Analysis of Total Quality Management on Competitive Performance of Oil and Gas Industry

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Abstract. The article examines the total quality management in oil and gas industries to prove its effect on the competitive performance. The data that used in this research is secondary data by using a questionnaire that was distributed to several oil and gas industry companies. Test result which using classic assumption showed that the questionnaire considered normal does not happen multicollinearity and heteroscedasticity. The data was tested using multiple linear regressions. The data is tested simultaneously and partially. The result of total quality management is proven to have a significant relationship to competitive performance. But partially not all components of total quality management had proven to affect competitive performance. This is because the test only using multiple linear regressions so that the results obtained are less specific.

Keywords: total quality management, competitive performance

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Introduction

The current rapid economic and industrial growth has resulted in increasingly tight global business competition. In the face of global competition every company is required to be able to anticipate the competition that occurs between each company, especially on the quality or quality produced by a company both engaged in manufacturing and services. Oil and gas industries play an important role in the global economy. The International Energy Agency (IEA) predicts that energy demand will increase significantly over the next three decades, with most of the increase coming from developing countries (Inkpen & Moffett, 2011). Indonesia has been active in the oil and gas sector for nearly 130 years after its first oil discovery in North Sumatra in 1885, and continues to be a significant player in the international oil and gas industry. Indonesia has proven oil reserves of 3.6 billion barrels and ranks 20th among world oil producers, accounting for about 1.1% of world oil production (PricewaterhouseCooper, 2014). The oil and gas industry is a broad industry linked to other industries, to facilitate the mapping of end to end business from oil search to oil and gas sales.

There are two types of business activities in oil and gas industry namely core business and supporting business. The core business consists of upstream and downstream activities. While supporting business consists of supporting and supporting industries supporting industries are industrial business activities that produce goods. Materials and related equipment used as direct support in oil and gas business activities supporting industrial activities include material industry. Oil-gas equipment and utilization industries Batam is one of the regions the most popular for foreign investors to instill capital in the oil and gas industry sector due to the Free Trade Zone facility. Its strategic location and easy to reach areas of oil and gas drilling which are mostly found in Sumatra and Riau Islands (Overview: Indonesia's Downstream Oil and Gas Sector, 2014).

In the modern business world, innovation has become the basis for creating sustainable competitiveness and in business planning there needs to be an understanding of innovation and the total quality management process (Phan et al., 2011). The origin of total quality management comes from a collection of Japanese scientists and engineers who dedicate themselves to renewing the life and productivity of Japan post World War II (Powell,

1995). Total quality management is a management philosophy and practice that can help the effectiveness and improvement of organization performance (Munizu, 2013).

There are many factors that affect the competitiveness of the company. One of which is the application of total quality management. Total quality management refers to a unified approach by management in order that all functions and levels of the organization focus on quality and continuous improvement. Over the years total quality management has become very important to improve the company's process capabilities in order to achieve conformity and maintain competitive advantage as well as customer satisfaction (Milosan, 2011). Total quality management is the need to create performance, and companies that do not try to apply models do not achieve excellence (Medinschi & Karnyanszky, 2010)

Competitive advantage is the condition when a company is able to create value beyond the cost incurred by the customer. The value in question if the company can produce a superior product and offer a lower price than its competitors (Porter, 2001). Competitive advantage consists of three things: cost leadership, differentiation strategies and cost focus that concentrate on certain segments in the market. The advantage of competitiveness can be obtained if the company has the ability to present every aspect of the business operations process better in producing goods and services that have high quality with competitive prices. So that the resulting product can compete both in terms of quality, price, product delivery, and flexibility than its competitors in the market (Heizer & Render, 2004).

A culture of openness, employee empowerment, and management commitment are related to total quality management and can be a distinct competitive advantage for the company (Powell, 1995). With this strategy, the goal is to become the lowest cost producer in the industry. Many market segments in the industry are supplied with an emphasis on minimizing costs. If the selling price is achieved at least can be equal or close to market price, then the lowest cost-producer will enjoy the best profit. This strategy is usually associated with large-scale businesses offering standard products with relatively little differentiation received by the majority of customers.

Research shows that with total quality management implementation, manufacturing organizations are more likely to achieve better performance in terms of customer satisfaction,

employee relations, quality and business performance (Hassan et al., 2012). The relationship between quality management practices and competitive performance are two interrelated matters and show that components such as quality management as leadership commitment, process management, and communication and information sharing should be explored to achieve high competitive performance (Phan et al., 2011).

Literature Review

Total Quality Management

According to Deming & Edwards (1982), the first rule that must be run by the company is the business development of quality companies. Deming & Edwards (1982) underscores that poor quality 85% comes from systems and processes at the company, the remaining 15% is human error. Deming & Edwards (1982) has the principle of "14 Deming Points" which requires management to build a commitment to quality and provide systems and invite employees and suppliers to work together in realizing that commitment.

Juran (2004) focuses on the definition of quality and cost of quality. Juran (2004) defines quality as suitability for use rather than just according to specification. Juran (2004) also developed the concept of quality cost, which allows us to measure quality in the form of currency and not just on the basis of subjective evaluation. According to Juran's tone of three quality to be done i.e. quality planning, it is necessary for companies to identify their customers, product requirements, and key business objectives. The second is quality control, emphasizing the routine use of statistical control methods to ensure that quality standards are met and to identify variations of the standard. The third part is quality improvement that must be done continuously and have a breakthrough.

Feigenbaum (1978) created 40 principles of quality. Feigenbaum (1978) takes a total quality system approach by promoting the idea of a work environment in which the development of quality is integrated throughout the organization. Management and employees have total commitment to improve quality, and people learn from each other's success.

Crosby (2001) developed the idea of a defective zero with the slogan "Do it right the first time". This idea involves placing the system in an area that ensures that everything is always done with the right method from the first and forever. Crosby (2001) points out that there will be a lot of quality costs to be incurred by the organization, which includes wasted labor costs, time, rework, and loss of sales opportunities and organizational costs that are difficult to measure if the organization does not take into account the zero opinion of the defect.

Ishikawa (1976) is known for the development of a quality measurement tool called a causal or fishbone diagram. This diagram is used to solve quality problems, find solutions, and lead to the creation of desired results. He also stressed the importance of total company quality control, in addition to focusing on products and services. Ishikawa (1976) believes that everyone in the company needs to be united with vision and purpose. He stressed that quality initiatives should be pursued at every level of the organization and all employees should be involved.

The target of Taguchi (1986) method is to make the product robust to noise, because it is often referred to as robust design. The definition of quality according to Taguchi (1986) is a loss received by the public since the product is shipped. The concept of this method is that the best quality should be designed on the product, achieved with minimum target deviation, the product design must be robust against uncontrollable environmental factors and measurement of quality cost is measured from a certain standard while losses are measured on the whole system.

Total quality management is defined as a continuous improvement concept, involving all employees at every level of the organization, to achieve satisfactory quality in all aspects of the organization through the management process.

Total quality management is an approach to running a business that tries to maximize the competitiveness of an organization through the continuous improvement of its products, services, people, processes, and environment (Tjiptono & Anastasia, 2003). Total quality management method starts from the customer and ends in the customer as well. Total quality management produces the main principles are (1) customer satisfaction; customers determine quality in various aspects of price, security and timeliness. (2) Respect on everyone; employees are the most valuable organizational resources, because they are treated well and given the opportunity to make decisions. (3) Management based on facts; every decision is based on data, not just feelings. (4) Continuous improvement; perform systematic processes by implementing plan-do-

check-act activities. Quality can be measured in addition to the cost calculation, namely through consumer research on customer perceptions of the quality of a product or company (Tjiptono & Anastasia, 2003).

Competitive Advantage

Competitive advantage is that a country obtains competitive advantage if the company is in that country competitive. The competitiveness of a country is determined by the industry's ability to innovate and improve its capabilities. Competitive advantage is characterized by the conditions under which a company is able to deliver sustainable earnings that exceed the industry average. Competitive advantage is said to exist when firms are able to offer products at lower cost or offer products that outweigh the benefits of competing products (Porter, 2001).

Competitive advantage is the heart of corporate performance in the competitive market. Competitive advantage can be defined as the company's ability to create value that is not owned and cannot be imitated by competitors. Measuring the company's competitive advantage by using indicators; price, quality, delivery dependability, product innovation, and time to market. This study will use competitive advantage indicators according to the point of view of Li et al. (2006).

1. Price. Price is a tool that companies can use to compete against competitors by applying low prices. Li et al. (2006) also mentions that companies can fight competitors by setting a cheaper price, or keeping costs low. The advantage of competitiveness can be obtained if each company has the ability to present every process in its business operations better in producing goods and services that have high quality with competitive prices.

2. Quality. Quality is defined as the appropriateness of use and includes product performance, reliability, and durability. According to Deming & Edwards (1982), product quality is the suitability of the product to the needs of the market or consumer. Companies must really understand what the consumer needs for a product to be produced.

3. Delivery Dependability/Delivery on Time. Delivery time can be a source of corporate competitive advantage, when the company is able to reduce delivery time of consumer orders or reduce service delivery time to consumers.

4. Product Innovation. Innovation is a broader concept that addresses the application of new ideas, products, or processes. While Hurley & Hult (1998) defines innovation as a corporate mechanism to adapt in a dynamic environment. Therefore, the company is required to be able to create new thoughts, new ideas and offer innovative products and improved service that satisfy customers (Thompson, 1965 and Hurley & Hult, 1998).

5. Time to Market. Time to market is the time it takes since the product and service is first conceived, until the product and service is ready to be launched into the market (Vesey, 1991). Time to market is an important dimension of competitive advantage (Holweg, 2005). The speed to launch products to the market creates an opportunity for companies to achieve market share, market leadership, and profit. Time to market is the extent to which a company is able to launch new products faster than its competitors (Krüger, 2001 and Vesey, 1991).

Relationship of Total Quality Management to Competitive Advantage

Research shows that with total quality management implementation, manufacturing organizations are more likely to achieve better performance in terms of customer satisfaction, employee relations, quality and business performance (Hassan et al., 2012). The relationship between quality management practices and competitive performance is interconnected and shows that components such as quality management as leadership commitment, process management, and communication and information sharing must be explored to achieve high competitive performance (Phan et al., 2011).

Hypothesis Development

Leadership is the key to a company's performance success. This is stated by the higher intellectual stimulation of a leader then he is able to build innovations that will make the company's performance better (Yasin et al., 2014), In addition to the research Lieberson (1972), Sam (2012) and Munizu (2014) concludes that leadership style has an influence on the company to gain its goals and be a good competitive advantage suggestion. So the hypothesis proposed by the researcher is as follows:

H1: There is a positive influence between leadership towards customers on competitive performance

Companies that have a good marketing strategy, will certainly require good cooperation between human resources of the company so that this will deliver the company on the operational performance in accordance with the vision and mission (Fuentes et al., 2006). So the hypothesis proposed by the researcher is as follows:

H2: There is a positive influence between cooperation on competitive performance

Companies must be able to understand the needs of customers, both internal customers i.e. from the management that is by providing improvisation, suggest cost efficiency on management and provide adequate training and external customers by way of quick service response and communicative (Munizu, 2014). Creation of innovations that meet customer needs in product performance also has an effect on the company's braid to customers (Ernst et al., 2011). So the hypothesis proposed by researcher is as follows:

H3: There is a positive influence between customer focus on competitive performance

The implementation of continuous improvement is related to how management identifies the highest standards of products, services or processes and improves in order to achieve those standards. This is supported by research by Elmuthi & Kathawala (1997) on benchmarking and Savolainen (1999) on how management should actively build and process new ideas to achieve the best standards. So the hypothesis proposed by researcher is as follows:

H4: There is a positive influence between continuous improvements on competitive performance

Management practices use a scientific approach to problem solving. In this practice includes preventive action, the use of statistical process control (SPC), motivation, reward system and so forth (Fuentes et al., 2006). So the hypothesis proposed by the researcher is as follows:

H5: There is a positive influence between process management on competitive performance

Gruman & Saks (2011) and Rodriguez & Shaw (2009) argue that employee engagement and rewards in every aspect will guide the company on what

decisions are successful or unsuccessful and will affect the company's performance. So the hypothesis proposed by the researcher is as follows:

H6: There is a positive influence between employee empowerment on competitive performance

Learning in the organization is important because of the learning, the company can channel the vision, mission and ways so that both things are achieved so that human resources will have the same vision and mission with the company. The method that the company does to achieve the vision and mission is to select, socialize, train and perform the communication process on human resources for the vision and mission of the company channeled (Argote & Ingram, 2000). So the hypothesis proposed by the researcher is as follows:

H7: There is a positive influence between learning on competitive performance

Munizu (2014) and Phan et al. (2011) concluded that total quality management has an important influence on the performance of the company and can be a strategic weapon in the competition between companies. Reed et.al (2000) and Fuentes et al. (2006) concluded that total quality management and the selection of appropriate strategies also support the running of a company's operational performance. It is also supported by Kober et. al. (2012) concluded that total quality management influences against the financial performance of a company. So the hypothesis proposed by the researcher is as follows:

H8: There is a positive influence between total quality management on competitive performance
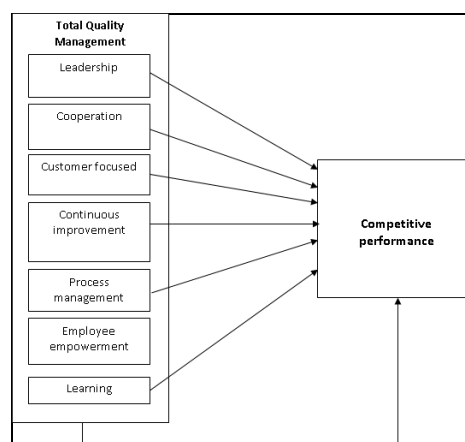

Fig. 1 Research Model

Research Methods

Development and certification of quality assurance systems in accordance with one of ISO 9000 standards can offer a good first step towards total quality management (Gotzamani & Tsiotras, 2001).

Data collection in this research is done by distributing questionnaires to oil and gas companies that have been certified ISO 9000. After the questionnaire is distributed, validity and reliability test is done to know whether the questionnaire can be used as a tool to collect data and the data can be analyzed further or not. Empirically the results show that the whole item of statement is valid and reliable. Furthermore, data processing is done by multiple linear regression method.

Results and Discussion

Descriptive Analysis

The results of questionnaire processing based on department shows 17 marketing departments (16%) and 17 people (16%), secondly 16 respondents (15%) and quality control (16%), on the third rank with 15 planning departments (14%), 14 respondents (13%) and 14 maintenance department (11%) respectively. The result of questionnaire processing based on management level shows that most of them are at middle management level of 78 people (74%) and top management is 27 people (26%). The results of questionnaire processing based on the length of work, on experience less than 5 years as many as 26 people (25%), 5-10 years working experience as many as 69 people (66%) and more than 10 years as many as 10 people (10%). The results of questionnaire processing based on the respondents who support this research are 4 persons (4%) at the level of Diploma 1, Diploma 3 level as many as 47 people (45%) and S1 (54%).

Table 1
Normality

		Unstandardized Residual
N		105
Normal Parameters a,b	Mean	.0000000
	Std. Deviation	5.19180160
Most Extreme Differences	Absolute	.095
	Positive	.095
	Negative	-.049
Kolmogorov-Smirnov Z		.976
Asymp. Sig. (2-tailed)		.296

The value of kolmogorov-smirnov is 0.976 and the significance of 0.296 means that the significant value is > 0.05 so it can be expressed residual normally distributed.

Table 2
Multicollinearities

Variable	Collinearity Statistics	
	Tolerance	VIF
Leadership	.938	1.066
Cooperation	.790	1.266
Customer focused	.774	1.292
Continuous improvement	.640	1.562
Process management	.806	1.241
Employee empowerment	.922	1.085
Learning	.737	1.356

Multicollinearity test results show the tolerance value of the above variable more than 0.1 and VIF < 10, so it can be stated that the variable above there is no multicollinearity in the regression model of this study.

The scatterplot graph shows spots randomly distributed either above or below the number 0 on the Y axis. It can be concluded that there is no heteroscedasticity or homoscedasticity.
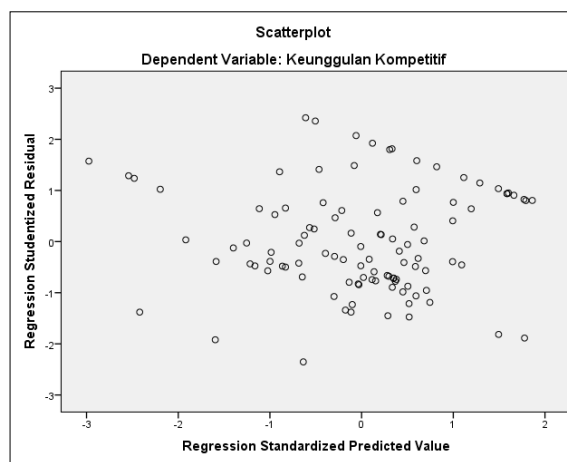

Fig. 2 Heteroscedasticity

Hypothesis Testing

Testing hypothesis 1 (H1) proposed in this research states leadership of 0.547 and significance value (sig.) 0.035 < 0.05 it can be concluded that leadership has a positive and significant impact on competitive performance or hypothesis accepted.

Hypothesis 2 (H2) test proposed in this research stated that cooperation of 0.825 and significance value (sig.) 0.000 < 0.05 it can be concluded that

cooperation has positive and significant influence on competitive performance or hypothesis accepted.

Table 3
Multiple Regression t-test (Partial)

Model	B	Beta	t	Sig.
(Constant)	28.98		3.127	0
Leadership	0.547	0.184	2.118	0.04
Cooperation	0.825	0.378	3.996	0
Customer focused	0.504	0.123	1.288	0.2
Continuous improvement	0.75	0.199	1.889	0.06
Process management	-0.665	-0.28	-2.95	0
Employee empowerment	0.062	0.021	0.24	0.81
Learning	-0.107	-0.03	-0.32	0.75

Testing hypothesis 3 (H3) proposed in this research stated focus on customer equal to 0.504 and significance value (sig.) 0201 > 0.05 hence can be concluded that focus on customer have positive effect but not significant at competitive performance or hypothesis accepted.

Hypothesis 4 (H4) test proposed in this study stated that continuous improvement of 0.750 and significance value (sig.) 0.062 > 0.05 it can be concluded that continuous improvement has positive but not significant impact on competitive performance.

Table 4
Multiple Regression F-test (simultaneously)

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1276.758	7	182.39	6.311	0.000
Residual	2803.3	97	28.9		
Total	4080.057	104			

Testing of hypothesis 5 (H5) proposed in this study stated that the management process of -0.665 more and the significance value (sig.) 0.004 < 0.05 it can be concluded that the process management has a negative effect on competitive performance or hypothesis rejected.

Testing hypothesis 6 (H6) proposed in this research stated employee appreciation equal to 0,062 and value of significance (sig.) 0881 > 0.05 hence can be concluded that employee appreciation have positive effect but not significant at competitive performance or hypothesis accepted

Testing of hypothesis 7 (H7) proposed in this study states that learning is -0.107 and significance value (sig.) 0.747 > 0.05 it can be concluded that learning has a negative effect on competitive performance or hypothesis rejected.

Testing hypothesis 8 (H8) proposed in this study states total quality management is 6.311 with F table

2.11 and significant value 0.000. If the value of F arithmetic > F table and significant value < 0.05 then stated that the total quality management effect on competitive performance or hypothesis accepted.

Conclusion

This study aims to explore the application of total quality management oil and gas industry which has applied total quality management for its excellence and role in improving its competitive performance. The findings of this study indicate that these firms apply total quality management at a high level.

Total quality management has criteria of leadership, cooperation, customer focus, continuous improvement, process management, employee rewards, and learning. The results of research separately (partial) indicate that the criteria of leadership and cooperation, proved to have a positive and significant relationship to competitive performance. While the criteria of customer focus, continuous improvement and staffing have a positive but insignificant relationship. Process and learning management have not been shown to have a significant effect on competitive performance.

This study examines the effect of total quality management on the competitive performance of the oil and gas industry. From this study it can be concluded that total quality management can be used as a parameter of the company's competitive performance when it is done in a related manner. The results of this study can be useful for the company as a reference, especially for the middle level of management engaged in the field of petroleum and gas.

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