al*, 1989; Flynn *et al*., 1994; Zeitz *et al*., 1997; Black and Porter, 1996; Powell, 1995; and Tamimi, 1995). This finding confirms that Hypothesis 1. Table 5.1 provides a list of meaningful six QMPs (as independent variables) to develop a comprehensive TQM implementation model in oil and gas industry in Indonesia. Table 5.1 also establishes links among QMPs examined in this research and those described in other studies.

Table 5.1
Links between Six QMPs and Literature

Construct's Name	Construct Item Code ($QMP_{1,2,3,4,5,6}$) and Related Practices	Sub Construct Item Code (qmm: quality management method)
QMPs	**QMP1—Quality Improvement Program→ Related practices:** Quality improvement measurement system and communication of improvement information **(Black and Porter, 1996);** Quality data and reporting **(Saraph *et al*., 1989);** Quality information (**Flynn *et al*., 1994);** Internal quality information usage **(Ahire *et al.*, 1996)**	Qmm40: The quality of the working environment is good. qmm41: There is an adequate documentation on how to do the job. qmm43: Top management sets realistic goals for its employees. qmm44: There are programs to develop team work among employees. qmm45: There are programs to develop effective communication among employees. qmm46: There are programs to develop employees' conflict resolution skills. qmm47: There are programs to broaden employees' skills for future organizational needs qmm48: Top management takes action towards executing its quality improvement policies. qmm49: Top management makes its quality improvement policies visible to all employees
	QMP 2— Supevisory Leadership→Related practices: Supervision **(Zeitz *et al*., 1997);** Supervisory leadership **(Tamimi, 1995)**	qmm22: Supervisors help their employees on the job. qmm23: Supervisors work to build the trust of their employees. qmm24: Supervisors lead in a way that is consistent with the aims of the organization. qmm25: Supervisors are viewed as coaches by their employees. qmm26: Employees express new ideas related to improving work method. qmm27: Employees seek their supervisors' assistant when they are unsure of their tasks
	QMP 3— Supplier Involvement→Related Practices: Supplier quality management (**Saraph *et al*., 1989);** Supplier Involvement **(Flynn et al., 1994);** Supplier quality management and supplier performance **(Ahire *et al*., 1996);** Supplier relationships (**Zeitz *et al*., 1997);** Supplier partnerships **(Black and Porter, 1996);** Closer to suppliers **(Powell, 1995);** Supplier management **(Tamimi, 1995)**	qmm33: Top management provides its workers with the methods/procedures qmm8: Suppliers use certain statistical quality control techniques. qmm9: Statistical control techniques are used to minimize a reliance on mass inspection. qmm10: Top management supports the belief that quality must be 'built into' the product/service and not 'inspected into' it. qmm11: Suppliers selection is based on quality and price rather than price itself. qmm12: Suppliers are involved in the product/service development process.
	QMP 4— Top Management	qmm13: Long-term relationships are developed with

(Continued)

Table 5.1 Continued

	Commitment→Related practices: Top management leadership **(Saraph *et al*., 1989);** Top management support **(Flynn et al., 1994);** Top management commitment **(Ahire *et al.*, 1996);** Management support **(Zeitz *et al*., 1997);** Executive commitment and **adopting philosophy (Powell, 1995);** Top management commitment **(Tamimi, 1995)** **QMP 5— Training to Improve Products/ Services→Related practices:** Product /service design **(Saraph *et al*., 1989);** Product design **(Flynn et al., 1994);** Design quality management **(Ahire *et al*., 1996);** Product/ service innovation **(Tamimi, 1995)** **QMP 6— Cross Functional Team Relationships among SBUs→Related practices:** Cross-functional communication to improve quality **(Tamimi, 1995);** Employee involvement **(Flynn *et al.*,1994);** Employee suggestions **(Ahire *et al*., 1996)**	suppliers. qmm15: Customers' requirements are analyzed in the process of developing a product/service. qmm1: Top management makes long-term plans. qmm2: Top management provides for research and development. qmm3: Top management provides new technology (EOR) qmm4: Top management promotes employee training/education. qmm5: Top management is committed to quality improvement as a way to increase profits. qmm6: Top management is committed to setting objectives for quality improvement. qmm7: Top management is committed to continuous quality enhancement as a primary goal. qmm16: Customers' feedback is used to continually improve the product/service. qmm17: Top management assess its competitors in order to improve the product/service qmm18: Employees are trained in statistical improvement techniques. qmm19: Employees are trained in quality-related matters (such as Six Sigma). qmm20: Employees are trained in specific work-related skills. qmm21: Supervisors are trained in statistical improvement techniques. qmm30: Different departments have compatible goals. qmm31: In the product/service design process there is teamwork among different departments or SBUs qmm32: There is good communication among different departments or SBUs.

Fostering *quality improvement* within the oil and gas companies (at the SBUs) is an increasingly main challenge for both upstream and downstream sectors. The author separates upstream and downstream SBUs, but considers them mutually influencing – an integrated TQM implementation in oil and gas industry. Hakim (1996) argues that most

upstream SBUs are more concerning with the number of reserves they have, while downstream SBUs are more concerning with the distribution of the adequate oil and gas needed by the society.

According to the mechanistic approach of TQM implementation, quality improvement usually requires oil and gas companies to document all their work procedures, instructions, specifications and methods for all functions and aspects of the organization in providing employees with a guiding framework to asses their work and work improvements at all once. This framework is very useful to ensure that, whenever a process is performed, the same information, methods skills, and control mechanism are used and practiced in a consistent manner (Dale, 1994; Josephine and Wilkinson, 2001). Quality improvement is necessary for oil and gas company survival, which will always be a source of increasing CNFP. According to Tidd *et al.* (2005), there is strong evidence for connecting quality improvement with company performance. In addition, if the CNFP is excellent, quality improvement then may be sufficient to gain a better CFP.

Despite its mechanistic approach, TQM implementation contains a large element of human relations emphasis. This approach to TQM implementation is often as being the organic model of TQM, which is more focusing on the qualitative aspects such as *greater top management commitment* (Wilkinson, 1999). Under this organic approach, the role of top management is to "act as the brain of the system of TQM implementation" (Spencer, 1994, p. 456). The role of top management is not seen in terms of central command, but rather in monitoring performance and the provision of feedback when remedial actions are necessary (Spencer, 1994). According to Deming (1982), the role of management is to "create constancy of purpose for the quality improvement".In addition, management designs a

system to be capable of producing quality output, and consequently it is the management - not employees—who is responsible for poor quality (Moore and Brown, 2006). The integrative nature of the TQM implementation maintains that all elements, as an extraordinary team, must be in harmony if the TQM programme is to be successful (Soltani *et al*., 2008).

5.2.2 Structural Relations of TQM Implementation Model

This study reveals an empirical evidence on the strength of the structural relations among six QMPs and WCC, four of QMPs and OE, CNFP, and CFP. The results illustrate that TQM really need not to be operated in isolation from its contextual factors in the oil and gas industry in Indonesia—it could be integrated instead. The research finding of the study extends the studies of Maiga and Jacobs (2005) and Demirbag *et al.* (2006).

Maiga and Jacobs (2005) investigate a new empirical evidence in the form and strength of the relations among MCS, quality improvement, customer satisfaction, and financial performance of manufacturing business units in the United States. Their review indicates that the factors of MCS (quality goal, quality feedback, and quality initiatives) affect both customer satisfaction (non financial performance) and financial performance through quality performance. MCS factors have significant relationships with quality performance, and higher levels of quality performance are found to be positively associated with both customer satisfaction and financial performance. However, the relation between customer satisfaction and financial performance is not significant. Further Maiga and Jacobs state that prior research linking customer satisfaction to financial performance has been mixed. Some researchers (Nagar and Rajan, 2001; Banker *et al*., 2000; and Ittner and Larcker, 1998) proposed a lagged relation between customer satisfaction and financial performance.

Yet, others found that customer satisfaction were positively associated with financial performance. Improvement in customer-satisfaction-oriented non financial measures is expected to result in increased revenue or financial performance (Fornell, 1992; Hauser *et al*., 1994). Perera *et al.* (1997) found that the use of non financial measures is associated with enhanced financial performance for firms pursuing customer satisfaction. Further analyses from Maiga and Jacob's study indicate that quality performance has mediated the relationship between MCS variables and both customer satisfaction and financial performance.

Another review by Demirbag *et al.* (2006) contends that TQM practices have a strong positive impact on financial performance with a mediating effect of non financial performance. This finding revealed that TQM practices provide a better explanation on financial performance measures such as revenue, net profits, return on assets, and profit to revenue ratio through non financial performance criteria such as market development, market orientation and investment in R&D. Demirbag *et al* (2006) studied an analysis of a relationship between TQM implementation and organizational performance in SMEs in Turkey. They concluded that although financial performance is generally accepted as the ultimate aim of business organizations; non financial performance indicators in the case of SMEs are also equally important in implementing TQM principles.

Thus, the second hypothesis of the study corroborate the findings of Maiga and Jacobs (2005) and Dermibag *et al.* (2006) showing a statistically significant link between QMPs and CFP through WCC, OE, and CNFP.

The next subsection discusses the linkage among the research constructs based on the results of SEM. The findings discussed in this study are limited only to organizations, which employ the research constructs QMPs, OE, WCC, CFP, and CNFP rather than by individual practices, due to the use of the first-order constructs as indicators of the second-order construct.

5.2.2a The Relationship between QMPs and WCC

The implementation TQM is generally described as a collective, interlinked system of (a set of QMPs) quality management practices associated with an organizational performance (GAO, 1991: Torrow and Wiley, 1991; Waldman, 1994; Madu *et al.*, 1996 cited in Lakhal *et al*., 2006). In this respect, several studies have attempted to identify the QMPs on which the success of a TQM process is based on (Saraph *et al*., 1989; Flynn *et al.*, 1994; Ahire *et al*., 1995 cited in Lakhal, *et al*., 2006). However, these studies have not considered the possible practices of the contextual factors of the organization, which may affect TQM implementation (Sadikoglu, 2004). On the other hand, recent studies, especially those of Cua *et al*. (2001), Sousa and Voss (2002), and Kaynak (2003), Lakhal *et al.* (2006) underline the importance of causal relations between QMPs and company performance through the contextual factors of the organizations.

In this study, it is found that six QMPs (QMP_{1-6}) had significant positive impacts on WCC. This finding suggests that there are synergies among six QMPs (QMP_{1-6}) possible to oil and gas companies, which employ WCC. It is in line with the work of Flynn *et al.* (1999), who determined that the WCC, significantly, is related to QMP (cost, quality performance, product flexibility, and volume flexibility). According to Flynn *et al.* (1999), QMPs allow

competition on the basis of dependability, which the WCC, separately, were not able to achieve.

5.2.2b The Relationship between QMPs and OE

The relationship among four of six QMPs ($QMP_{1, 2, 4, 5}$) is presented in Figure 5.1. This study observes that OE is always becoming essential in developing oil and gas business based on the QMPs. Findings indicated that quality improvement program, training to improve products/services, supervisory leadership, and top management commitment, are positively associated with operational excellence in oil and gas industry. It asserted that the adoption of QMPs into the OE could help to alter an oil gas company to understand the controls from a point-in-time crude oil/natural gas exploration project implementation mindset to a sustainable approach embedded into day-to-day operational processes. Hence, the need to adopt QMPs is vital to promote OE. To make the OE to be successful, the integrative of quality improvement program, training to improve products/services, supervisory leadership, and top management commitment must be in harmony.

5.2.2c. The Relationship between WCC and CNFP

It is observed that there is a strong relationship between a set of WCC (six dimensions of Hayes and Wheelwright's practices – workforce skills and capabilities, management technical competence, competing through quality, workforce participation, rebuilding manufacturing engineering, and incremental improvement approaches) and a set of CNFP (quality of products/service offerings, delivery of products/service offerings, and variety of products/service offerings, customer satisfaction, employee satisfaction, and community involvement). This is consistent with the findings of *Flynn et al.* (1999) stating that WCC was related to cost, quality, and flexibility (CNFP).

5.2.2d The Relationship between OE and CNFP

The study observed that there is a strong relationship between a set of OE (safety, environment, health, reliability, and efficiency) and a set of CNFP (quality of products/service offerings, delivery of products/service offerings, and variety of products/service offerings, customer satisfaction, employee satisfaction, and community involvement) as well. OE is necessary for oil and gas industry survival, which will be a source of sustainable competitive advantage (Thompson *et al*., 2010).

5.2.2e The Relationship between CNFP and CFP

The study determined that CNFP has a strong positive impact on CFP. Performance is a multifaceted concept and this study tried to capture performance dimensions from both financial (financial performance, market performance, and operating costs) and non financial (quality of products/service offerings, delivery of products/service offerings, and variety of products/service offerings, customer satisfaction, employee satisfaction, and community involvement). These findings were interpreted only by sets of CNFP and CFP, rather than by individual practices, due to the use of the first-order constructs as indicators of the second-order construct.

5.2.2f The Structural Relations Model and Sustainability of TQM

From sustainability of TQM perspective, the positive results on the structural relations between QMPs and CFP provide an important confirmation. Under the context of sustainability, TQM is considered as one form of innovation (Westphal *et al*., 1997; Yamin *et al*., 1997 cited in Prajogo and Sohal, 2004a). Sustainability of TQM recognizes the importance of the programs on continuous improvement and innovation process,. However, the two programs also differ fundamentally. The continuous improvement program seeks a

steady incremental improvement to process performance. The continuous innovation program – on the other hand – seeks breakthroughs, not by enhancing existing processes, but by discarding and replacing them with entirely new ones, and furthermore involves a different approach to change management from that is needed by TQM programs (Hammer and Champy, 1993).

Hammer and Champy also stated that without TQM the companies cannot perform a continuous innovation. Prajogo and Sohal (2004a) suggests in practice, because self-reinforcing and dual-direction character of the impact quality improvement and innovation have on one another, firms seek quality through innovation or innovate through quality improvement—an integration between total quality management and total innovation management (Prajogo and Sohal, 2004a)., They also added that, as a response to changes in the business environment (including oil and gas industry), a company has shifted its focus to innovation, without neglecting its quality performance. In other words, quality is the pre-requisite for innovation. Bolwijn and Kumpe (1990) cited in Projogo and Sohal (2004a) have affirmed that a company cannot be successful in managing innovation before it has developed the capability to manage quality. This supports the arguments suggesting that companies need to appreciate the competitive dimensions, particularly quality and innovation, which are so interrelated with each other as a cumulative performance rather than as a trade-off between the two. The capability of synergistically managing both will survive to developing sustainable competitive advantage (Corbett and Wassenhove, 1993; Thompson, 1993/1994; Wheelwright and Clark, 1992 cited in Parojogo and Sohal, 2004a).

A successful implementation of sustainability of TQM requires a recognition to the following contributions about integration between TQM and the contextual factors of TQM

in the oil and gas industry (sustainable value-creation, sustainable development program, and sustainable competitive advantage through OE and WCC):

1. Sustainability of TQM must be perceived by stakeholder and its program must begin with the needs analysis of the stakeholders, as TQM actions are only meaningful when they are perceived by the stakeholder (primary or secondary) in order to build culture of sense of belonging (high level of commitment).
2. Sustainability of TQM requires a continuous process in improvement and innovation. Although TQM should be continuously improved, it sometimes pays for a notion to target a quantum leap innovation in order to adapt the contextual factors. Small improvements are often obtainable through working harder, yet a large innovation calls for fresh solutions, hence working smarter is being required.

According to Higginson and Waxler (1994), the integration of TQM and the contextual factors of an organization, which may affect sustainability of TQM implementation, to some extent, require the following characteristics to be successful:

1) Good communication—clear and simple communication practices and channels backed by a full and inclusive understanding of the vision, mission, objectives and strategies involved in quality improvement program.
2) Extensive support and continuous articulation of that support in word and deed from top management—top management leadership and commitment.
3) A positive corporate culture focusing on short-run and long-run benefits and growth potential through OE.
4) Teamwork among all employees involved (employee/society involvement) founded on a democratic sense of the workplace and the meaning of work itself through learning organization to be a world-class organization.

5) A significant role of a transformational leadership in applying TQM principles (both mechanistic and organic perspectives) in the innovation area and quality improvement program.

5.2.3 The Mediation of WCC, OE, and CNFP

The results of mediation analysis however also indicate the explanatory power of partial mediating variables (OE and CNFP) between quality improvement or top management commitment and CFP. The findings extend the research on TQM implementation by addressing the calls for research that focuses on mediating variables in the relations between QMP and CFP (Maiga and Jacobs, 2005; Demirbag *et. al.*, 2006). Specifically, the data from this study suggests that OE and CNFP partially mediates the relations between quality improvement or top management commitment and CFP. If all of six QMPs examined into one QMP construct, OE and CNFP were found to mediate the relations between QMP and CFP.

The results of this study parallel the findings reported by Shah and Ward (2003) where contextual factors of an organization were found to mediate the relations between QMP and company performance. The oil and gas managers' confirmation also support these findings that OE and CNFP mediated the relation between quality improvement or top management commitment and CFP. Both quality improvement and top management commitment are the primary critical factors of QMP to improve CFP through OE and CNFP. A set of OE (safety, environment, health, reliability, and efficiency) is very crucial in the oil and gas industry, especially for increasing the oil and gas production (the level of productivity) in the upstream sector, and for improving operational reliability in the downstream sector.

The hypotheses that were not supported by the data of the study were the ones which predicted that OE and CNFP would mediate the relations between supervisory leadership **or** supplier involvement **or** training to improve products/services **or** cross-functional relationship team relationship among SBUs and CFP. WCC and CNFP also mediate the relations between quality improvement program or supervisory leadership **or** supplier involvement **or** top management commitment **or** training to improve products/services **or** cross-functional relationship team relationship among SBUs and CFP.

According to the oil and gas managers' confirmation about this result, Indonesia's oil and gas companies have already implemented WCC since 2004 to achieve their vision to be recognized as world-class companies. Although WCC has been and will continue to be a vital part of business operations, companies must fundamentally reconsider their ways of conducting business. Based on their experiences in implementing WCC, the fact shows that the central barrier of the effectiveness of WCC lies on the low commitment from top management. The majority of top management are still not fully supportive and committed to WCC; and viewing it as a measure aimed to increasing short-term profit, rather than as Wilkinson *et al.* (1998, p. 20) put it, "a national survival strategy" (Soltani, *et al*., 2008).

5.3 Summary of Findings and Discussions

Throughout this chapter, an overall summary of research findings and interesting results were described. In addition, the discussions of this empirically based study were described in detail. The possible new findings and related concerns were summarized briefly as well. The next and last chapter of the study (Chapter VI) presents the conclusions with an overall summary of the study as well as a table of research summary (the research objectives 1, 2, 3, 4, 5, and 6) related to research questions 1, 2, 3, 4, 5, and 6; research hypotheses 1, 2a-f,

3a-f, 4, and 5; and research findings 1, 2, 3, 4, 5, and 6). A promising comprehensive TQM implementation model for oil and gas industry in Indonesia is also provided and explained.