

Uncertain Supply Chain Management

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Business sustainability of manufacturing companies: The role of eco supply chain management (ESCM) and total quality management (TQM)

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ABSTRACT

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The proposed study of this paper investigates the effects of total quality management (TQM) and eco supply chain management on business sustainability. The type of research used in this research is quantitative research and uses an online questionnaire as a tool to collect data from respondents. Research data was obtained by distributing online questionnaires to 568 Manufacturing company managers who were determined using the simple random sampling method. The questionnaire was designed to contain statement items and the Likert scale used in this research. The data analysis method used in this research was structural equation modelling partial least squares (PLS-SEM) with data processing tools, namely SmartPLS 4.0 software. The findings of this research specify that TQM and eco supply chain management had significant effects on business sustainability. The results of this research indicate that TQM and eco supply chain implementation were manifested in the company's ability to produce high product quality directly affecting the business sustainability of manufacturing companies.

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1. Introduction

In the era of industrial revolution 4.0, all entrepreneurs definitely want to earn profits continuously over a long period of time. However, sometimes these entrepreneurs forget about other important aspects such as the environment and social issues (Mukaromah et al., 2020). This is where understanding business sustainability or sustainable business comes into play. Business sustainability is a concept that makes business not only beneficial for the economy, but also the environment and people's lives. Apart from that, this concept also applies legal values and behavior in business (Cosimato & Troisi, 2015). A concept like this will add value to the business itself. Not only that, this concept will indirectly make companies able to compete, thereby having an impact on generating income in the long term. Companies that want their business to continue for a long period of time need to increase their efficiency. The efficiency referred to here is related to production activities in the environment and the raw materials used. This can be achieved by implementing business sustainability. This method allows companies to manage raw materials better so they can maximize their use. So, not a lot of raw materials are wasted. This efficiency will result in less waste being produced by the company, thereby minimizing the negative impact on the environment. Apart from that, companies can also make more products with existing raw materials (Astawa et al., 2021).

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Companies are always required to maximize good operational performance to remain competitive in the market. To deal with this, companies need a competitive advantage strategy to be able to survive and compete in the market. According to Abdallah and Al-Ghwayeen (2020), competitive advantage helps companies maintain market share where competition is increasingly fierce, so minimizing costs is very important here to be used as the spearhead of innovation in very tight market competition. Currently, environmental issues have become an interesting problem for the world community to discuss. Environmental pollution that is getting worse is the impact of environmental management which is not what has been determined (Das, 2018). Some companies still do not think about the social impacts that arise as a result of industrial practices that use advanced technology and dangerous chemicals, including when obtaining raw materials, production processes and production results which have the effect of causing environmental pollution such as air and water pollution, waste, etc. Eco supply chain management integrates supply chain management with environmental management, so it is important for the manufacturing industry because it can reduce environmental impacts and create business competitiveness and high operational performance (Permana & Soediantono, 2022). Competitive advantage is created and can be maintained by a company that can make continuous improvements to produce the best customer value through low costs, high quality and continuous innovation (Famiyeh et al., 2018). Competitive advantage is a form of strategy to help companies maintain continuity so they are able to compete, so they can be supported by implementing TQM. TQM is an integrated approach to obtain and maintain high quality output, focusing on maintenance, continuous improvement and failure prevention at all levels and functions of the company, in order to meet or exceed customer expectations. The concept of TQM as a management philosophy and principles, is also a set of strategies and practices that can be used to increase competitiveness through meeting customer needs and satisfaction. TQM and product quality are also important elements for companies to be able to compete.

Manufacturing has a high contribution in increasing regional and community income so its sustainability is very important because it can reduce poverty in Indonesia which also has an impact on the global economy. Manufacturing that does not have business competitiveness is abandoned by the market, because not having business competitiveness means not having an advantage and not being superior means no survival in a competitive market in the long term. A view that is similar to Habib et al. (2020) in creating competitive advantage is expressed, that if an industry can optimally apply flexibility, innovation, quality and cost reductions, this optimal application is the key to the industry's success in gaining competitive advantage. According to Al-Ghwayeen and Abdallah (2018), competitive advantage is a company's ability to create and maintain superiority over its competitors in market competition. Based on phenomena that occur in developed countries, it turns out that the key to improving company operational performance lies in the ability of manufacturing companies to collaborate with their business partners.

Manufacturing companies are very important to increase their strategic business competitiveness. Companies must be able to take advantage of several possible niches to become more competitive and productive so that they can improve company operational performance (Eco Jr et al., 2012). Company operational performance is a benchmark indicator of a company's development. A competitive business focuses on how to increase value to consumers, namely providing products and services that are more valuable than competitors (Thun & Müller, 2010; Yang et al., 2013).

Several previous studies found that eco supply chain management has a positive influence on business sustainability and this result is supported by Micheli et al. (2020) who stated that eco supply chain management has a positive influence on business competitiveness. The influence of supply chain management on competitive advantage in companies has been extensively discussed by many researchers. Research by Laari et al. (2018) shows that eco supply chain management has a positive influence on company business competitiveness, implementing eco supply chain management will create a company reputation so that the company will have high business competitiveness. Based on these aspects, it will help companies encourage and create business competitiveness so that companies can survive in the vast market competition (Jawaad & Zafar, 2020). Several previous studies found that business competitiveness has a positive influence on business sustainability and this result is supported by Khaksar et al. (2016) who stated that business competitiveness has a positive influence on business sustainability. Other research conducted by Luthra et al. (2014) stated that the implementation of supply chain management in companies will have a positive influence on the company's business competitiveness, having a good supply chain system will boost the company's reputation, thereby encouraging increased operational performance.

2. Literature Review and Hypotheses Development

2.1 Eco (Green) Supply Chain Management

According to Choi et al. (2018) and Choi and Hwang (2015), the supply chain is a collection of business actors involved in a series of business processes in a supply chain. Currently, the competition is no longer between companies, but between one supply chain and another supply chain (Praditya & Purwanto, 2024). The implementation of supply chain strategies implemented in Eco Supply Chain Management (GSCM) shifts the paradigm of the new industrial era which demands the role of industry in protecting the environment by reducing or eliminating pollution and waste. Eco supply chain management requires industrial activities to improve the balance between operational performance and environmental issues, giving rise to new issues such as saving energy use and reducing pollution to increase business competitiveness strategies (Cousins et al., 2019). Eco Supply Chain Management can integrate environmental management practices into the entire supply chain management to achieve eco supply chain management and maintain competitive advantage and also to increase business profitability and market goals. Environmentally friendly attention is implemented by supply chain management (SCM) in

environmentally operational performance, namely Eco supply chain management. Eco supply chain management is an important strategy to achieve sustainable development for companies (Habib et al., 2020; Baah & Jin, 2019).

Eco supply chain management is an innovation in implementing a supply chain strategy based on an environmental context which includes activities such as reduction, recycling, reuse and material substitution (Guang et al., 2012). Eco supply chain management is the integration of an environmental perspective into supply chain management including product design, selection and selection of raw material sources, manufacturing processes, delivery of final products to consumers, as well as product management after the end of their useful life. Several operational functions and activities in eco supply chain management include eco procurement, eco manufacturing, and eco distribution. Activities in eco distribution, namely eco packaging and eco manufacturing. Eco procurement is related to the state of the purchasing environment which consists of involvement in purchasing reduction activities, reuse and recycling of materials in the purchasing process. Eco manufacturing is a production process that uses inputs with low environmental impact, which is very efficient and produces little to no waste or pollution. Eco distribution includes activities in eco distribution, namely eco packaging and eco manufacturing (Das, 2018).

2.2 Total Quality Management

Total Quality Management (TQM) is a concept of continuous improvement, involving all elements and employees at every level of the organization in order to achieve the best quality in all aspects of the organization through the management process. TQM is a basic principle for an organization that wants to continuously make improvements from service operations to consumers for service businesses. TQM is mutually beneficial cooperation of everyone in the organization and linked to business processes to produce product and service value that exceeds consumer needs and expectations. TQM is a customer-centered operational activity to continuously improve product productivity and services produced involving all organizational processes, starting from input activities such as providing raw materials, adequate human resources, or streamlining production or distribution processes products, to output that guarantees effectiveness.

2.3 Business sustainability

Ac Abdallah and Al-Ghwayeen (2020) state that business sustainability is a company or organization's strategy to achieve advantages compared to its competitors. Business competitiveness is the ability of an organization or manufacturing company to obtain relatively high income out of competition (Guang et al., 2012). According to Famiyeh et al. (2018), Business competitiveness relates to how effective an organization is in the competitive market, compared to other organizations that offer the same or similar products or services. Capable companies producing good quality products or services are companies that are effective in the sense to compete. According to Fantazy and Tipu (2019), companies that do not have power competition will be abandoned by the market. Because not having business competitiveness means having no advantage, and not being superior means there is no reason for some companies to survive in the competitive market for the long term. Efforts to measure a company's operational performance require an in-depth understanding of operational management concepts (Jawaad & Zafar, 2020). In the current era of business competitiveness, operational management is a series of activities that produce value in the form of goods and services by converting input into output. Operational performance measures are to evaluate the level of success or operational performance of functions, jobs or industrial operational performance in general. In other words, operational performance measures are carried out to find out how far a particular function or part of the company and the people who work in it achieve the goals, both general and specific goals assigned to them. In general, operational performance is defined as the level of success in a job, whether for an individual, group or organization/company. Luthra et al. (2014) define operational performance as the result of an activity where the selection of measures for operational performance assessment depends on the organizational unit being assessed and the goals achieved. The objectives that have been previously established in strategy formulation as part of the strategic management process (related to profits, marketing audits, and cost reduction) must be used to measure company operational performance when the strategy is implemented. Apart from analyzing company operational performance, this research also analyzes company business competitiveness. According to Chin et al. (2015), two indicators for measuring company operational performance, namely: a) Financial Operational performance, operational performance is generally assessed using measurements based on financial data. Some experts use return on sales, profitability, sales growth, improvements in work productivity, and improvements in production costs to measure financial operational performance. b) Operational performance, apart from measuring company operational performance based on 1 operational performance, to explain company operational performance do well, non-financial operational performance measurements are also used (Khaksar et al., 2016).

2.4 The relationship between TQM and business sustainability

The implementation of TQM implemented by the company will be successful or effective if the company is able to create solid cooperation between each work team. Collaboration between teams can facilitate production workers' ability to work together in every job they do. In addition, working as a team will also lead employees to a better attitude. Although employees naturally have concerns about the quality of the work they do and will take the initiative to fix it, they need something other than the tools and training necessary to quality improvement, namely about cooperation in one team. In this case, the team in question does not only involve fellow employees, but also between employees and superiors. TQM is an approach that is widely used by companies to improve quality systematically using many dimensions and has been widely applied by many companies with the aim of improving performance such as quality, productivity and profitability. Implementing TQM in a

company can provide several things. The main benefit is increasing profits and the competitiveness of the company concerned. Implementation of TQM and directed management can increase employee productivity and performance.

H1: *TQM has a positive and significant influence on business sustainability.*

2.5 *The relationship between Eco Supply Chain Management and business sustainability*

Several previous studies found that eco supply chain management has a positive influence on business sustainability and this result is supported by Micheli et al. (2020) who stated that eco supply chain management has a positive influence on operational performance. The results of research by Laari et al. (2018) state that the concept of eco supply chain management is able to reduce production operational costs and create company efficiency and encourage companies to minimize operational costs and increase company income. Other studies (e.g., Jawaad & Zafar, 2020; Arijanto et al., 2022) show that the implementation of eco supply chain management will provide profits and increase operational performance for organizations, especially manufacturing. Based on previous research studies, the following hypothesis is formulated:

H2: *Eco supply chain management has a positive influence on business sustainability*

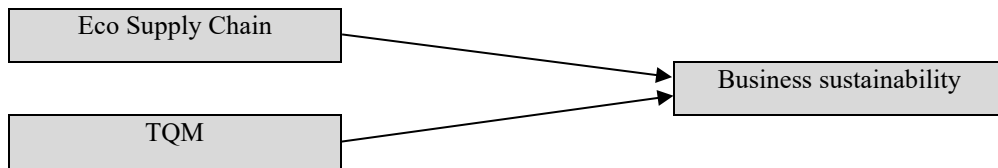


Fig. 1. The proposed study

3. Method

The type of research used in this research is quantitative research. This research uses an online questionnaire as a tool to collect data from respondents. Research data was obtained by distributing online questionnaires to 568 manufacturing company managers who were determined using the simple random sampling method. The questionnaire was designed to contain statement items and the Likert scale used in this research was the Likert scale of 7 with the criteria (1) strongly disagree, (2) disagree, (3) moderately disagree, (4) Neutral, (5) moderately agree, (6) agree, (7) Strongly agree. The data analysis method used in this research is structural equation modelling partial least squares (PLS-SEM) with data processing tools, namely SmartPLS 4.0 software. The data analysis stage is the validity test, namely the loading factor value, average variance extracted value and discriminant validity. Reliability test, namely Cronbach alpha value and composite reliability value have been used.

4. Result and Discussion

4.1 *Model Scheme of Partial Least Square (PLS)*

In this research, hypothesis testing uses analytical techniques *Least Square (PLS)* with the SmartPLS program. Fig. 1 shows the proposed study of this paper. In Fig. 1, it is shown that the *theuter Model PLS* is built from a conceptual framework. The figure explains the relationship between each variable which comes from various theories and previous research. Each variable tested is equipped with indicators built from the relationship between the theories. Analysis model using *partial Least Square (PLS)* can be seen in Fig. 2.

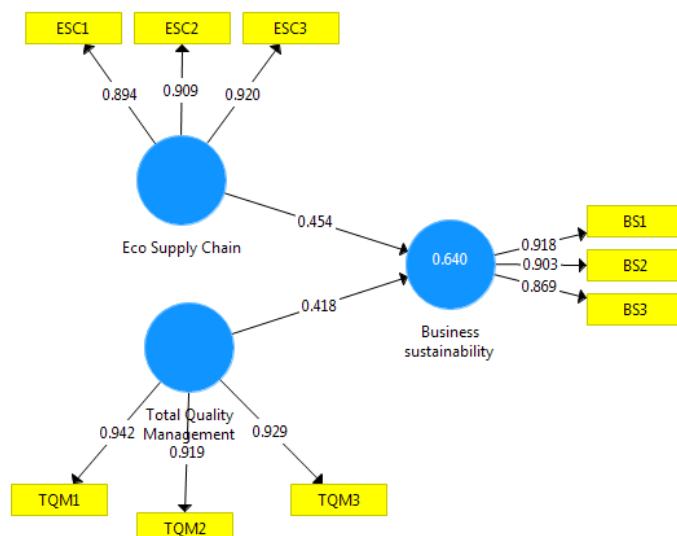


Fig. 2. Inner Model PLS

In Fig. 3, the PLS Inner Model has been processed through the application of *Partial Least Square*. The relationship between the value of each indicator and the value of the relationship between the exogenous variable and the endogenous variable can be seen.

4.2 Discriminant validity

Discriminant validity testing can be done by looking at the average value of the extracted variance (AVE) for all indicators, the value received is > 0.50 for a good model, the results of data analysis obtained the AVE value as follows:

Table 1
Average Variant Extracted (AVE)

	Average Variance Extracted (AVE)
Eco supply chain management	0.612
Business sustainability	0.734
Total Quality management	0.614

Based on Table 1, it is known that the AVE values of TQM, *Eco supply chain management* and *Business sustainability* are greater than 0.5. Thus, it can be stated that each variable has *discriminant validity*.

4.3 Composite Reliability

A variable can be declared to be satisfactory *composite reliability* when it has value *composite reliability* of each variable used in this research:

Table 2
Composite Reliability

	Construct Reliability and Validity
Eco supply chain management	0.845
Business sustainability	0.916
Total Quality management	0.893

Based on Table 2 it can be seen that the values of *composite reliability* variable TQM, *Eco supply chain management* and *Business sustainability* are greater than 0.60. These results indicate that each variable has met *composite reliability* so it can be concluded that all variables have a high level of reliability.

4.4 Cronbach Alpha

A variable can be declared reliable or satisfactory *Cronbach alpha* when having a Cronbach alpha value > 0.7 , the following is the value of *Cronbach alpha* from each variable:

Table 3
The summary of Cronbach Alpha

	Cronbach Alpha
Eco supply chain management	0.819
Business sustainability	0.921
Total Quality management	0.823

Based on data analysis in Table 3, the Cronbach alpha value for each eco supply chain management variable, Business sustainability is > 0.70 and it is concluded that each research variable meets the Cronbach Alpha value requirements so it is concluded that all variables have high reliability.

4.5 Path Coefficient

If the value increases *the path coefficient* of one independent variable on the dependent variable, the stronger the influence of the independent variables on the dependent variable.

4.5.1 Model goodness test (Goodness of Fit)

Based on data processing that has been carried out using the SmartPLS program, values are obtained *R-Square Adjusted* as follows:

Table 4
Values of *R-Square*

	R Square	R Square Adjusted
Business sustainability	0.776	0.765

Based on Table 4 it can be seen that the Value *R-Square Adjusted* for the Business sustainability variable is 0.64. This value shows that the large percentage can be explained by *Eco supply chain management* and total quality management amounting to 36%. Assessment of *goodness of fit* known from the value *q-square*. In regression analysis, where the higher *q-square*, then the model can be said to be better or more fit to the data. Based on the calculation results above, a value is obtained *Q-Square* of 0.834. This shows that the large diversity of research data that can be explained by the research model is 83.4%, while the remaining 16.6% is explained by other factors that are outside this research model. Thus, from these results, this research model can be stated to have *goodness of fit*.

4.6 Testing the direct effect of the hypotheses

Explanation of the partial direct influence hypothesis test can be seen in the following Table 5:

Table 5
Direct T-statistics and P-Values

	T Statistics	P Values	Remark
Total Quality management → Business sustainability	5.473	0.000	Supported
Eco supply chain management → Business sustainability	6.875	0.000	Supported

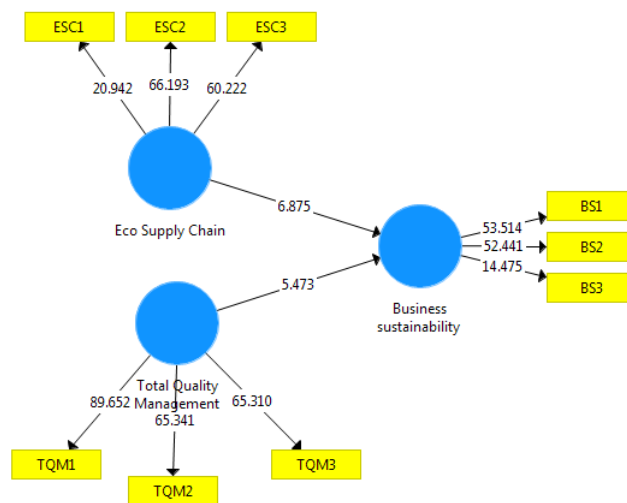


Fig. 3. Hypothesis testing

4.6.1 The Influence of Total Quality Management on Business sustainability

Based on the research results, it shows that TQM has a positive effect on business sustainability. These results show that a well implementation of TQM allows all company resources to be used effectively to achieve the desired competitive advantage and besides that, the company offers competitive prices and products that have quality in accordance with customers' desires. The results of this research are in line with research conducted by Micheli et al. (2020) that TQM has a positive effect on operational performance. Companies that implement TQM aim to meet customer satisfaction and expectations, the demands of environmental changes and the demands of the company itself. Effective implementation of TQM will ultimately have a positive influence on organization. Apart from good management, companies also need to pay attention to quality management information if the organization can properly implement a quality management system in its business and this is followed by increasingly better company performance. By implementing TQM, the company's focal point is the quality. Implementation of TQM techniques must be followed by implementing a reward system in parts of work that improve quality so that it can be useful as a means of career development and increase the effectiveness of strategic work quickly and can improve the performance of managers and employees. The results of the research show that TQM practices have an important impact on satisfaction of employees, which means that the better the implementation of TQM practices carried out by the company will increase employee job satisfaction. TQM is a structured system for improving managerial performance by making continuous improvements to company activities, strategies, employee performance, service quality in order to improve customer satisfaction. TQM is an integrated approach that aims to obtain and maintain high quality output, then focus on maintenance and continuous improvement and prevention of failure at all levels and functions of the company, in order to meet and/or exceed customer expectations. TQM can be understood as a holistic management philosophy that encourages continuous improvement and development in all organizational functions, and can be achieved if the concept of total quality is used from the use of resources in customer after-sales service. Based on the understanding of the experts above, TQM can be broadly defined as a management strategy and philosophy that tries to integrate all organizational functions involving all managers

and employees to work together to improve products, services, people, processes, and the environment so as to optimize the performance of the company's employees.

4.6.2 *The relationship between eco supply chain management and Business sustainability*

Based on the results of data analysis, it was obtained that the p-value was $0.000 < 0.050$ and the path coefficient value was positive, so it was concluded that eco supply chain management had a positive and significant influence on Business sustainability, the implementation of eco supply chain management in companies would encourage increased manufacturing operational performance. The results of this research are in line with research by (Mukhsin & Suryanto, 2022) that companies that have implemented eco supply chain management will gain profits and increase operational performance. This result is supported by Novitasari and Agustina (2022) as well as Kalyar et al. (2020) that manufacturing organizations that have implemented Eco supply chain management will encourage improved operational performance. Another study by Rao and Holt (2021) also concluded that eco supply chain management encourages increased operational performance of manufacturing companies. Several previous studies found that eco supply chain management has a positive influence on operational performance (e.g., Zhu et al., 2012, 2019; Micheli et al., 2020). The results of research by Laari et al. (2018) state that the concept of eco supply chain management is able to reduce production operational costs and create company efficiency and encourage companies to minimize operational costs and increase company income. Other studies by Jawaad and Zafar (2020) and Arijanto et al. (2022) show that the implementation of eco supply chain management will provide profits and increase operational performance for manufacturing firms.

Sustainable business has been popularly implemented by many companies in the world. Simply put, every business actor wants his business to last a long time and generate consistent profits, and quite a few business actors even have the expectation that their business can progress and develop amidst this tight market competition. This expectation is then realized by running a sustainable business.

The findings from this research support previous researchers' that the implementation of eco supply chain management has a significant effect on competitive advantage, and that the implementation of supply chain management at a higher level plays an important role in increasing the company's competitive advantage (Tan et al., 2019). The research results of Rao and Holt (2021) indicate that the supply chain has a significant effect on the competitive advantage of small companies because small companies experience difficulties in the ability to manage the supply chain which has an impact on the risk of high costs and low bargaining power between fellow supply chain partners (Mukhsin & Suryanto, 2022). Several previous studies found that eco supply chain management has a positive influence on business competitiveness and this result is supported by Micheli et al. (2020) who stated that eco supply chain management has a positive influence on business competitiveness (Luthra et al., 2014). The influence of supply chain management on competitive advantage in companies was discussed. Research by Laari et al. (2018) shows that eco supply chain management has a positive influence on company business competitiveness, implementing eco supply chain management will create a company reputation so that the company will have high business competitiveness. Other research conducted by Luthra et al. (2014) stated that the implementation of supply chain management in companies will have a positive influence on the company's business competitiveness, having a good supply chain system will boost the company's reputation, thereby encouraging increased operational performance. Competitive advantage has a significant positive effect on company operational performance. Based on this research, it can be seen that there is a positive relationship between competitive advantage and company operational performance. These results mean that the relationship between eco supply chain management can influence company operational performance and also through company business competitiveness (Younis et al., 2016). Efforts need to be made by companies to be able to design eco supply chain efficiency by implementing an e-supply chain system where the process of ordering raw materials can improve the process of ordering raw materials to be more effective and efficient due to integration between all related departments so that it can create better company operational performance (Purwanto & Juliana, 2022). Based on the results of research and interviews, many manufacturing companies still experience obstacles in implementing eco supply chain management and some have not yet implemented it, this is due to several obstacles faced, such as: standard guidelines for implementing eco supply are still low, the cost of purchasing eco raw materials is expensive, supplier commitment is still lacking, and top management commitment is still missing. Therefore, recommendations for companies can be made in several aspects, namely: building a joint commitment between suppliers, companies and the government in terms of implementing an eco supply chain starting from eco purchasing, and environmentally friendly production to eco distribution (Yu et al., 2014, 2019). Supply chain management includes suppliers, manufacturing companies or service providers, distributor companies, wholesalers or retailers who deliver products or services to final consumers (Rao & Holt, 2021).

5. Practical, theoretical and managerial implications

The results of this research have shown that supply chain management has a significant positive influence on business sustainability. Supply chain management includes suppliers, manufacturing companies or service providers, distributor companies, wholesalers or retailers who deliver products or services to final consumers. So, the better implementation of supply chain management can increase competitive advantage. Based on the results of research data analysis, it was found that eco supply chain management variables have a positive and significant influence on company operational performance.

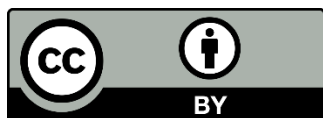
6. Conclusion

Based on the results of research data analysis, it was concluded that eco supply chain management and total quality management have positive and significant influences on the business sustainability of manufacturing companies. The results of this research have indicated that business competitiveness is manifested in the company's ability to produce high product quality directly affecting the company's capabilities. The results of this research were not free from limitations during the research, so these limitations can be refined by future researchers. Some of these limitations include: research respondents focus on the manager level who were busy so that information during in-depth interviews was limited. It is hoped that future researchers will expand their research on respondents.

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