

Corporate Sustainability Improvement Strategy in Manufacturing Industry with The Use of Controls in Environmental Pollution, Quality, and Occupational Health and Safety

Erwin^{1*}, Husen Asbanu¹

¹*Department of Mechanical Engineering, Faculty of Engineering, Darma Persada University, Jakarta, 13450, Indonesia*

*Corresponding author e-mail: erwin.dosen@gmail.com

Abstract

Although industries had taken measures to control environmental pollution, quality, and occupational health and safety, they did not receive comparable benefit, particularly in terms of corporate sustainability. The objective of this study is to examine the impacts of environmental pollution control, quality control, and occupational health and safety control on corporate sustainability through a comprehensive review on past conceptual and empirical researches. As environmental pollution control is the outcome of environmental management system that reduces waste and consumption of water and energy and increases the amount of recycled waste, quality control as the result of quality management systems enhances manufacturing process, product and service quality, customer loyalty, sales and profits, and continuous improvements, while occupational health and safety control improves employees' competence, health, and safety at work as well as customer's wellbeing for better competitiveness. The control over the three aforementioned aspects enhances corporate sustainability. The result of this study is a conceptual model for environmental pollution, quality, and occupational health and safety controls that support sustainability in manufacturing industry.

Keywords

Environment, Quality, Occupational Health and Safety, Sustainability

Received: , Accepted:

<https://doi.org/10.26554/ijems.2018...100-106>

1. INTRODUCTION

Management systems in environment, quality, safety, and health can improve organizational performance and increase the level of the management system to support organizational performance. However, inconsistencies in its application may still occur in the long run. The application of the said system does not provide equal benefit for the organizations and does not guarantee productivity from their business process (Inan et al., 2017; Hamidi et al., 2012; Gianni and Gotzamani, 2015; Santos et al., 2011). Gianni et al. (2017) indicated that environmental, quality, safety, and health management system supports corporate sustainability performance and that the system depends on the availability of resources and the level of its application. Lean-Integrated Management System is believed to be a tool for continuous improvement leading to corporate sustainability (Souza and Alves, 2018). According to Paraschivescu (2016), the system is a new dimension based on social responsibility, professional performance, and sustainable development applied in organizations. Gianni et al. (2017) emphasized that

organizations implement multiple integrated management systems to achieve business goals and to meet the expectations and the needs of stakeholders, in addition to their effort of conforming with corporate sustainability principles.

Integrated environmental, quality, safety, and health management systems positively impact organizational performance (Muhamad Khair et al., 2018). The model of this system provides added value for the achievement of organizational performance (Rebelo et al., 2016). Past studies explained that corporate sustainability performance is gained following the implementation of integrated environmental, quality, safety, and health management system, which increases the company's ability to implement other management systems to satisfy the expectations and the needs of stakeholders. This research attempts to measure corporate sustainability achieved through the fulfilment of ISO requirements related to corporate sustainability program.

Gaps between past researches can be filled by observing the implementation of Lean management, since it supports

corporate sustainability performance and enhances control over environmental pollution, quality, and safety and health. The said controls are inseparable from corporate sustainability program, so a more in-depth study to examine the relationship between them and corporate sustainability is crucial as previous conceptual literatures and empirical studies above are prominent for their differences in views and results.

2. LITERATURE REVIEW

2.1 Environmental Pollution Control

Environmental pollution control by organizations or companies reflects their environmental management system, since it covers energy and water consumption efficiency, waste reduction, and increased recycling (Maletić et al., 2016; Epstein and Roy, 2001; Maletic et al., 2015a; Rusko et al., 2014).

2.1.1 Energy Efficiency

Energy-saving programs provide effectiveness in achieving organizational performance. Therefore, process approach in environmental management needs to be improved continuously (Rebelo et al., 2016). In order to achieve ecological performance, reducing energy consumption is necessary for lower environmental impact and better environmental management system. Souza and Alves (2018) explained that effective implementation Lean-Integrated Management System contributes to corporate sustainability performance through the application of fourteen structured steps, from environmental consideration to efficient energy consumption.

2.1.2 Clean Water Usage Efficiency

Concerning actions related to environmental management system, sustainability performance is implemented through a 5-step process consisting of setting priorities, identifying cause-and-effect correlation, developing appropriate measures, collecting and analyzing data, and reviewing framework. Therefore, corporate sustainability performance can be achieved through, one of which, waste water disposal control (Epstein and Roy, 2001). Corroborated by Rebelo et al. (2016), process approach helps the achievement of organizational performance. Therefore, several proposals to increase the ability of work environment to reduce water consumption need to be made. Environmental performance for better corporate sustainability results in water consumption efficiency along industrial operations through a series of performance measurement mechanisms (Maletic et al., 2015a). Souza and Alves (2018) explained that Lean-Integrated Management System contributes to corporate sustainability performance through fourteen structured steps, one of which is related to environmental aspects, particularly control over recycled water volume.

2.1.3 Hazardous and Toxic Waste Management

The implementation of integrated management system is influenced by customer's expectation related to environmental issues that determine the success of the development of the integrated environmental, quality, and occupational health and safety management system. The strong commitment of leaders encourages employees to communicate with suppliers for cooperation aimed at reducing waste and pollution (Tari and Molina-Azorín, 2010). Organizations' performance in applying process approach determines their effectiveness in achieving organizational performance. Therefore, proposals to improve work environment for better management of waste, including the hazardous one, need to be made (Rebelo et al., 2016).

2.1.4 Waste Recycling Management

Since performance in process approach provides effectiveness in achieving organizational performance, suggestions to improve work environment for better recycling need to be proposed (Rebelo et al., 2016). Environmental management system aims to strengthen environmental achievement, meet the wishes and expectations of stakeholders, and comply with environmental regulations and policies. Environmental performance results in raw material consumption efficiency, more recycled materials, and less waste (Maletic et al., 2015a). Souza and Alves (2018) explained that Lean-Integrated Management System contributes to corporate sustainability performance through fourteen structured steps; one of which is control over environmental aspects through reduction of recycled waste water. Past studies have found that the increase in recycled waste to reduce environmental impacts and the increase in the usage of recyclable materials contribute to higher ecological performance.

2.2 Quality Performance Control

Quality control is the outcome of quality management system; it includes improving product and service quality, maintaining customer loyalty, increasing sales and profits, and ensuring continuous improvement (Simon et al., 2012b; Maletic et al., 2015b; Tari and Molina-Azorín, 2010; Luk et al., 2005; Rebelo et al., 2016).

2.2.1 Process Quality Improvement

There are several aspects of organizational performance measurement that need further analysis; they are customer (e.g. low reject rate of products, delivery timeliness, and customer satisfaction), employees (e.g. morality, quantity, and quality; continuous improvement on which may solve environmental problems), community (e.g., consumption of raw material, emissions, hazardous waste, community development). The keys to success here are the achievement of financial performance, productivity, quality costs and product quality (Tari and Molina-Azorín, 2010). Paraschivescu (2016) stated that integrated management system contributes to planning, control, monitoring, and measurement phases. It also increases

corrective or preventive actions, continuous improvement, and facilitates adaptation to market needs, customer demand, new trends, and so on. Lean-Integrated Management System is a tool for continuous improvement with effective contribution to company sustainability (Souza and Alves, 2018).

2.2.2 Product Quality Control

Process approach provides effectiveness in achieving organizational performance. Therefore, several proposals to improve working environment for minimum accidents, enhance product suitability, promote efficient use of energy and water, increase the use of recyclable materials, upgrade waste management system, including the disposal of hazardous waste, need to be made (Rebelo et al., 2016). Several researchers explained that product and service quality is a part of the organization's efforts to achieve a certain degree of conformity to stakeholders' requirements (Tarí and Molina-Azorín, 2010; Rusko et al., 2014; Muhamad Khair et al., 2018; Simon et al., 2012b; Rebelo et al., 2016).

2.2.3 Customer Focus

According to Simon et al. (2012a), internal aspect is the most influential factor for innovation. Hence, managers need to ensure that organization's and employees shared objectives are in line with the application of integrated environmental, quality, safety, and health management system. The management of internal aspects within the organization will create employee awareness to improve product and service quality and maintain customer loyalty to achieve customer satisfaction. There are several aspects of organizational performance measurement that need further analysis; they are customer (e.g. delivery timeliness, customer satisfaction, and low reject rate of products), employees (e.g. morality, quantity, and quality; continuous improvement on which may solve environmental problems), community (e.g., hazardous waste, consumption of raw material, community development, and emissions). The factors for success here are the achievement of financial performance, productivity, quality costs and product quality (Tarí and Molina-Azorín, 2010). Luk et al. (2005) explained that the positive impact of interaction with stakeholders, which is considered as an approach, is essential for corporate sustainability through a combination of orientations, i.e. to customers, competitors, and employees.

2.2.4 Profit Improvement

Karapetrovic and Jonker (2003) explained that integrated management system is a set of processes involving various resources, such as human resources, information, materials, infrastructure, and finance, to achieve objectives related to compliance with stakeholders' requirements. There are several aspects of organizational performance measurement that need further analysis; they are customer (e.g. delivery timeliness, customer satisfaction, and low reject rate of

products), employees (e.g. morality, quantity, and quality; continuous improvement on which may solve environmental problems), community (e.g., hazardous waste, consumption of raw material, community development, and emissions). The factors for success here are the achievement of financial performance, productivity, quality costs and product quality (Tarí and Molina-Azorín, 2010).

2.3 Occupational Health and Safety Control

A study by Luk et al. (2005) found that the positive impact of interaction with stakeholders, which is considered as an approach, is essential for corporate sustainability through a combination of orientations, i.e. to customers, competitors, and employees. Those components are involved in business practices and inseparable. Negligence on even one of them decreases business performance. If those three components are applied together, the company's financial, market, and social performance will increase. There are several aspects of organizational performance measurement that need further analysis; they are customer (e.g. delivery timeliness, customer satisfaction, and low reject rate of products), employees (e.g. morality, quantity, and quality; continuous improvement on which may solve environmental problems), community (e.g., hazardous waste, consumption of raw material, community development, and emissions). The factors for success here are the achievement of financial performance, productivity, quality costs and product quality (Tarí and Molina-Azorín, 2010). According to Paraschivescu (2016), integrated management system is based on social responsibility, professional performance, and sustainable development applied in organizations.

Souza and Alves (2018) explained that Lean-Integrated Management System can contribute to achieving corporate sustainability performance through 14 structured steps. The implementation of integrated management system ensures effective social activities such as human rights training and anti-corruption policy, environmental impact, sustainable monitoring, development, and employee participation in social events. The other impacts of Lean-Integrated Management System are public assessment result concerning social and ecological performance, empowerment of surrounding communities, occupational health and safety committees, public complaints and non-compliance with regulations, accident rates, adequacy of occupational health and safety training, corporate sustainability performance, identification of opportunities for improvement, mapping of future conditions, continuous improvement for the future, improvement steering committee, and process improvement seeking for perfection. Control of safety and health is a measurable result of the implementation of occupational health and safety management system, which includes improving aspects of safety and health, advancing employee training, increasing employee satisfaction, and enhancing customer wellbeing which enriches the company's image (Paraschivescu, 2016; Maletic et al., 2015b; Rebelo et al., 2016; Luk et al., 2005;

Tarí and Molina-Azorín, 2010; Souza and Alves, 2018)

2.3.1 Occupational Health and Safety Risk Reduction

Based on Inan et al. (2017) research, organizations must implement the safety and health management system to compete locally and globally. Their research provides a benchmark in decision-making techniques used to measure the performance of safety and health management system. Based on their findings, the most important attribute in safety and health management system implementation is the arrangement phase, having the urgency of 29%. The organization identifies potential hazards and risks, identifies relevant regulations, sets their objective targets, and identifies management programs to achieve organizational performance. The second prominent attribute is reviews on implementation and management, having the urgency of 23%. Organizations need to consider sustainability improvement in communication, consultation, participation, awareness, training, roles and responsibilities, adequate resources, documentation, emergency response plans, and operational control. The implementation of the management system needs to be reviewed periodically by the organization's middle-to-higher management. Occupational health and safety performance will support the organization's social programs (Maletic et al., 2015a). The effectiveness of achieving organizational performance is supported by implementing an integrated management system through the Plan-Do-Check-Action (PDCA) process approach, which can minimize the risk of work accidents and health problems that needs to be improved (Rebelo et al., 2016).

2.3.2 Productivity Enhancement

Several aspects of organizational performance measurement need further analysis, such as employees (e.g., employee morale, quantity, and quality of continuous improvement to solve environmental problems) (Tarí and Molina-Azorín, 2010). Confirmed by Hamidi et al. (2012), integrated management system reduces accident rates, while personnel attitudes and job satisfaction is determined by work safety programs. In addition, integrated management system reduces time losses due to work accidents and occupational diseases and reduces exposure to emissions that pollute the environment, while employee satisfaction through the fulfillment of employee's need for occupational health and safety will support social implementation (Maletic et al., 2015a).

2.3.3 Employee Competence Improvement

Based on Inan et al. (2017), organizations are required to implement safety and health management systems to compete locally and globally. Their research provides a benchmark in decision-making techniques used to measure the performance of safety and health management system. Based on their findings, the second most important attribute in safety and health management system implementation,

with the urgency of 23%. Meanwhile, organizations need to consider actions to improve sustainability in terms of roles and responsibilities, adequate resources, communication, consultation, participation, awareness, training, documentation, emergency response plans, and operational control; these also need to be reviewed periodically by the organization's middle-to-upper management. Souza and Alves (2018) explained that Lean-Integrated Management System contributes to achievement of corporate sustainability performance through 14 structured steps; they include employee development and participation in social activities, public assessments of social and environmental impacts, community empowerment for the environment, occupational health and safety, public complaints, non-compliance with regulations, accident rates, and adequacy in occupational health and safety training.

2.3.4 Company Competitiveness Strengthening

Companies that prioritize customers have better social performance because people believe that they care about their customer's wellbeing. Their total commitment in this respect determines their reputation (Luk et al., 2005). Here environmental management system is a framework that can improve organizational performance through process efficiency, cost savings, and positive image; they eventually contribute to the organization's financial performance, which is also supported by a positive correlation between environmental and financial achievements (Maletic et al., 2015a).

2.4 Corporate Sustainability

Corporate sustainability performance is fundamental for organizations in their effort of fulfilling the needs and expectations of their stakeholders. Several empirical studies that are relevant to corporate sustainability state that further research is needed to develop a model for measuring organizational performance that is proxied by integrated management system implementation level (Inan et al., 2017). According to Rebelo et al. (2014), the consequent studies should assess the implementation of integrated environmental, quality, safety, and health management systems aimed at fulfilling the expectations and needs of stakeholders. Meanwhile, Hamidi et al. (2012) suggested future research to analyze cases of integrated environmental, quality, safety, and health management systems implementation for organizational performance in various industries.

Several researchers who conducted theoretical studies on corporate sustainability proposed that future research should further examine the relationship between the effectiveness of integrated management system implementation and corporate sustainability performance through empirical research (Gianni et al., 2017). Lean-Integrated Management System can provide an assessment framework for the achievement of corporate sustainability performance (Souza and Alves, 2018). Rusko et al. (2014) concluded

that there is a positive relationship between the implementation of integrated environmental, quality, safety, and health management systems and improved organizational performance in meeting customer's or stakeholder's expectation through integrated performance audits and management reviews, product quality improvement, and reduction of environmental impact to support the company's economic growth, create competitiveness, and gain financial benefits. There is a positive correlation between the implementation of integrated environmental, quality, safety, and health management system and the Responsible Care program in the improvements of organizational objectives in terms of product quality, negative environmental impacts, and safety and health risks to increase organizational performance in meeting the expectation and the need of customers, as investigated by [Muhamad Khair et al. \(2018\)](#). [Sampaio et al. \(2012\)](#) found the positive effect of integrated environmental, quality, safety, and health management system implementation on corporate sustainability performance through Lean-Integrated Management System, which is conducted using tangible steps, that supports corporate sustainability.

3. RESEARCH METHOD

To meet the research objectives, a comprehensive review of the results of past conceptual and empirical research was conducted to reveal the influence of environmental pollution control, quality control, occupational health, and safety control on corporate sustainability. The initial step was searching for articles and journals related to corporate sustainability issues and the implementation of environmental pollution control, quality control, occupational health, and safety control. The following are the systematic stages of the article and book review ([Ferdinand, 2014](#)).

1. Searching for articles and appropriate variables using the keywords of environmental pollution control, quality control, occupational health and safety control, corporate sustainability
2. Conducting discussions related to the substance of the research
3. Looking for arguments for and against regarding the substance used for later discussion
4. Developing a research conceptual model

The steps above were carried out systematically. The references were compiled from various sources of scientific databases, e.g. Elsevier, Google Scholar, Emerald, Springer and Sage Publications, Scopus, ProQuest, based on the keywords set by the researcher. Then, in-depth discussions were held, whose results is in the form of a model. The concept was developed through empirical research, especially on environmental pollution control, quality control, safety, health control, and corporate sustainability.

4. RESULTS AND DISCUSSION

Based on the studies of [Simon et al. \(2012a\)](#), [Maletic et al. \(2015a\)](#), [Tari and Molina-Azorin \(2010\)](#), [Luk et al. \(2005\)](#), and [Rebelo et al. \(2016\)](#), integrated environmental, quality, safety, and health management system can increase customer satisfaction through internal aspects such as supporting innovation and increasing employee awareness for product and service quality improvements. Further, continuous improvements in customer satisfaction and productivity will increase sales, profits, and financial performance, and quality improvement provides added value for sustainability performance. [Rusko et al. \(2014\)](#) concluded that there is a positive correlation between environmental pollution control, quality control, occupational health, and safety control and corporate sustainability improvement in terms of meeting customer's or stakeholder's requirements through integrated performance audits and management reviews, improved product quality, reduced environmental impact, support to company's economic growth, creation of competitiveness, and generation of financial benefits.

It has been verified by [Santos et al. \(2011\)](#) that TQM can provide its potential in the implementation of a safety control system in the lack of exemplary safety management implementation, namely the risk assessment process, responsibility, and training. The relationship has shown that with the primary safety management system's approach, the likelihood of adopting a safety management system is noticeably higher when a company operates in a TQM environment. Value in quality management means companies to stand vigilant and focused in identifying, removing, minimizing, and managing causes that interfere with and compromise expected accomplishment. Based on [Maletic et al. \(2015a\)](#), [Rebelo et al. \(2016\)](#), and [Luk et al. \(2005\)](#), the implementation of safety and health management system contributes to higher levels of employee safety, health, and satisfaction, employee training, and corporate image as a part social performance achievement for corporate sustainability.

A study conducted by [Rebelo et al. \(2014\)](#) concluded that integrated management reviews ensure that all requirements for the integrated management system are appropriate, effective, and efficient for continuous improvement. Organizations must permanently consider the ongoing pressures of global business requirements related to stakeholder requirements and management system standards. Continued enhancement of international organizational achievement must have a sustainable goal approach. The model developed from integrated environmental, quality, safety, and health management system within the organization must prioritize each stage, from planning, implementation, inspection, to action ([Rebelo et al., 2014](#)). Implementing an environmental management system is part of the framework for improving environmental and financial performance ([Maletic et al., 2015a](#)). Changes in the management process approach to implementing quality management system standards require

a method in conducting an assessment, especially on the implementation of audits by auditors through a new direction. Through the performance of an environmental management system, organizations can support the company's economic growth, create competitiveness, financial benefits, and decrease the negative effect of organizational activities on the environment. The ISO 14001 for environmental management system provides positive elements in implementing an effective environmental management system to achieve organizational goals in improving environmental and economic performance. This standard can be integrated with other measures to support environmental protection, preventing ecological pollution with socio-economic needs. These integrated requirements can be reviewed simultaneously and periodically and carried out by the organization (Rusko et al., 2014).

In the study by Inan et al. (2017), it is mentioned that company organizations are required to implement the safety and health management system to compete locally and globally. The study also provides a benchmark in decision-making techniques for measuring the implementation of the safety and health management system. According to the research results, the most important attribute in safety and health management system implementation is the arrangement phase, having the urgency of 29%, including how the organization identifies potential hazards and risks and their control, compliance with regulations and requirements, and setting objective targets and management programs to achieve organizational performance.

4.1 Environmental Pollution Control

Environmental pollution control is the result of the implementation of an environmental management system, which includes efficiency in water and energy consumption, waste reduction, and increased recycling, as mentioned by Maletic et al. (2015b), Epstein and Roy (2001), and Rusko et al. (2014). To strengthen the concept of quality performance, the following items are included.

- Energy Efficiency, which is cutting the consumption of energy to reduce environmental impacts (Tarí and Molina-Azorín, 2010; Rebelo et al., 2016; Epstein and Roy, 2001; Maletic et al., 2015a).
- Clean Water Usage Efficiency, which is reducing water usage to prevent further environmental impacts (Tarí and Molina-Azorín, 2010; Rebelo et al., 2016; Epstein and Roy, 2001; Maletic et al., 2015a).
- Hazardous and Toxic Waste Management, which is minimizing hazardous waste to reduce environmental impact (Tarí and Molina-Azorín, 2010; Rebelo et al., 2016; Epstein and Roy, 2001; Maletic et al., 2015a).
- Waste Recycling Management, which is increasing recycled waste to reduce environmental impacts (Tarí and Molina-Azorín, 2010; Rebelo et al., 2016; Epstein and Roy, 2001; Maletic et al., 2015a).

4.2 Quality Control

This study explores several aspects that positively support the implementation of adequate integrated environmental, quality, safety, and health management systems in achieving corporate sustainability. By controlling the quality, desired outcome shall be gained from the implementation of a quality management system, which includes product and service quality improvement, customer loyalty maintenance, increased sales/profit, and higher continuous improvement (Simon et al., 2012b; Maletic et al., 2015a; Tarí and Molina-Azorín, 2010; Luk et al., 2005; Rebelo et al., 2016). The developed concept of quality performance encompasses the followings.

- Process quality improvement in the manufacturing process, which is the organization's efforts in achieving its goals and mission through the involvement and participation of the entire organization and stakeholders (Rebelo et al., 2016; Santos et al., 2011; Rebelo, 2011; Paraschivescu, 2016; Inan et al., 2017; Hamidi et al., 2012; Simon et al., 2012a; Maletic et al., 2015a; Tarí and Molina-Azorín, 2010; Luk et al., 2005; Rebelo et al., 2016; Rebelo et al., 2014; Muhamad Khair et al., 2018; Souza and Alves, 2018).
- Product quality that suits stakeholders' demand (Tarí and Molina-Azorín, 2010; Rusko et al., 2014; Muhamad Khair et al., 2018; Simon and Yaya, 2012; Rebelo et al., 2014).
- Higher profits, which is an increase in sales and earnings through higher employee productivity (Tarí and Molina-Azorín, 2010; Luk et al., 2005; Maletic et al., 2015a; Rebelo et al., 2016; Simon et al., 2012b).
- Customer focus, which is an aspect that affects organizations in maintaining the loyalty of their customers (Simon et al., 2012b; Maletic et al., 2015a; Tarí and Molina-Azorín, 2010; Santos et al., 2011; Souza and Alves, 2018; Rebelo et al., 2016).

4.3 Occupational Health and Safety Control

As another supporter, social performance is a measurable result to be achieved by implementing a safety and health management system. It includes improvements in the aspects of safety and health, employee satisfaction, employee competency, and customer wellbeing which enriches the company's image (Paraschivescu, 2016; Maletic et al., 2015a; Rebelo et al., 2016; Rusko et al., 2014; Souza and Alves, 2018). The developed concept of quality performance includes the followings.

- Safety and health risk, which is the reduction in the risk of accidents and health problems at the workplace (Maletic et al., 2015a; Rebelo et al., 2016; Rebelo, 2011; Inan et al., 2017; Rebelo et al., 2014; Muhamad Khair et al., 2018; Alvarez-Santos et al., 2018).
- Employees need to comply with occupational health and safety regulations to increase productivity (Maletic et al., 2015a; Hamidi et al., 2012).
- Employee competence, which is the development of employee competencies (Maletic et al., 2015a; Hamidi et al.,

2012; Muhamad Khair et al., 2018; Souza and Alves, 2018; Santos et al., 2011).

- Competitiveness, which is the commitment to meet the demand of all customers (Maletic et al., 2015a; Luk et al., 2005).

4.4 Corporate Sustainability Performance

One strategy to streamline the implementation of integrated environmental, quality, safety, and health management systems is by incorporating these system requirements. Consistency in implementing integrated environmental, quality, safety, and health management system is difficult to achieve. Another part that is not realized by organizations that have implemented quality, environmental, health, and safety management system is that they indirectly contribute to corporate sustainability program through the said implementation. The integrated management system should be investigated further to determine its impact on the achievement of corporate sustainability and obtain the right strategy. Environmental pollution control, quality control, occupational health, and safety control contribute to the corporate sustainability program and become part of the strategy to support corporate sustainability.

Some researchers such as Simon et al. (2012a), Maletic et al. (2015a), Tarí and Molina-Azorín (2010), Luk et al. (2005), and Rebelo et al. (2016) concluded that customer satisfaction could be increased through the fulfilment of internal aspects such as supporting innovation and increasing employee awareness in improving product and service quality. Continuous improvement in customer satisfaction and productivity will increase sales, profits, and financial performance. Improvement programs in terms of quality will provide added value to corporate sustainability performance. Based on the research of Tarí and Molina-Azorín (2010), Rebelo et al. (2016), Epstein and Roy (2001), and Maletic et al. (2015a), reduction of the consumption of natural resources, such as energy and water, removal of hazardous waste, and an increase in the ratio of recycled waste may be resulted from integrated environmental, quality, safety, and health management system complemented with other control systems that support the improvement of corporate sustainability performance. Maletic et al. (2015a), Rebelo et al. (2016), and Luk et al. (2005) concluded that the implementation of the safety and health management system contributes to the improvement of safety and health management system, employee satisfaction levels, employee training, and corporate image as parts of social performance achievement that supports company sustainability.

Based on the discussion above, the researchers have developed a construct model that contains the research model and items constituting it. The model construct, presented in the following Figure 1, is described as a strategic model in supporting corporate sustainability through environmental pollution control, quality control, and occupational health

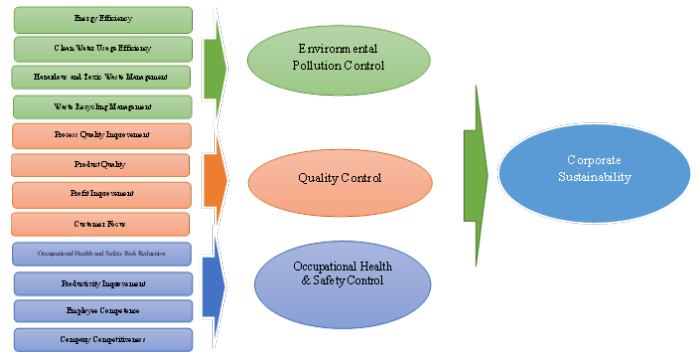


Figure 1. The Conceptual Model of The Research Construct

and safety control.

The proposed model construct above explains that environmental pollution control is supported by energy efficiency, clean water usage efficiency, hazardous and toxic waste management, and waste recycling management. Quality control is supported by customer focus, product quality, increased profits, and process quality improvement. Safety and health management is promoted by reducing occupational health and safety risk, increasing productivity, employee competence, and competitiveness. All of which support corporate sustainability.

5. CONCLUSIONS

The model developed in this study is a construct model of environmental pollution control, quality control, and occupational health and safety control associated with improvements in corporate sustainability. Hazardous and toxic waste management, waste recycling management, energy efficiency, and clean water usage efficiency are items that support environmental pollution control. Customer focus, product quality, increased profits, and process quality improvement are items for quality control. Reducing occupational health and safety risks, increasing productivity, employee competence, and competitiveness are essential for maintaining occupational health and safety control. Those three items enable improvements for the achievement of corporate sustainability performance. This study produces a construct model that needs to be analyzed further regarding the direct influence of environmental pollution control, quality control, and safety and health control on sustainable performance through empirical research in organizations consisting of several sections or departments at pulp and paper manufacturing industries.

6. ACKNOWLEDGEMENT

The authors would like to express their gratitude to Yefri Chan, ST., MT. for his suggestions and comments on the early drafts of this paper.

REFERENCES

- Alvarez-Santos, J., J.-Á. Miguel-Dávila, L. Herrera, and M. Nieto (2018). Safety Management System in TQM Environments. *Safety Science*, **101**; 135–143
- Epstein, M. J. and M.-J. Roy (2001). Sustainability in Action: Identifying and Measuring The Key Performance Drivers. *Long Range Planning*, **34**(5); 585–604
- Ferdinand, A. (2014). *Research Methode of Management Science*. UNDIP Press
- Gianni, M. and K. Gotzamani (2015). Management Systems Integration: Lessons from an Abandonment Case. *Journal of Cleaner Production*, **86**; 265–276
- Gianni, M., K. Gotzamani, and G. Tsiotras (2017). Multiple Perspectives on Integrated Management Systems and Corporate Sustainability Performance. *Journal of Cleaner Production*, **168**; 1297–1311
- Hamidi, N., M. Omidvari, and M. Meftahi (2012). The Effect of Integrated Management System on Safety and Productivity Indices: Case Study; Iranian Cement Industries. *Safety Science*, **50**(5); 1180–1189
- Inan, U. H., S. Gül, and H. Yilmaz (2017). A Multiple Attribute Decision Model to Compare The Firms Occupational Health and Safety Management Perspectives. *Safety Science*, **91**; 221–231
- Karapetrovic, S. and J. Jonker (2003). Integration of Standardized Management Systems: Searching for A Recipe and Ingredients. *Total Quality Management and Business Excellence*, **14**(4); 451–459
- Luk, C.-L., O. H. Yau, A. C. Tse, L. Y. Sin, and R. P. Chow (2005). Stakeholder Orientation and Business Performance: The Case of Service Companies in China. *Journal of International Marketing*, **13**(1); 89–110
- Maletic, M., D. Maletic, J. Dahlgaard, S. M. Dahlgaard-Park, and B. Gomišček (2015a). Do Corporate Sustainability Practices Enhance Organizational Economic Performance. *International Journal of Quality and Service Sciences*, **7**(2-3); 184–200
- Maletić, M., D. Maletić, J. J. Dahlgaard, S. M. Dahlgaard-Park, and B. Gomišček (2016). Effect of Sustainability-oriented Innovation Practices on The Overall Organisational Performance: An Empirical Examination. *Total Quality Management and Business Excellence*, **27**(9-10); 1171–1190
- Maletic, M., M. Podpečan, and D. Maletic (2015b). ISO 14001 in a Corporate Sustainability Context: a Multiple Case Study Approach. *Management of Environmental Quality: An International Journal*, **26**(6); 872–890
- Muhamad Khair, N. K., K. E. Lee, M. Mokhtar, and C. T. Goh (2018). Integrating Responsible Care into Quality, Environmental, Health and Safety Management system: A Strategy for Malaysian Chemical Industries. *Journal of Chemical Health and Safety*, **25**(5); 10–18
- Paraschivescu, A. O. (2016). The Advantages of The Process of Integrating Quality Management System. *Economy Transdisciplinarity Cognition*, **19**(2); 48–55
- Rebelo, M. (2011). *Contribuição Para A Estruturação De Um Modelo De Sistema Integrado De Gestão QAS*. Master Thesis. Polyt Inst Cavado Ave. Portugal
- Rebelo, M. F., G. Santos, and R. Silva (2014). A Generic Model for Integration of Quality, Environment and Safety Management Systems. *The TQM Journal*, **26**(2); 143–159
- Rebelo, M. F., G. Santos, and R. Silva (2016). Integration of Management Systems: Towards a Sustained Success and Development of Organizations. *Journal of Cleaner Production*, **127**; 96–111
- Rusko, M., J. Sablik, P. Marková, M. Lach, and S. Friedrich (2014). Sustainable Development, Quality Management System and Environmental Management System in Slovak Republic. *Procedia Engineering*, **69**; 486–491
- Sampaio, P., P. Saraiva, and P. Domingues (2012). Management Systems: Integration or Addition. *International Journal of Quality and Reliability Management*, **29**(4); 402–424
- Santos, G., F. Mendes, and J. Barbosa (2011). Certification and Integration of Management Systems: The Experience of Portuguese Small and Medium Enterprises. *Journal of Cleaner Production*, **19**(17-18); 1965–1974
- Simon, A., S. Karapetrovic, and M. Casadesús (2012a). Difficulties and Benefits of Integrated Management Systems. *Industrial Management and Data Systems*, **112**(5); 828–846
- Simon, A., S. Karapetrovic, and M. Casadesus (2012b). Evolution of Integrated Management Systems in Spanish Firms. *Journal of Cleaner Production*, **23**(1); 8–19
- Simon, A. and L. H. P. Yaya (2012). Improving Innovation and Customer Satisfaction through Systems Integration. *Industrial Management and Data Systems*, **112**(7); 1026–1043
- Souza, J. P. E. and J. M. Alves (2018). Lean-integrated Management System: A Model for Sustainability Improvement. *Journal of Cleaner Production*, **172**; 2667–2682
- Tarí, J. J. and J. F. Molina-Azorín (2010). Integration of Quality Management and Environmental Management Systems: Similarities and The Role of The EFQM Model. *The TQM Journal*, **22**(6); 687–701