

Quality Management System and Environmental Management System:

What is Its Role in Manufacturing Industry

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Abstract—Management standards are internationally recognized and have been widely used by various manufacturing industries in industrial estate, which are environmental management systems and quality management systems. There is guarantee of product quality and existence of environmental performance guarantees in accordance with procedures that must be adhered to so that it can convince various parties related to stressed business professionals. Utilization of two types of standards is expected to increase business competitiveness, especially in manufacturing industry. In addition, quality management systems and environmental management systems are market demand in business competition to provide quality products, safe for consumers, and meet various safety and environmental preservation requirements. The company's efforts to develop management systems through monitoring and measurement, compliance obligations, operational controls, and environmental issues so as to improve environmental performance are an important part of the application of environmental management standards. Continuous improvement, customers focus and relationship management is an effort to increase customer satisfaction so as to improve competitiveness in the manufacturing industry through application of quality management. Commitment from various available resources is needed to be able to implement two management systems consistently. Research was conducted to test the effect of environmental management and quality management systems on corporate identity and its impact on the competitiveness of manufacturing industry. Hypothesis testing to answer this research is done through structural equation modelling. Findings obtained in this study that environmental management system and quality management system have significant effect on corporate identity and have significant impact on competitiveness of manufacturing industry. To strengthen the competitiveness of manufacturing industry by implementing environmental management system and quality management system consistently as a company's effort to have an identity to add value and be accepted by consumers.

Keywords: *environmental management, quality management, industrial manufacturing*

I. INTRODUCTION

Global competition requires high speed, accuracy, creativity and consistency to win business through strengthening optimal competitiveness [1]. Management

system is much influenced by consumer demands so that there is guarantee that products or services that are consumed or used meet the requirements and have standards that have been recognized and proven feasible to be utilized. Manufacturing industry must continue to grow and develop despite being in turbulent and uncertain global economic condition. To address the existing conditions, manufacturing industry is encouraged to participate in implementing management systems that refer to professional corporate governance that is currently developing. There are many management systems that can be adopted by manufacturing industries, two of which are quality management systems and environmental management systems. Quality management system provides procedures, processes, resources needed to ensure the quality of products and services produced by company. Meanwhile, environmental management system utilizes planning, scheduling, implementation and monitoring of all activities to improve environmental performance. Implementation of internationally standardized management system encourages business performance to grow and even be able to compete and win competitions in various business lines.

Emerging economies are countries or regions that are moving from developing to developed status, to a free market system, and toward a knowledge-based economy [2]. Manufacturing can provide organizations with certain competitive power to achieving manufacturing performance in cost, quality and time dimensions [3]. A fourth industrial revolution is occurring in global manufacturing [4]. Manufacturing strategies dimension identify the emergence of new terms for leads to a fine-tuned framework [5]. The key to a company's business includes the customer's desire to repeat transactions and the degree to which strategic partners are motivated to maintain and enhance their collaboration, while being key in preventing strategic customers and partners from migrating to competitors generally leads to higher transaction rates and lower costs [6]. Sustainable manufacturing is used to describe manufacturing practices that do not endanger the environment in manufacturing processes that emphasize the use of processes that do not pollute the environment or harm consumers, employees, or community which include recycling, conservation, waste management, water supply, environmental protection, regulatory compliance, pollution control and various other related problems [7].

In development of industrial estate, participation of local communities as social capital in order to achieve civil society, but development of industrial estate is considered less effective and inefficient because it does not benefit to local community [8]. Strategic direction requirement was added to review by management and try to integrate quality management systems into business [9]. Corporate identity maintain employee competence to carry out goals [10]. In Indonesia nearly 3000 companies are already ISO certified for implementation of quality management system and environmental management system [11]. Various organizations are required to increase awareness of performance achievement, both of quality and environmental standard related products and services, consistent related policy, development of economic policy and other tools that encourage consumer protection, raising awareness of sustainable development. This study aims to determine the application of quality management and environmental management systems to strengthen competitiveness of manufacturing industry in industrial estate through enhancing corporate identity that is in line with current industry needs. Strengthening competitiveness in manufacturing industry is important as an effort to address various business failures and factory closures that have occurred in industrial estates in recent years. Problem limits used in this study only cover the scope of industrial estate with concept of quality management, environmental management, corporate identity and competitiveness as reference in conducting research.

II. LITERATURE REVIEW

Competitiveness is a factor of economic growth that forces innovation and increases productivity [12], necessary for efficient resources' use and population welfare but also for sustainable development in all the regions in a certain country and should be focused on sustainable development [13]. Core competitiveness is collection a set of skills and technology [14], directly proportional to quality, objectivity and clarity of strategies that the certain organization adopts and uses [15]. Today's companies gain their competitive advantage and economic benefits largely from innovation [16]. Competitive advantage is a concept based on economic theories on competitiveness of organizations, emphasizing their particular value in resources that they dispose of, as well as the products and services offered in the market [17]. Competitive strategy is required by every business unit to win competition in uncertain and turbulent business environment especially in manufacturing industry [18].

Companies are imposed to carry out development in all fields through innovation and creativity regarding their methods in order to find out new innovation ideas which distinguish the company from others and give it an efficient competitiveness [16]. When it is applied to the correct issues and people within the business, it could contribute to long-term sustainability, competitiveness and success. As ethical conduct may play an important role in the survival of new entry-level emerging company, in turn, influence their sustainable competitiveness within industry [19].

The organization's most valuable asset is identity. Identity can determine image and perception as strategic resource to

build credibility and support from multiple stakeholders, plays a role to gain competitive advantage in new business environment [20], and has uniqueness and ability to incorporate communication, design, culture, behaviour, structure, industry identity and organizational strategy [21]. The definition of organizational identity is pattern of beliefs, values and emotions formed in specific interaction between society and environment in the context of organizational culture by promoting value of solidarity, loyalty and equality [22], strategic activity that utilizes several signs to introduce company to stakeholders, and behavioural characteristics become key variables in corporate identity [23].

All activities in quality management system having the influence on the quality should be planned, systematic, documented and supervised [24], all elements related to the quality have crucial impact on quality management system [25], respond to increase on global competition and aiming to respond external stakeholder pressures or internal motivations and achieve increased performance [9], companies that already have superior performance are inclined to adopt quality management models, need to legitimize or to obtain recognition, favourable organizational environment, or having resources to apply in the necessary investments to finance [26].

Quality management system contains organization structure, competence division and responsibility, procedures, processes and resources [27], set of guiding principles and management style to improve competitiveness and organizational performance, plays an important role in productivity and performance of organization and the dimensions included leadership, strategic planning, customer focus, and employee relation [28]. Continual improvement is important principle of total quality management and requires management support [29]. ISO 9001 has clear benefits on organizational, operational, people and customer results [30], linked to organization and main motivations to implement the standard are internal, more benefits are achieved than when they are external [31], very different ways depending on organizations, which might explain the heterogeneous performance of these standardized systems [32].

The issue of environmental management is very intense study related to increasing cases of pollution and environmental damage due to rapid industrialization era [33]. Environmental management system can be driver of environmental compliance in the business world [11]. International standard ISO 14000 is one of mode to guarantee the performance of environmental management system, and while advantages include reduction in use of material resources, reduction in energy, reduction in waste materials, reduction in complaints and follow-up, avoiding fines and penalties, and avoiding person's liability [34]. The reason for implementing environmental management system is to improve corporate image, increase employee participation, reduce environmental pollution, and increase market share and consumer demand [35].

III. METHODS

Type of research used is descriptive and verification. Descriptive research aims to obtain an overview of factors that

become antecedents of tested research models, quality management, environmental management, corporate identity, and competitiveness. Descriptive research aims to analyse data by describing or describing the collected data as it is without intending to make conclusions that apply to generalizations [36]. Verification research is intended to examine influence of five variables. Verification research is intended to test theory and try to produce scientific method that is hypothesis in the form of conclusion so that hypothesis can be accepted or rejected. Verification research tests hypotheses using statistical calculations. The observation process using time horizon that is cross section means that data obtained is through the results of research conducted at certain time, October - December 2018.

Method used in this study is descriptive survey to systematically and accurately describe facts of each research variable and use explanatory survey method to perform hypothesis testing procedures to answer the problem formulation and research objectives. Type of inquiry in this study is causality that shows the direction of relationship between variables based on construction of the research model. Unit of analysis was carried out on manufacturing industries in Indonesian industrial estate which was represented by 400 industrial workers engaged in four industrial estates in Bekasi and Karawang districts consisting of MM2100 industrial estate, Jababeka industrial estate, east Jakarta industrial park and Karawang international industrial city. Design of analysis used to test hypothesis and find out influence between research variables using analysis method of structural equation modelling using Lisrel 8.8. The method used in this study is descriptive survey method to systematically and accurately describe facts of each research variable and use explanatory survey method to perform hypothesis testing procedures to answer research objectives. This study implemented of research data collection uses survey method.

IV. RESULTS AND DISCUSSION

Table I shows profile of respondents for industrial workers, the result reveals that 77.75% of industrial workers have over than 5 years of existence. The implication of this characteristic is majority of respondent in industrial manufacture have good experience working in industrial manufactures. Based on location, Bekasi have majority respondent that 92.75% respondent in this research survey most of them working in this area and Jababeka is the biggest of manufactures number. Regard to core business manufacture, 59% manufactures was doing business in automotive fields.

TABLE I. RESPONDENTS CHARACTERISTIC

Profile	Characteristic	No. Respondent	%
Working experience	<5 years	89	22.25
	5-10 years	187	46.75
Location	>10 years	124	31.00
	Jababeka (Bekasi)	213	53.25
	MM2100 (Bekasi)	109	27.25
	KIIC (Karawang)	29	7.25
	EJIP (Bekasi)	49	12.25
Core Business	Automotive	236	59.00
	Electronic	111	27.75
	Food & beverage	36	9.00
	Pharmaceutical	17	4.25

To calculate reliability in calculation of structural equation modelling used construct reliability (CR) and variance extracted (VE). Table 2 presents the results of construct reliability and variance extracted calculations to see reliability of variables used in this study. The calculation results can be seen that values of VE for quality management variables is 0.537 indicating that 53.7% of information contained in three indicators can be reflected through quality management variables. Then CR value is 0.774 greater than 0.7 indicates that all three indicators have consistency in measuring latent quality management variables. So is the case for environmental management variables with VE value is 0.559 indicating that 55.9% of information contained in four indicators is reflected through latent variable of environmental management. Then CR value is 0.833 is greater than 0.7 indicating that four indicators have consistency in measuring latent variable of environmental management.

Variance extracted value for corporate identity variable is 0.732 indicating that 73.2% of information contained in both indicators can be reflected through latent variable of corporate identity. While CR value is 0.843 and greater than 0.7 indicating that both indicators have consistency in measuring latent variable of corporate identity. VE value for competitiveness variable is 0.510 indicating that 51.0% of information contained in four indicators can be reflected through latent variable competitiveness. CR value is 0.804 greater than 0.7 indicating that four indicators have consistency in measuring latent variable competitiveness.

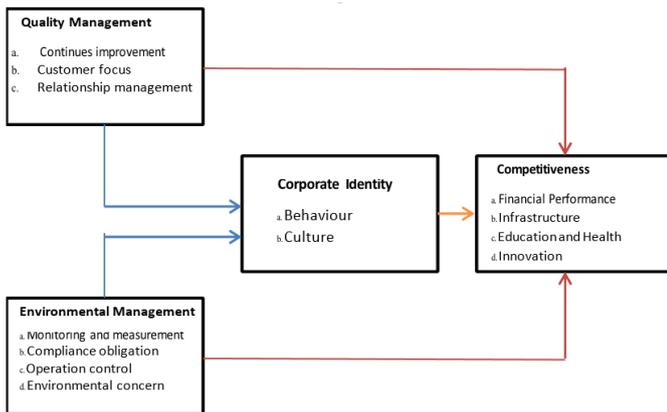


Fig. 1. Research paradigm.

- H1 = Quality management and environmental management have significant effect on corporate identity.
- H2 = Quality management and environmental management have significant effect on competitiveness.
- H3 = Corporate identity has significant effect on competitiveness.

TABLE II. MEASUREMENTS CONSTRUCT RELIABILITY AND VARIANCE EXTRACTED

Var	Dimension	I	t-value	E	CR	VE	Remark
QM	Continues improvement	0.82	17.85	0.32	0.975	0.614	Valid & reliable
	Customer focus	0.78	16.81	0.39			
	Relationship management	0.75	15.95	0.44			
EM	Monitoring & measurement	0.90	22.21	0.20	0.950	0.607	Valid & reliable
	Compliance obligation	0.87	21.07	0.25			
	Operation control	0.86	20.86	0.26			
	Environment concern	0.35	6.97	0.88			
CI	Behavior	0.86	0.00	0.26	0.975	0.674	Valid & reliable
	Culture	0.78	9.24	0.40			
C	Finance & performance	0.43	0.00	0.81	0.958	0.512	Valid & reliable
	Insfrastructure	0.68	7.00	0.54			
	Education & health	0.64	6.88	0.59			
	Innovation	0.66	6.98	0.56			

Based on the calculation of fit model with several fit criteria then obtained some criteria that have been measured. There are two indexes that do not meet requirements of fit model that are chi-square value and significance probability. For other nine indexes already have good index criteria. When referring to value of RMSEA then it meets criteria fit and so do other criteria. The conclusion of this test stated that research model can be accepted with chi-square value less than chi-square table and for significance probability value is expected to be greater than 0.05.

This study used 400 samples so that unevenness of chi-square value and significance probability are still considered valid because criteria test the other of nine indexes have met condition of fit model.

TABLE III. RESULT OF FIT MODEL

GOF Index	Cut of Value	Result	Remark
GFI	≥0.90	0.95	Good fit
RMSEA	≤0.08	0.058	Good fit
NFI	0.90	0.95	Good fit
NNFI	0.90	0.96	Good fit
CFI	0.90	0.97	Good fit
RFI	0.90	0.93	Good fit
AGFI	0-1	0.92	Good fit
PNFI	0-1	0.72	Marginal

Goodness of fit test is used to measure the accuracy of sample regression function in estimating the actual value. Result of measurement model shown manifest or indicator variables in measuring the latent variables can be shown in Table 4. Furthermore, t-value > 1.96 ($\alpha = 0.05 / 0.10$) for all indicators or variables shows significant value in measuring latent variables of study. Value factor loading manifest variables in this study can be good indicator in forming latent

variables with indicator environmental concerns has highest loading value to measure environmental management. While for culture is highest loading value to measure corporate identity. Models that meet goodness of fit measures described above are good models for data. In principle, more and more size criteria are met by model so that it can be known that model is suitable for data or samples obtained. Because in principle SEM test a theory that is modelled on the sample data owned, it requires precision and caution in determining conclusions on the model obtained under criteria of goodness of fit. SEM used in research data analysis because it is able to test complex data simultaneously [37].

Root mean square error of approximation model on calculation has value of 0.058 indicating that model belongs to fit category and is quite reasonable. A model is said to be fit if it has NFI (Normed Fit Index) and NNFI (Non-normed Fit Index) values greater than 0.9. The resulting model in this case shows that NFI value of 0.95 is included in fit category. While NNFI value of 0.96 is used to overcome the problem of model complexity in NFI calculation, so it can be seen that model is fit and quite reasonable. When viewed from other goodness of fit criteria such as GFI, CFI, RFI, AGFI and PNFI can be concluded good criterion if have value >0.90 and GFI value of 0.95, CFI value of 0.97 and RFI value of 0.93 so it can be concluded that model has fit model. As for value of AGFI is 0.92 so it can be concluded that model has fit model and PNFI of 0.72 has value between 0.70 - 0.90 so it can be concluded that the model includes category of marginal fit.

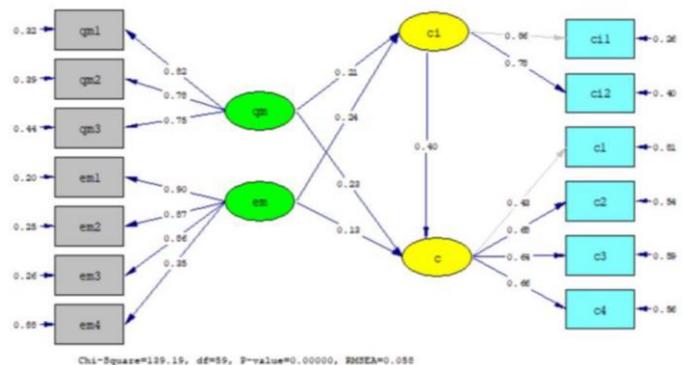


Fig. 2. Standardized solution in SEM.

In Figure 2 shows results of structural model test to measure the level of influence quality management, environmental management, corporate identity, and competitiveness in order to increase business of manufacturing industry at industrial estate. Standardized solution is presented indicates the influence value between variables tested. Value of the influence of quality management on corporate identity is $\gamma_{11} = 0.21$, this means that implementation of quality management by manufacturing industry affects corporate identity by 21%, while 79% is influenced by other factors. Value of environmental management influence on corporate identity is $\gamma_{21} = 0.24$, this means that application of environmental management affects corporate identity by 24%, while 76% is influenced by other factors. Value of quality management influence on competitiveness is $\gamma_{12} = 0.23$, this

means that implementation of quality management affects competitiveness by 23%, while 77% is influenced by other factors. Value of environmental management influence on competitiveness is $\gamma_{22} = 0.13$, this means that application of environmental management affects competitiveness by 13%, while 87% is influenced by other factors. Value of corporate identity on competitiveness of $\beta_{21} = 0.40$, this means that implementation of corporate identity affects competitiveness by 40%, while 60% is influenced by other factors.

TABLE IV. RESULT OF HYPOTHESES

Hypotheses	Standardize Solution	Significance	Conclusion
H ₁			
QM → CI	0.21	3.43	Accepted
EM → CI	0.24	4.05	Accepted
H ₂			
QM → C	0.23	3.44	Accepted
EM → C	0.13	2.17	Accepted
H ₃			
CI → C	0.40	4.76	Accepted

Exposure to results of three hypotheses is based on four tested variables, namely quality management, environmental management, corporate identity, and competitiveness shown in table 4, which states that all hypotheses are acceptable and feasible to use for this study, this is based on the results of all significance values > 1.96 . Quality management and environmental management have significant effect on corporate identity. Continuous improvement and monitoring & measurement are the most important indicators in strengthening corporate identity in development of manufacturing industries in industrial estate. Quality management and environmental management have significant effect on competitiveness. To improve competitiveness of manufacturing industry in industrial estate, it needs full support from continuous improvement and monitoring & measurement as part of the indicators of quality management and environmental management. Corporate identity has significant influence on competitiveness. Behaviour is one of important indicators of corporate identity to strengthen competitiveness of manufacturing industry in industrial estate so that business continuity in manufacturing industry is still running as it should even the business carried out can grow rapidly despite uncertain global conditions.

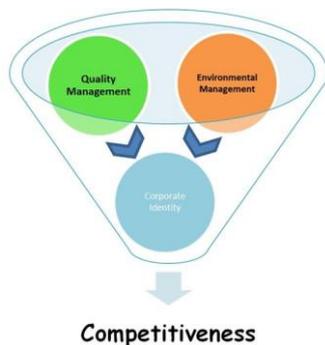


Fig. 3. Competitiveness models in industrial estate.

Continues improvement and customer focus are two important indicators that support quality management system that should be implemented by manufacturing industry in industrial estate in developing the business. Monitoring, measurement and compliance obligation are part of indicators that contribute significantly in developing environmental management system so that environmental governance in manufacturing industry is able to be standardized in accordance with the demands of global needs, especially those that can be applied in industrial estate. Behaviour and culture should be applied as appropriate in accordance with prevailing ethics and rules so as to be able to support overall business activities to show identity that is owned for manufacturing industry because this is important part of corporate identity implementation. Infrastructure and innovation can be used as special attraction for industrial estates because both of these indicators can strengthen competitiveness so that manufacturing industries operating within them can compete and even grow so that business performance can take place as expected even in unstable economic conditions.

This study produces novelty called competitiveness models in industrial estate. This novelty is expected to be reference for improving business performance for manufacturing industry, especially for companies that do business activities in industrial estate. Competitiveness for manufacturing industry will produce optimal work performance if it is able to create corporate identity through development of behaviour and culture. In addition, quality management and environmental management applied by manufacturing industry in running business well are expected to strengthen competitiveness, especially in facing the demands of quality for products produced and demands of consumers who always change over the times. The resulting novel is expected to be applied by companies in other industrial estates or outside industrial estate where the company is manufacturing industry.

V. CONCLUSION

Based on result of quantitatively concluded that improvement of quality management and environmental management system impacted on strengthening corporate identity. Environmental management has greater effect than quality management on corporate identity. It can be identified where corporate identity is more influenced by environmental management when compared to quality management. Improved quality management and environmental management towards strengthening of competitiveness faced by industrial manufacturing, where competitiveness is more dominantly influenced by environmental management than quality management. Increased corporate identity in industrial manufacturing will affect to increased competitiveness in culture dimension that have more dominant of the influence value when compared with behaviour. Improving quality management and environmental management can provide improved for competitiveness due to strengthening of corporate identity, especially in industrial manufacturing in general sector, and environmental management is more dominant have influence either directly or indirectly through corporate identity in influencing competitiveness.

The benefits of implementing quality management include ensuring customer satisfaction through continuous improvement and risk management control to improve the competitiveness of company. Target management can be arranged alone and not limited in the system with hope that corporate goals can be achieved. Successful implementation of both systems relies heavily on the commitment of all levels employees. The competitiveness of industry needs to increase in view of the implementation for economics community [38]. Environmental policies generally reflect local natural conditions, scale of activities, and environmental impacts resulting from company's production activities that include two commitments, namely commitment to continuous improvement and pollution prevention. Corporate management was hoped to review of quality management and environmental management system to ensure sustainability of suitability, adequacy and effectiveness. Management review aims to change conditions it considers necessary to change policies, objectives, and other elements of quality management and environmental management, based on results of management system audit, changing conditions, and commitment to continuous improvement.

Identity of organization can serve as dynamic capability that can affect company's resources and as source of competitive advantage [39]. Brand identity is mostly affected by the image and least by the recognition [40]. Competition as an effort in development of corporate identity is absolutely done through increase of companies to actively engage in social activities, improvement of internal corporate capabilities and compliance in corporate management [41]. Corporate identity developed and promoted identity to ensure establishment of good reputation in order to remain competitive in global market [42].

This study suggests to industrial manufacturing at industrial estate in order to develop of quality management and environmental management standard through improved capabilities and strengthening of commitment to implement both of standard for all stakeholders. Capabilities and commitment is needed for implemented management standard to achieve good manufacturing performance. Finally, main objective of industrial manufacturing is sustainable of business. This finding integrates insights in management standard framework into generalization to increase competitiveness in industrial manufacturing.

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