1 INCORPORATING OPERATIONAL EXCELLENCE STRATEGY INTO COMPANY FINANCIAL PERFORMANCE IN OIL AND GAS INDUSTRY: AN EMPIRICAL STUDY

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Abstract

The objective of this research is to test the effect of Quality Management Practices (QMP) based on Deming's 14 points, Operational Excellence Strategy (OE), on company financial performance (CFP). Conceptual model of Deming's Principle is used with operational excellence strategy (operational excellence dimensions and investment level) as mediating variables between the independent variables of Quality Management Practices and the dependent variable of company financial performance. The survey instrument used a comprehensive set of 81 importance and performance questions that were directly tied to the eight constructs of the study.

In summary, eight causal paths specified in the hypothesized model were found to be positive and statistically significant. Furthermore empirical results suggest that quality management practices have a positive and significant indirect effect on company financial performance through its direct effect on operational excellence strategy. The results also show that a complete model fit and the acceptable parameter level which indicate the overall parameter are good fit between the hypothesized model and the observed data. By concentrating on a single industry (oil and gas) is that Structural Equation Modeling (SEM) specification of the sequential relationship model between eight research constructs can be more complete and specific because unique characteristics of the oil and gas industry can be included (e.g. upstream and downstream chain activities). Finally, the particular design of the research and the findings suggest that the final structural model of the study has a great potential for replication to manufacturing as well as service operations.

Based on the oil and gas managers (the SBU level), operational excellence

strategy (five meaningful factors of operational excellence) can be viewed as the effective use of production and operations capability and technology for achieving business and corporate goals. Operational excellence strategy, therefore, is to help a company's operations organization define the common ground where it can play a proactive and collaborative role with other company functions or cross-functional relationships.
Oil and gas managers in Indonesia can use these meaningful factors of operational excellence in concert with other critical quality management practices to help them in their word-class company initiatives. Researchers can also use these factors to build structural model linking such factors to various organizational performance measures (i.e., non-financial or value-gain and financial or monetary-gain performances).
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***Keywords**: Quality Management Practices, Operational Excellence Strategy, Company Financial Performance*

INTRODUCTION

Today's demanding business and public environment places strong emphasize on the four key competitive priorities—flexibility, dependability, quality, and cost (Fliedner & Vokurka, 1997). The competitive environment of the global marketplace and marketspace in the 2000s is changing. Markets are becoming more globalize, dynamic, and customer driven. Customers are becoming more sophisticated. The demand more variety, better quality, and greater service in terms of reliability and response time. As a result, the model of world-class company is changing. World-class companies are emphasizing agility in corporate (company-wide) and operating (operational excellence strategy). Fliedner & Vokurka (1997) stated companies that will prosper in tomorrow's dynamic competitive environment are those that become today's agile companies.

The agile companies have two levels of strategy: operating (or operational excellence) and corporate (or company-wide). Each strategic business unit (SBU) in the agile company choose operating level strategy as its means of competing in individual product markets (Hitt *et al.*, 2005). The company's corporate level strategy is concerned with two key questions: what each SBU should be in and how the corporate office should manage the group of SBUs in order to increase the company financial performance. By definition corporate-level strategy specifies actions the company takes to gain a competitive advantage by selecting and managing a group of SBUs competing in several industries and product markets. The effective corporate level strategy creates, across all SBUs, aggregate returns that exceed what those returns would be without the strategy and contribute to the company's strategic competitiveness and its ability to an above average returns.

Recognizing that corporate strategy is a key component in today's global economy environment and there was a lack of empirical evidences that determine the incorporating operational excellence into company financial performance; this study wants to describe

the sequential relationship between operational excellence strategy and company financial performance—a case of the Indonesia's oil and gas industry. In the coming years, the Indonesia's oil and gas industry will be characterized by increased challenge for achieving world-class company. There will be a greater need for more effective use of the alternative resources that are available. Operational excellence and quality management practices will play a major role in the success or failure of oil and gas endeavors. To successfully manage each oil and gas production/operations, oil and gas managers will need to employ a systems approach to total quality management (TQM).

Total quality management (TQM) is a comprehensive management system (an integrative approach) for achieving continuous improvement in stakeholder satisfaction (Foster, 2004). TQM is not one-short deal, but rather a commitment for the life of the organization. For it to be successful there must be strong visionary leadership which earnestly believes in the company's a products or services, and more important, its employee involvement and empowerment. Important motivations for this study were to integrate several theoretical perspectives regarding quality and innovation management practices, operational excellence strategy and to examine their possible relationships with oil and gas companies' financial performance.

It is the ultimate purpose of this paper to develop a sequential model of operational excellence strategy—company financial performance links into the oil and gas industry context. This research investigates a structural model with eight research constructs. To accomplish this purpose, the next two sections review the research issues and the literature relevant to operational excellence practices. This is followed by a description of a study undertaken to expand the application of operational excellence strategy into a specific oil and gas industry context. This research is partially a response to recent calls for theoretically and methodologically rigorous, yet managerially relevant, research in operational excellence strategy—company financial performance links. Thus, in the last sections, the managerial and research implications of this operational excellence strategy are discussed.

Research Issue: The Amendment of Law of the Republic of Indonesia Concerning Oil and Natural Gas

The period of 2001 – 2005 is important transition years for Indonesia's Oil and Gas Industry, following passage of a new oil and gas law in October 2001. The Indonesian Parliament passed the oil law on October 23, 2001 (Law 22/2001). This new Law, which replaced the 1960 Oil and Gas Law and Law for State Owned Company 8/1971, required the upstream and downstream sectors to deregulate within four years (2001-2005). The amendment of law created two new governmental bodies: the Executive Body that takes over State Owned Company's upstream functions and the Regulatory Body that supervises downstream operations.

The Executive Body (Oil and Gas Upstream Implementing Body) was established on July 16, 2002 (Government Regulation No. 42/2002). It took over State Owned Company's upstream regulatory functions and management of oil and gas contractors. The Regulatory Body (Oil and Gas Downstream Regulatory Body) was established on December 30, 2002 (Government Regulation No. 67/2002). It has license downstream operators to assure sufficient natural gas and domestic fuel supplies and the safe operation of refining, storing, transport and distribution of petroleum products.

The oil and gas policy reform is necessary in order to maintain Indonesia's status as a net oil exporter and enhance efficient use of energy resources. To do so, the government must implement legislation and policies that will attract new private direct investment and rationalize use of Indonesia's energy resources (Embassy of USA, 2004). Based on the new law, there are three types of contracts: the Production Sharing Contract (PSC), the Technical Assistant Contract (TAC), and Enhance Oil Recovery (EOR) Contract. In addition to contracts that give bundles of right to explore and exploit, the participants in the PSC, TAC, or EOR may also enter into separate agreements. The objective of this agreement is to discuss how they are going to conduct petroleum operations. These are known as Joint Operating Agreements (JOA) and Joint Operating Bodies (JOB).

To support the oil and gas policy reform, Ministry of State Owned Enterprises will establish the Indonesia

Quality Award (IQA). This award will be given to the company to fulfill their vision to be recognized as World–Class Companies successfully. This award is not the end of the oil and gas companies' journey. It is only the beginning. The companies must continue to evolve and learn with perseverance.

The Article 33 of National Act 1945 emphasizes that land, water and their containing natural resources are possessed by the state and are used for people's utmost wellbeing. Based on this Article, the privilege to manage oil industry is in the government's hand. In addition The New Law (Oil and Gas Law No 22/2001), which replaced the 1960 Oil and Gas Law and Law for State Owned Company No. 8/1971, required the upstream and downstream sector to deregulate within 4 years (2001-2005).

The upstream implementing body assumes the long role of State Owned Company's regulatory function and responsibilities in managing oil and gas contractors (Government Regulation No. 42/2002). A new downstream regulatory body assumes the role of State Owned Company in controlling downstream activities. Among this regulatory body's responsibilities are regulating and determining the supply and distribution of oil-based fuel regulating the transmission and distribution of natural gas (Government Regulation No. 67/2002).

The oil and gas chain activities and an integrated oil and gas industry are explained in the following sections. The raw stocks from the oil and gas fields are transformed in the upstream process of making the intermediate products and shipping them to the next customer (the downstream process). The intermediate products are converted into market products in the downstream process. The final outputs are the customer receiving the market products of oil and gas. An important aspect of the oil and gas process is a feedback loop. A feedback loop relates information about the market products (outputs) from any stage or stages back to another stage or stages so that an analysis of continuous improvement process can be made (Gitlow *et al.*, 2005).

The Indonesia's oil and gas industry is committed to adopting the following operations strategy principles in its journey to operational excellence orientation: Quality Leadership, Stakeholders Focus, Integrated Business Strategy, Teamwork, Empowerment, Process Management, Asset Management, Continuous Improvement, Learning Organization, and Measurement of Company Performance. Although operational excellence strategy has been implemented, the management oil and gas companies in Indonesia realized that to reach their vision to be world-class companies, they must fundamentally rethink their way of conducting business. The management oil and gas companies have encouraged themselves to restructure the corporate strategy related to other management philosophies such as operational excellence underlying ChevronTexaco way.

As time passed, the Indonesia's oil and gas industry began recognizing that operational excellence need not implement in isolation from other changes initiative programs (i.e., Quality Management Practices, and Company Performance)—it could be integrated.

Related literature and Assessing Operational Excellence Practices

Basu and Wright (1996) stated that in entering the global market environment, manufacturers must compete against world-class companies. It only follows that a manufacturer's ability to compete, and survive, will depend on its ability to create a consistent standard of excellence which transcends global boundaries or to achieve world-class performance in operations (Thorne and Machrey, 2000). To meet this need, a manufacture should develop an internal benchmarking approach that enable as a company to self-appraise against establish world-class performance in operations. It is called operational excellence strategy.

The term "Operational Excellence" was used by Chevron-Texaco (2003) to describe organizations for assuring essential global management system standards which are implemented for all aspects of structured and sustainable operations. Chevron-Texaco (2003) defined operational excellence (OE) is the systematic management of safety, environment, health, reliability, and efficiency to achieve its vision to be the global energy company most admired for its people, partnership, and performance (world-class performance in operations). The following performance expectations have been established as part of

operational excellence (SEHRE):

1. Achieve an injury-free work place **(Safety)**
2. Eliminate spills and environmental incidents and identity, mitigate key environmental risks **(Environmental)**
3. Promote a healthy work place and mitigate significant health risks **(Health)**
4. Operate incident-free with industry leading asset availability **(Reliability)**
5. Maximize utilization of resources/asset **(Efficiency)**.

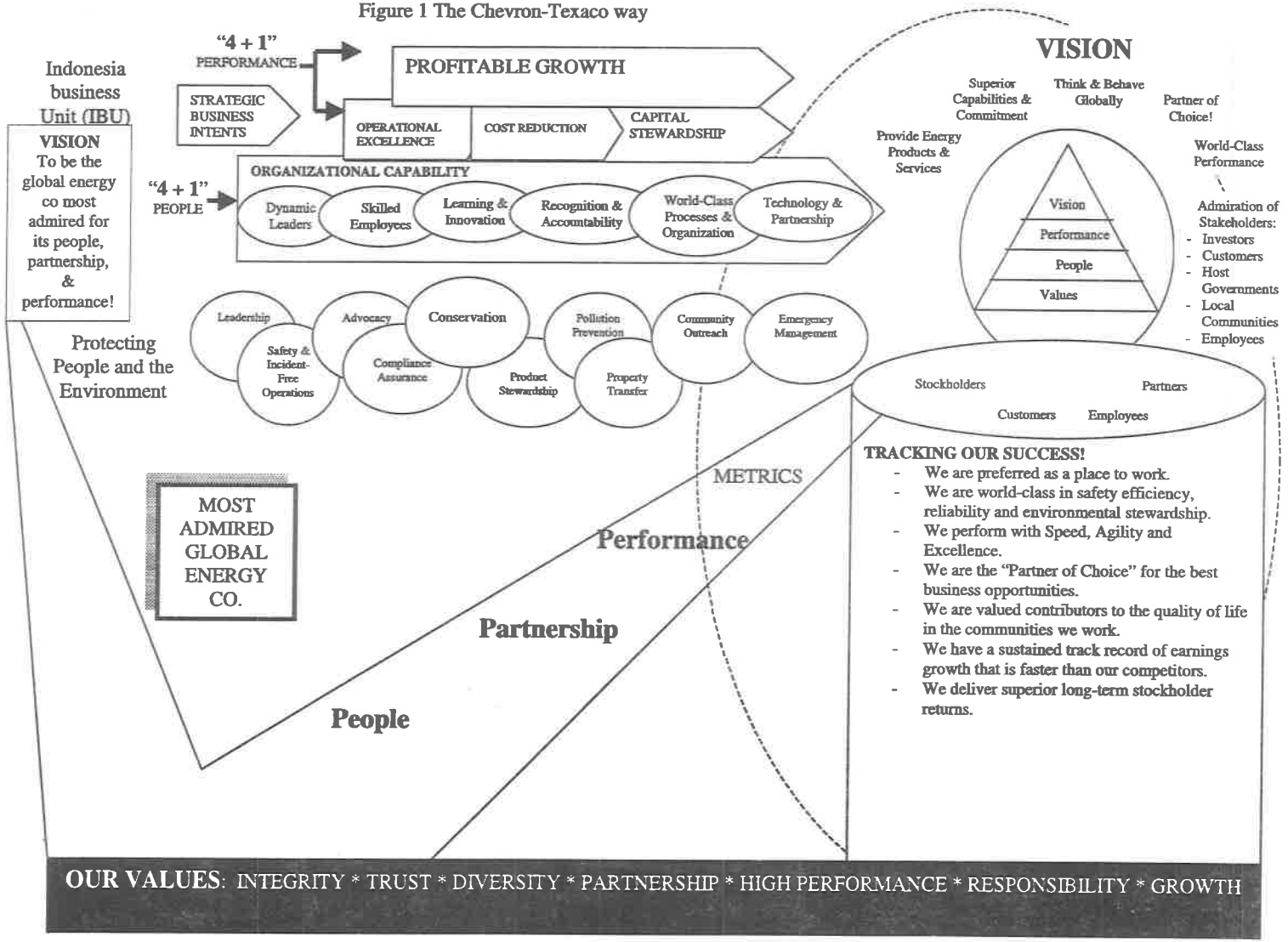
Operational excellence is an integral part of the strategic business intents to achieve the "4 + 1" performance (organizational capability, operational excellence, cost reduction, capital stewardship, profitable growth) as shown in Figure 1. Organizational capability systems link six elements: dynamic leaders, skilled employees, learning and innovation, recognition and accountability, world-class processes and organization, technology and partnership. In the holistic efforts, for distinct capabilities system will be built: operational excellence, cost reduction, capital stewardship and profitable growth. To help the businesses deliver world-class performance, protecting people in the environment has been established for operating practices in the following critical element areas: leadership, safety and incident free operations, legislative and regulatory advocacy, compliance assurance, natural resource conservation, product stewardship, pollution prevention, property transfer, community outreach, and emergency management.

The concept of operational excellence has been embraced, expanded and enhanced by a number of authors, who have reinforce some of Allen & Kutnick's ideas, added some new practices and ignored others (Allen & Kutnick, 2002). Allen and Kutnick developed their concept of operational excellence based on the concept of centers of excellence (COEs): optimize efficiency and effectiveness among all processes, integrate like tasks and processes, leverage automation, ensure clear accountability, provide multi-platform support, directly correlate to service-level agreements, roll up more easily to cost centers, and provide consistent customer experience.

The study concerns the context of justification (theory-driven research) and a quantitative-deductive (explanatory) approach. This study addresses two key research questions that enable us to develop a sequential model of operational excellence strategy—company financial performance links for the Indonesia's oil and gas industry:

1. Do five dimensions of operational excellence individually and collectively comprise reliable and valid instrument for measuring company financial performance?
2. Does a final structural model indicate the overall parameter is good fit between the hypothesized model and the observed data?

Figure 1 The Chevron-Texaco way



Research Purpose

A primary motive of this study was to encourage future researchers to more deeply investigate the sequential relationships between Quality Management Practices (based on Deming's 14 points), operational excellence strategy (through five dimensions of operational excellence and investment level) and company financial performance. Hopefully by investigating these relationships, researchers will be able to advance knowledge and understanding in the areas of operational excellence—the interaction between quality and innovation.

In light of quantitative-deductive research approach, the objectives of the study are twofold:

(1) To generate a sequential analytic or structural model which includes the interrelationships between eight research constructs for the Indonesia's oil and gas industry (a single industry); and

(2) To establish the relationships among eight research constructs that are both substantively meaningful and statistically well-fitting for the Indonesia's oil and gas industry in order to fulfill its vision to be recognized as World-Class Company committed to operational excellence based on the oil and gas policy reform.

Research Method

The intention of the cross-sectional study was to use the perceptions and experience of range operations strategy practitioners from oil and gas industry (a single industry) as the basis for identifying the dimensions of operational excellence underlying the Chevron-Texaco way. Their perceptions were to be measured using a questionnaire incorporating quality management practices, five dimensions of operational excellence, investment level, and company financial performance. These dimensions were taken as the basis for this questionnaire since it is the best established and recognized the contribution of five dimensions of operational excellence to company financial performance.

Empirical data for this study were collected from seven group companies of the integrated oil and gas industry in Indonesia (based on the new law of oil and gas number 22/2001); containing 49 oil and gas companies and 140 strategic business units. Forty six of which were privately owned and two of which were in the public sector (state owned) companies.

The primary unit of analysis for empirical validation is the individual Strategic Business Unit (SBU) level. The SBU organizational structure is chosen in this study because of three reasons. First, the Indonesia's oil and gas companies have realized that SBUs allow corporate management to delegate authority for the strategic management of distinct business entities—the SBUs (Hakim, 1996 and Pearce and Robinson, 2005). In addition the SBUs are profit centers, which facilitate accurate assessment of profit and loss. The second important reason of choosing the SBU as unit of analysis is that the advantage of the SBU to meet the increased coordination and decision-making requirements that result from increased diversity and size (Pearce and Robinson, 2005). Third, the SBU is the level of implementation for most world-class company programs.

Two thousand and eight hundred (2800) questionnaires were distributed to the participating oil and gas companies in a qualified sample of 140 SBUs. An initial sample of 200 SBUs operating in Indonesia was drawn at random from the directory of Directorate General of Oil and Gas, Republic of Indonesia. Each SBU was contacted by telephone and e-mailed web system to establish that individuals with primary responsibilities for the three level of management position were identifiable. It was not possible to contact 12 SBUs because of incorrect contact details. A further 48 SBUs were either unable or unwilling to identify individual managers with the required responsibilities. Each qualified sample of 140 SBUs received 20 questionnaires. Only responses and answered completely on of the research constructs were used. The effective response rate is calculated as follows (Bryman & Bell, 2003):

$$\text{Response Rate} = \frac{\text{Number of useable questionnaires}}{\text{(Total samples-unsuitable or uncontactable numbers of the samples)}} \times 100$$

A total of 1,332 individual usable questionnaires were returned thus qualified for analysis, representing an effective response rate of 50.19 percent. Of these,

354 were from high level managers, 447 from middle level managers, and 531 from low level managers. At least 6 questionnaires were returned by qualified sample of 140 SBUs, with 62 SBUs returning more than 10 questionnaires of 20 questionnaires distributed. All 140 SBUs returned questionnaires from their high level manager, middle level manager, and low level manager. An assessment of non response bias was made by using the extrapolation approach recommended by Armstrong (1979). Each individual questionnaire type (high, middle, and low level managers) was categorized by the date the completed questionnaire was received. Tests revealed no significant differences between early and late responders on any of the quality management practices.

The survey instrument (questionnaires development) was based on a replica of previous assessing the dimensions of quality management practices, operational excellence strategy, and company financial performance. The questionnaire contained eighty-one questions. The questionnaire asked the managers at the SBU level to respond to a set of eighty-one questions, synthesized from the previous studies and its establishments on a five-point interval scale (1 = not at all true; 2 = slightly true; 3 = somewhat true; 4 = mostly true; and 5 = completely true).

Definitions and Operationalization of Variables

The researcher has developed a framework of the study (Figure 2) to illustrate the linkages between Quality Management Practices (QMP), Operational Excellence Strategy (five dimensions of Operational Excellence and Investment Level), and Company Financial Performance (CFP). In this framework, the researcher argues that QMP (as an independent construct) improve CFP (as a dependent construct) through six mediating variables (five dimensions of operational excellence and investment level). All eight constructs are measured with five-point Likert scales. The eight constructs found in Figure 2 are discussed in the following section.

Quality Management Practices (QMP) were operationalized using a set of 50 quality management dimensions (qm1-50). These fifty quality management dimensions can be explained by six Quality Management Practices (QMP1-6). This study interpreted the six QMPs: Quality Improvement Program, Supervisory Leadership, Supplier Involvement, Top Management Commitment, Training to Improve Products, and Cross-Functional Team Relationships among SBUs. Interestingly, six QMPs closely resembled of the factor that were developed by Saraph *et.al.* (1989), and Tamimi's study (1995 & 1998) which reduced Deming's 14 points into a smaller set of meaningful factors (CSFs of TQM construct) for easier implementation. This study used the extracted factors to gain better understanding of Deming's principles of quality management for the Indonesia's oil and gas industry that has been empirically tested by Tamimi.

Operational Excellence (OE) was operationalized using five dimensions of operational excellence. The measure was adapted from Chevron-Texaco 2003. To succeed the Chevron-Texaco must achieve world-class performance and exceed the capability of the strongest competitor. To do so, the management of the Chevron-Texaco company develops the five dimensions of tracking for success: world-class in **S**afety, **E**fficiency, **H**ealth, **R**eliability, **E**nvironmental stewardship (SEHRE) in order to maintain superior long-term stockholder returns.

Investment level embodies the financial, technological, and human capital investments associated with operational excellence and quality management practices. Financial investments include spending on R&D quality management projects and empowering SEHRE dimensions of operational excellence. Technological investments are expenditures on infrastructure equipment and basic facilities required for operational excellence and quality management implementations. Human capital investments include salaries, training and development (T&D) and other costs associated with developing staff (Zahra and Das, 1993).

Company Performance was conceptualized by Cook and Verma's study (2002) according to two dimensions. The first dimension is relating to financial or monetary gain or MGP (i.e., profit, market share enhancement, and cost reduction). The second dimension is relating to non financial or value gain or VGP (i.e., product/service quality enhancement, delivery performance, customer and employee

satisfaction, and community development impacts). Based on Cook and Verma (2002), the study described the company performance into company financial performance construct.

The research framework (Figure 2) which identifies a thirteen-stage path analytic model (structural model) delineating the factors involved in the relationships between eight research constructs. On the basis of a review of the diffusion of distinctive literatures, the researcher posits seven quantitative-deductive research hypotheses to test the effect of Quality Management Practices on Company Financial Performance through Operational Excellence Dimensions and Investment Level and to investigate the interrelationships between Quality Management Practices, Operational Excellence, Investment Level, and Company Financial Performance.

1. H1: Quality Management Practice (QMP) has a direct and significant effect on Company Financial Performance (CFP).
2. H2: Quality Management Practice (QMP) has direct and significant effects on each of the Five Operational Excellence dimensions (OE1-5).

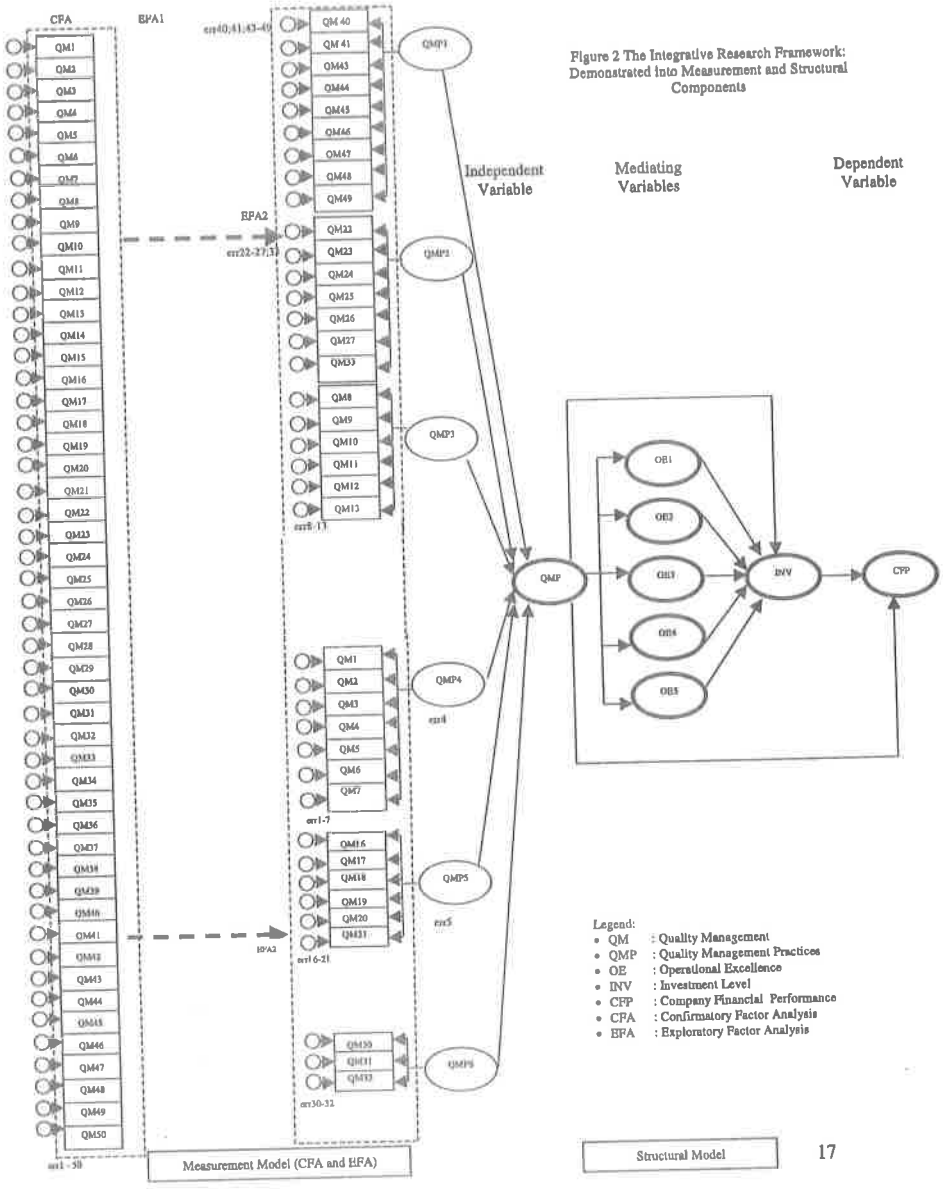


Figure 2 The Integrative Research Framework: Demonstrated into Measurement and Structural Components

3. H3: Quality Management Practice (QMP) has a direct and significant effect on Investment level (INV).
4. H4: Each of the Five Operational Excellence dimensions (OE1-5) has a direct and significant effect on Investment level (INV).
5. H5: Investment level (INV) has a direct and significant effect on Company Financial Performance.

Data Analyses

To test the hypotheses, the researcher used confirmatory factor analysis (CFA) and exploratory factor analysis (EFA). The researcher used CFA to measure the research constructs. Then, the researcher used EFA to identify the underlying the quality management practices (Deming's 14 points). The SPSS 11.0 (Coakes and Stead, 2003) were used to the quantitative data analyses.

Eighty-one (81) questionnaire items were used in this study. After reversed scores were adjusted, items representing the eight variables were subjected to reliability and validity tests.

Rigorous statistical analysis is required in order to meet professional standards of validity and reliability. This approach would enable items to be retained or removed based on multivariate statistical analysis such as factor analysis/principle component procedure. According to Samson and Terziovski (1999) this has not been done with any statistical rigor based on a large and selected sample (n > 1000). Previous studies have been generally based on between about 20 and 200 observations (i.e. in this study 140 Strategic Business Units and 1,332 respondents).

a. Reliability of measures

Cronbach's alpha coefficients were computed to estimate the reliability of each scale (observed variable or indicator). Item to total correlation was used to refine the measures and eliminate items whose inclusion resulted in lower alpha coefficients. Items with item to total correlation coefficients less than 0.50 were eliminated. However, items with item to total correlation coefficients less than 0.50 were retained if eliminating those items would result in lower Cronbach's alpha coefficient of the related scale (Hair *et al.*, 1998). The Cronbach's alpha of the measures is ranging from 0.7720 to 0.8933, which, according to DeVellis (1991), are respectable to very good. Table 1 shows the reliability of the measures. Table 2 informs the number of items retained of the constructs.

Table 1. Reliability Coefficients (Cronbach's Alpha) of the Constructs

Construct	Number of Items in the Questionnaire	Number of Items Retained	Cronbach's Alpha
QMP	6 Items	1 Item	0.8933
OE1	6 Items	5 Items	0.8768
OE2	4 Items	4 Items	0.8643
OE3	5 Items	4 Items	0.8032
OE4	4 Items	4 Items	0.8886
OE5	4 Items	4 Items	0.7720
CFP	3 Items	3 Items	0.8089
INV	5 Items	5 Items	0.8475

Table 2 Number of Items Retained of the Constructs

Construct's Name	Construct Item Code	Sub Construct Item Code
Quality Management Practices **(QMP)**	QMP1 QMP2 QMP3 QMP4 QMP5 QMP6	qmp40,41,43,45,47,48,49 qmp22,23,24,26,27 qmp9,10,11,12,15 qmp1,3,4,5,6,7 qmp16,18,19 qmp30,31,32
Operational Excellence (OE)	OE1 OE2 OE3 OE4 OE5	OE1 (1-5) OE2 (1-4) OE3 (1-4) OE4 (1-4) OE5 (1-4)
Investment Level (INV)	INV	**INV** (1,2,3)
Company Financial Performance (CFP)	CFP	**CFP** (1,2,3)

b. Validity of measures

After the scales had met the necessary levels of reliability, the scales were assessed for validity. Confirmatory factor analysis was to assess the validity of each scale, which consisted of the retained items or manifest indicators. All loadings (path coefficients or regression weights) from a latent construct to their corresponding manifest indicators were significant (critical ratio values > 1.96). Thus provided evidence of convergent validity.

This study also assessed the discriminant validity of the latent constructs. Discriminant validity is the degree to which two conceptually similar constructs are distinct. According to Anderson and Gerbing (1988), when the confidence interval of ± two standard errors around a correlation estimate between two factors (constructs) does not include the value 1, that is evidence of discriminant validity for the two constructs. None of the confidence intervals in this study includes one.

c. Construct Reliability (α)

The composite reliability of each latent construct (α) measures the internal consistency of the construct indicators, depicting degree to which they indicate the common latent (unobserved) construct. High reliability of measures provides the researcher with greater confidence that the individual indicators consistently measure the same measurements (see Table 3.). The threshold value for acceptable reliability is 0.70. (Hair *et al.*, 1998).

d. Fixing the Error Terms and the Lambdas

Single indicators measured latent constructs of this study; however, in each case, the indicator was a multiple-item scale. It is unlikely that a single indicator perfectly measures a construct; therefore, this study estimated the measurement error terms. The measurement error terms were fixed at $(1-\alpha)\ \sigma^2$ and the corresponding lambdas—the loading from a latent construct to its corresponding indicator—were fixed at $\alpha^{1/2}\ \sigma$ (Howell, 1987). For the non-latent (observed) variables, the error terms were fixed at 0 and the corresponding lambdas were fixed at 1.

The measure of this study consists of indicators five latent variables measured on a 5 point scale. Therefore, before fixing the error terms and the lambdas for the samples, the study converted those latent variables into standard scores (Z scores) by subtracting the mean and dividing by the standard deviation for each variable. Using standardized variables eliminates

the effects due to scale differences (Hair *et al.*, 1998). Table 3 provides the reliability of the constructs, lambdas, and error terms.

Table 3. Construct Rellability

Construct	ε	λ	α
ξ1 (QMP1)	0.0186	0.3642	0.8770
ξ2 (QMP2)	0.0371	0.4857	0.8641
ξ3 (QMP3)	0.0520	0.4625	0.8044
ξ4 (QMP4)	0.0210	0.4144	0.8918
ξ5 (QMP5)	0.0438	0.4010	0.7855
ξ6 (QMP6)	0.0410	0.4158	0.8097
ή1 (WCC)	0.0379	0.8186	0.9465
ή2 (OE)	0.1387	0.5999	0.7218
ή3 (CPF)	0.0567	0.4976	0.8136

e. An assessment of non response bias

An assessment of non response bias was made by using the extrapolation approach recommended by Armstrong (1979). Each individual questionnaire type (high, middle, and low level managers) was categorized by the date the completed questionnaire was received. Tests revealed no significant differences between early responders (the first wave of responses; n = 442) and late responders (the second wave of responses; n = 890) on any of the constructs. As indicated by a CFI (the comparative fit index) of 0.998 for the research model, the multi group models represent excellence fit to the data. As such, non-response bias in unlikely to be present in this data (Morgan and Piercy, 1998).

f. EFA for Quality Management Practices (QMP) Construct

An exploratory principle components factor analysis was conducted to determine whether the observed correlations among the 50 items measuring Deming's 14 points can be explained by the existence of a smaller number of hypothetical factors.

Table 4: SEM Results (Initial Causal Model)

Hypothesis	Structural Relation (Causal Paths)	Standardized Regression Weights (y)	CR	*error* (ε)	Residual (ζ)	Hypothesis Supported?
H1	QMP -------> CFP	**0.026**	**1.078**	ε1 = 0.006	ξ1 = 0.166	No
H2a	QMP -------> OE1	0.913	58.833	ε2 = 0.019	ξ2 = 0.194	Yes
H2b	QMP -------> OE2	0.898	54.476	ε3 = 0.037	ξ3 = 0.186	Yes
H2c	QMP -------> OE3	0.902	49.541	ε4 = 0.052	ξ4 = 0.233	Yes
H2d	QMP -------> OE4	0.876	52.903	ε5 = 0.021	ξ5 = 0.237	Yes
H2e	QMP -------> OE5	0.873	44.082	ε6 = 0.044	ξ6 0.280	Yes
H3	QMP -------> INV	**-0.001**	**-0.008**	ε7 = 0.025		No
H4a	OE1 -------> INV	0.261	3.506	ε8 = 0.057		Yes
H4b	OE2 -------> INV	**-0.017**	**-0.226**			No
H4c	OE3 -------> INV	**0.060**	**0.798**			No
H4d	OE4 -------> INV	**-0.024**	**-0.335**			No
H4e	OE5 -------> INV	0.259	3.550			Yes
H5	INV -------> CFP	0.836	32.746			Yes

Goodness of Fit Measures	
Chi-Square Statistic (X^2)	20.203
Degree of Freedom (df)	5
Normed Chi-Square (X^2/df)	4.401
GFI	0.996
AGFI	0.973
CFI	0.998
RMR	0.002
RMSEA	0.048
P	0.001
ECVI	0.062

A thorough investigation indicated that the six factors were meaningful and accounted for 56.188% of the total variation among the 50 items. The six factors may be interpreted, respectively, as quality improvement program, supervisory leadership, and supplier involvement, top management commitment, training to improve products/services and cross functional team relationships among SBUs). Factors 7-14 of Deming's 14 points, however, were not clear enough to be meaningfully interpreted.

g. Assessment of Structural Model Fit

Table 4 presented the original structural model and goodness-of-fit statistics results. Eight criteria for assessing for overall fit were used: X^2. X^2/df, GFI, AGFI, CFI, RMR, RMSEA, and p-value based on the acceptable or desirable parameter level (Hair *et al*. 1998). The initial structural model supported hypotheses 2a-e, 4a and 4e, and 5, although the model fit showed the marginal satisfactory goodness-of-fit indices. Unfortunately, hypotheses 1, 3, 4b-d, were not confirmed because the critical ration values (CR) were negative or less than 1.96 (these indicate statistically insignificant). Therefore, the paths QMP —> CFP, QMP —> INV, OE2 —> INV, OE3 —> INV, and OE4 —> INV were eliminated and the model was revised. The SEM initial model is shown in Figure 3.

Figure 3 SEM Initial Model

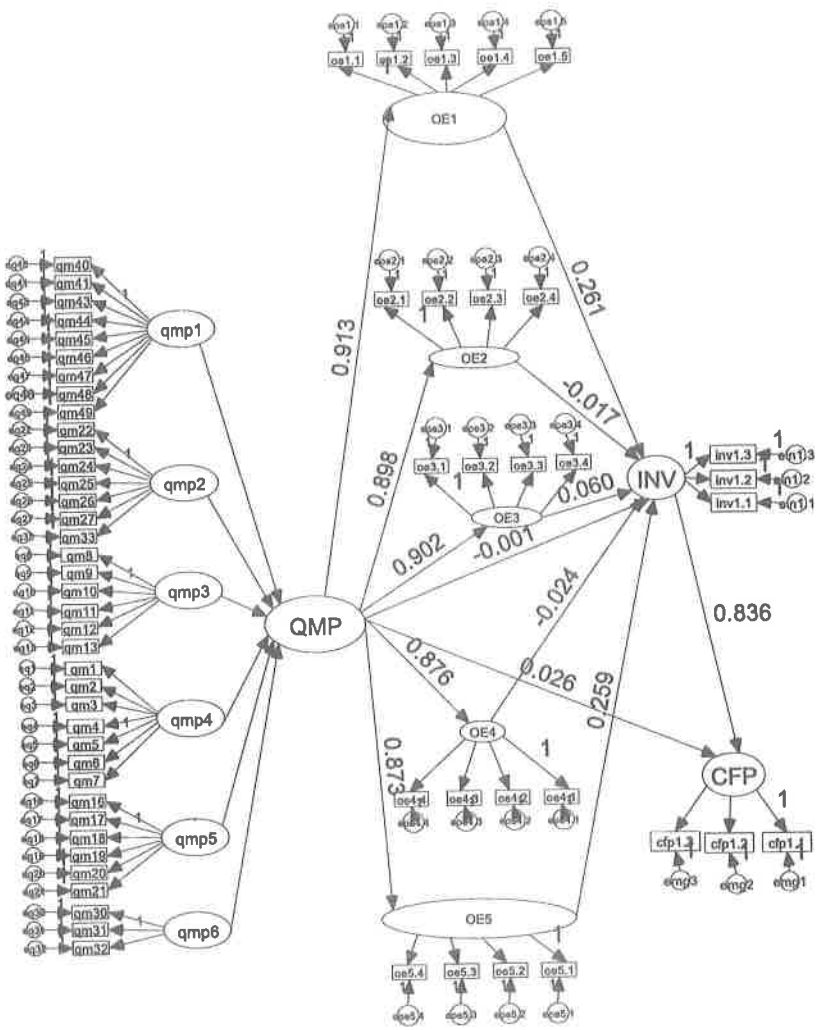


Table 5 shows the fully revised structural model. After eliminating the paths QMP —> CFP, QMP —> INV, OE2 —> INV, OE3 —> INV, and OE4 —> INV all remaining paths in the fully revised structure model are significant, so no further model reductions were attempted. Most of the overall model fit indices (the goodness-of-fit index or GFI = 0.996; the goodness-of-fit index adjusted for degrees of freedom or AGFI = 0.985; the root mean square error of approximation or RMSEA = 0.0.30; the comparative fit index or CFI = 0.999; and p value = 0.014) thus suggesting that the contending model represented a good-fit to the data. Because of the goodness-of-fit statistics resulting from this analysis is a good fitting model, this model is accepted. This attempt has improved the normed chi-square from 4.401 to 2.219; the RMSEA from 0.048 to 0.030 as well as the p value from 0.001 to 0.014.

This study also provides important insights into the consistent and smallest ECVI value (Expected Cross-Validation Index) = 0.056. According to Byrne (2001) the structural model having the smallest ECVI values exhibits the greatest potential for replication. Figure 4 depicted the SEM final model of the study.

Table 5: SEM Results (Final Causal Model)

Hypothesis	Structural Relation (Causal Paths)	Standardized Regression Weights (y)	CR	*error* (ε)	Residual (ζ)	Hypothesis Supported?
H1	QMP -------> CFP (Deleted)	-	-	ε1 = 0.006	ξ1 = 0.166	No
H2a	QMP -------> OE1	0.913	58.855	ε2 = 0.019	ξ2 = 0.194	Yes
H2b	QMP -------> OE2	0.898	54.476	ε3 = 0.037	ξ3 = 0.186	Yes
H2c	QMP -------> OE3	0.902	49.543	ε4 = 0.052	ξ4 = 0.233	Yes
H2d	QMP -------> OE4	0.876	52.900	ε5 = 0.021	ξ5 = 0.236	Yes
H2e	QMP -------> OE5	0.873	44.141	ε6 = 0.044	ξ6 = 0.278	Yes
H3	QMP -------> INV (Deleted)	-	-	ε7 = 0.025		No
H4a	OE1 -------> INV	0.256	5.713	ε8 = 0.057		Yes
H4b	OE2 -------> INV (Deleted)	-	-			No
H4c	OE3 -------> INV (Deleted)	-	-			No
H4d	OE4 -------> INV (Deleted)	-	-			No
H4e	OE5 -------> INV	0.285	6.209			Yes
H5	INV -------> CFP	0.850	38.609			Yes

Goodness of Fit Measures		Acceptable Parameter Level (Hair *et al.* 1998)
Chi-Square Statistic (X^2)	22.190	
Degree of Freedom (df)	10	
Normed Chi-Square (X^2/df)	2.219	1 < X < 5
GFI	0.996	Close to 1 is better
AGFI	0.985	> 0.90
CFI	0.999	Close to 1 is better
RMR	0.002	Close to 0 is better
RMSEA	0.030	< 0.10
P	0.014	> 0.05
ECVI	0.056	< 0.05

Figure 4 SEM Final Model

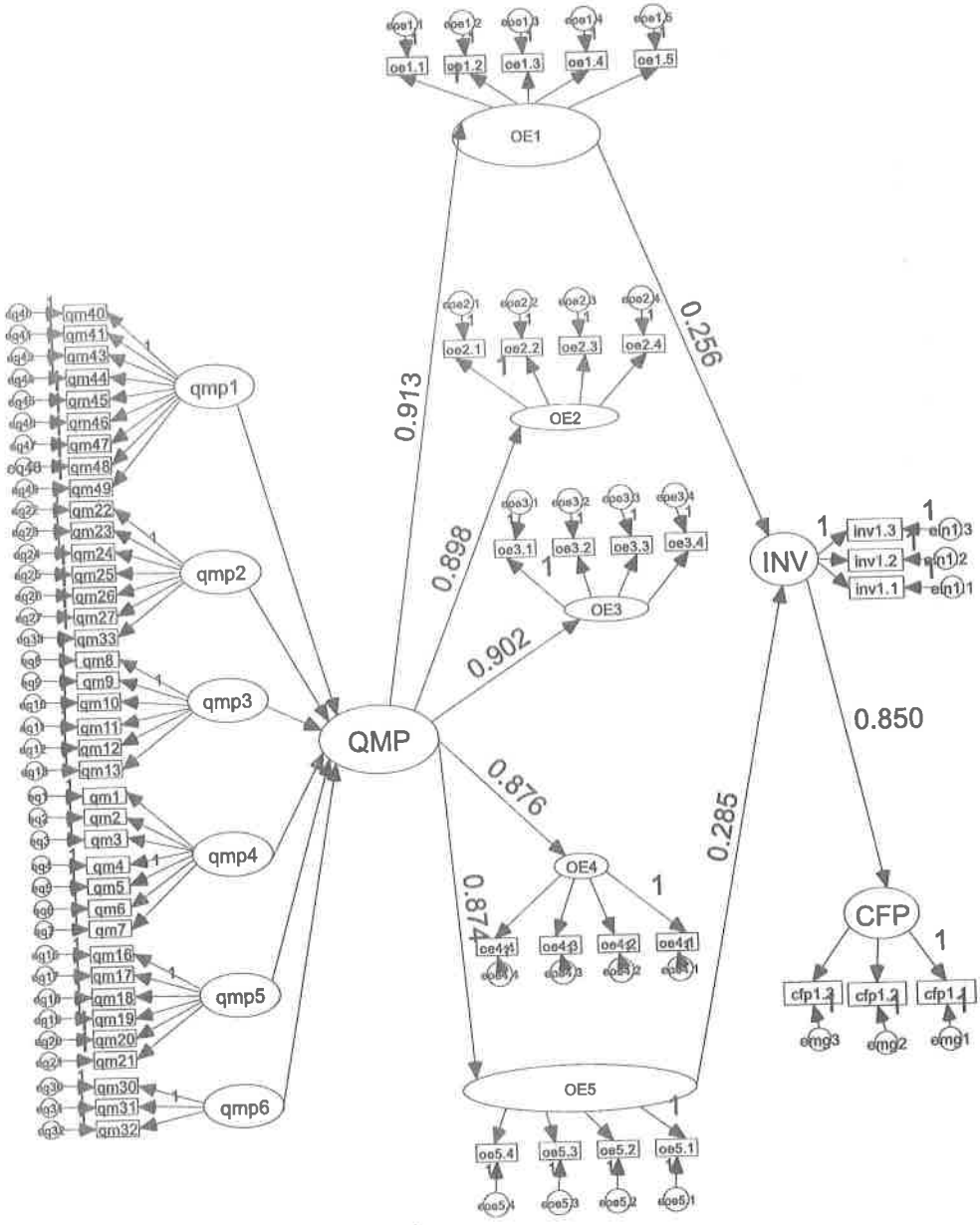


Table 6 shows the direct effect and indirect effect of the one exogenous variable (QMP) and the two mediating variables (OE1-5 and INV) on company financial performance (CFP). This result provided by the path analysis do allow for some meaningful interpretation and potential contribution. For example the direct effect of QMP on INV is negative. However, QMP has positive indirect and significant effects on CFP through its positive direct effects on OE1-5.

Table 6. The Direct and Indirect Effects of the One Exogenous Variable and the Mediating Variables on Company Performance

Dependent Variable	Predetermined Variable	Total Effect	Indirect Effects Via						Direct Effect
			INV	OE1	OE2	OE3	OE4	OE5	
OE1	QMP	0.91	-	-	-	-	-	-	0.91
OE2	QMP	0.90	-	-	-	-	-	-	0.90
OE3	QMP	0.90	-	-	-	-	-	-	0.90
OE4	QMP	0.88	-	-	-	-	-	-	0.88
OE5	QMP	0.87	-	-	-	-	-	-	0.87
INV	QMP	0.48	-0.03	0.25	-0.02	0.06	-0.03	0.25	-0.002
INV	OE1	0.00	-	-	-	-	-	-	0.00
INV	OE2	0.00	-	-	-	-	-	-	0.00
INV	OE3	0.00	-	-	-	-	-	-	0.00
INV	OE4	0.00	-	-	-	-	-	-	0.00
INV	OE5	0.00	-	-	-	-	-	-	0.00
CFP	QMP	0.43	-0.06	0.22	-0.01	0.05	-0.02	0.22	0.03
CFP	INV	0.84	-	-	-	-	-	-	0.84

t-value significance at the p = 0.000

Managerial Implications

To validate the oil and gas companies in Indonesia claim to quality management and operational excellence practices, the linkages between QMP, Operational Excellence, Investment Level, and Company Financial Performance has been developed in this study. In summary, eight causal paths specified in the hypothesized model were found to be positive and statistically significant. These paths show that QMP have significant positive and indirect effect on company financial performance. Although the QMP had no significant direct effects on company financial performance, the QMP did have significant positive effects on the operational excellence dimensions. Investment level has strong positive effect on company financial performance.

The particular design of the research and the findings suggest that if quality management and operational excellence practices are properly implemented, investment level can be managed successfully while also rising company financial performance. The combination of these improvements eventually leads to increase the return on investment (financial perspective).

Conclusions

This study examined model that defines structural relationships among eight constructs that are relevance to company financial performance in the Indonesia's oil and gas industry (a single industry). The research constructs are Quality Management Practices, Operational Excellence (Five Dimensions—SEHRE), Investment Level, and Company Financial Performance. The model is developed based on findings and conceptualizations of the compilation from previews studies. This study has moved from anecdotes and case studies to a testable model and multiple research hypotheses, linking the theoretical concept of operational excellence—company financial performance links to empirical evidence. This investigation is believed to make a contribution to the debate by providing empirical evidence from a single industry (oil and gas) that has a set of unique characteristics that offer additional insights into the question and also mitigate some of the measurement problems of earlier research.

It is important to note that the potential limitation of this study stems from the use of a cross sectional analysis. Cross sectional analysis only give us portrayed at a particular point of time. The researcher can not examine the dynamic nature of trade-off which is changing over time (Silveira and Slack, 2001). In addition the researcher encourages to think about whether the model of the study effects vary over time, either because other time the constructs are theoretically important or because the theoretical effect

is unstable for some reason.

Next research should be conducted longitudinally to observe the progress of improvement efforts (i.e., by developing ABC Analysis→ Antecedents, Behavioral, Consequences; or MTMM → Multitrait-Multimethod Measurement Model framework or Triangulation Method). Recommendations can be made to implement a set of meaningful factors of Operational Excellence categorized by different classes and sizes of industry; these will be a significant contribution to the literature on operations strategy (Ahmed & Montagno, 1996).

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