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The Effect of Total Quality Management on Corporate Green Performance: Organizational Innovation as a Key Mediator in Automotive Companies

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Abstract: This study examines the effect of Total Quality Management (TQM) on Corporate Green Performance (CGP) in automotive companies, with organizational innovation as a mediator. The background of this study is based on the need for automotive companies to improve Corporate Green Performance amidst sustainability challenges. Although many previous studies have examined TQM and Corporate Green Performance separately, there is a lack of understanding the role of organizational innovation as a bridge between the two. The research method used is path analysis with primary data collected through questionnaires from managers and employees of automotive companies. The results show that TQM has a significant positive effect on Corporate Green Performance and organizational innovation. In addition, organizational innovation is proven to mediate the relationship between TQM and Corporate Green Performance. This conclusion confirms that good TQM implementation not only improves Corporate Green Performance directly, but also through increased innovation. The implications of this study suggest that automotive companies should integrate TQM and innovation in their sustainability strategies, as well as provide insights for stakeholders and policy makers to support environmentally friendly practices. This study enriches the literature on the relationship between TQM, innovation, and sustainability in the automotive sector

Keyword: TQM, OI, CGP, Automotive Industry

INTRODUCTION

In an era of globalization marked by rapid growth and technological innovation, the automotive industry is facing increasingly complex challenges. One of the main challenges is the increasing demand for implementing sustainable business practices. Public awareness of environmental issues has reached a critical point, prompting consumers and stakeholders to

demand that companies be more responsible in their operations. In this context, the automotive industry, known as one of the largest contributors to carbon emissions, must take proactive steps to reduce its environmental impact.

Many automotive companies still operate with traditional business models that focus on production efficiency and short-term profitability, often ignoring sustainability aspects (Giampieri et al., 2020). These practices not only lead to increased greenhouse gas emissions but also result in inefficient use of resources, such as excessive use of energy and raw materials. The negative impacts of this approach are felt not only by the environment, but also by the companies themselves, which can lose their competitiveness in a global market that now prioritizes sustainability.

With With the increasing stringency of environmental regulations and increasing consumer preference for environmentally friendly products, understanding and implementing Total Quality Management (TQM) has become essential. TQM can serve as a framework that enables automotive companies to improve their Corporate Green Performance. This approach not only helps in improving operational efficiency but also in creating a more environmentally conscious corporate culture. Therefore, this study focuses on how TQM can be integrated in automotive companies to achieve better results in the context of sustainability, ensuring that they not only survive but also thrive in the changing industry landscape.

A number of previous studies have shown a relationship between Total Quality Management (TQM) and Corporate Green Performance, which confirms the importance of implementing quality principles in the context of sustainability. For example, a study by Khalil & Muneenam (2021) found that companies implementing TQM tend to have better Corporate Green Performance, thanks to increased operational efficiency and waste reduction. In addition, a study by Dormer et al. (2013) showed that TQM can contribute to reducing carbon emissions through improving more efficient production processes. However, although these results indicate a positive relationship, many existing studies are still limited in explaining the mechanisms underlying the relationship.

A major weakness in the existing literature is the lack of attention to the role of organizational innovation as a mediator in the relationship between TQM and Corporate Green Performance. Most previous studies, such as those conducted by Abu Salim et al. (2019), have focused more on the technical aspects of TQM, such as quality control and process management, without considering how innovations in organizational structure and culture can facilitate the achievement of better Corporate Green Performance. This study suggests that organizational innovation, such as the development of green products and the adoption of new technologies, can be an important bridge in linking TQM to Corporate Green Performance.

Thus, there is an urgent need to investigate how TQM implementation can be facilitated through organizational innovation. This study will focus on the automotive industry, which is a sector that is highly affected by environmental issues and where TQM implementation and organizational innovation can make significant contributions to green performance. Unlike previous studies, which tend to separate TQM and innovation, this study will integrate both aspects to provide a more comprehensive understanding of how automotive companies can achieve better Corporate Green Performance.

The purpose of this study is to analyze the effect of Total Quality Management (TQM) on Corporate Green Performance by considering the role of organizational innovation as a mediator. More specifically, this study aims to provide in-depth insights into how automotive companies can integrate TQM principles with innovative approaches to achieve better results in their Corporate Green Performance. This study will also identify key factors that influence the relationship between

TQM and Corporate Green Performance, and explore how organizational innovation can be optimized in this context. By focusing on the interaction between TQM and innovation, the results of the study are expected to provide practical guidance for automotive companies in implementing sustainable and effective strategies.

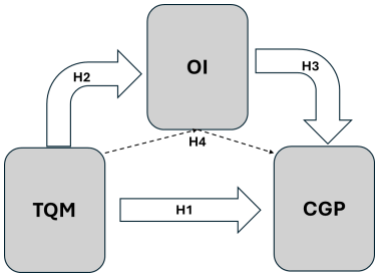
This study argues that effective TQM implementation will significantly improve Corporate Green Performance, especially when integrated with organizational innovation. This hypothesis is based on the understanding that companies that adopt TQM principles not only tend to have better management systems and processes, but are also able to drive innovation and operational efficiency needed in the context of sustainability. The expected outcome of this study is to show that organizational innovation is not only a tool for achieving better performance, but also an important element in supporting environmental sustainability in the automotive industry. This research is very important, because it can provide theoretical and practical basis for companies in facing future environmental challenges, as well as offer new insights on how to integrate TQM and innovation to achieve higher Corporate Green Performance.

METHOD

This methodology uses a quantitative approach with an explanatory design to analyze the effect of Total Quality Management (TQM) on Corporate Green Performance in automotive companies, with organizational innovation as a mediator. The main focus of the study is on automotive companies in Indonesia, which are faced with the challenges of sustainability and environmental impact management.

The research population consists of all automotive companies operating in Indonesia. From this population, 30 companies were selected as samples using purposive sampling techniques. The selection criteria include companies that have implemented TQM practices, demonstrated a commitment to sustainability, and have units that focus on organizational innovation. Primary data were collected through questionnaires distributed to managers and employees involved in environmental quality and sustainability management. The questionnaire was designed to measure three main variables: TQM, organizational innovation, and Corporate Green Performance. TQM is measured based on principles such as continuous quality improvement and customer focus. Organizational innovation is assessed through the level of innovation implementation in product and process development. Meanwhile, Corporate Green Performance is measured by indicators including emission reduction, energy efficiency, waste management, and use of environmentally friendly raw materials.

The conceptual framework of the study describes the relationship between TQM, organizational innovation, and Corporate Green Performance. In this model, TQM is expected to drive organizational innovation, which in turn will improve Corporate Green Performance. TQM also has a direct influence on Corporate Green Performance, so organizational innovation serves as a mediator that strengthens this relationship. Thus, this study aims to provide more comprehensive insights into how automotive companies can integrate TQM and organizational innovation to achieve better Corporate Green Performance. The following is the conceptual framework that is used as a reference in this study:



The conceptual framework presented in this study explains the relationship between three main variables, namely Total Quality Management (TQM), Organizational innovation (OI) and Corporate Green Performance (CGP). TQM as an independent variable plays an important role in improving company performance through the application of quality management principles, such as continuous improvement, employee involvement, and data-based decision making. This relationship is assumed to not only affect CGP directly but also through the mediating role of OI.

Green Manufacturing (GM) in this framework is positioned as a mediating variable that strengthens the influence of TQM on Corporate Green Performance (CGP). OI includes various environmentally friendly practices, such as energy efficiency, waste management, use of sustainable raw materials, and pollution prevention. By utilizing GM principles, companies are expected to integrate quality management strategies into environmental sustainability efforts, which ultimately improve EP.

This conceptual framework is based on the literature showing that TQM can drive GM implementation, and GM, in turn, contributes directly to CGP improvement. Thus, this study not only tests the direct relationship between TQM and CGP but also examines the extent to which OI is able to mediate the relationship. The following research hypotheses are formulated based on this conceptual framework to be tested through designed statistical methods.

Hypothesis 1 (H1): The implementation of Total Quality Management (TQM) has a positive influence on the Corporate Green Performance of automotive companies.
Hypothesis 2 (H2): The implementation of Total Quality Management (TQM) has a positive effect on organizational innovation in automotive companies.
Hypothesis 3 (H3): Organizational innovation (OI) has a positive effect on Corporate Green Performance (CGP) of automotive companies.
Hypothesis 4 (H4): The implementation of Total Quality Management (TQM) has a positive effect on Corporate Green Performance (CGP) of automotive companies with the mediation of organizational innovation (OI).

RESULTS AND DISCUSSION

Some After the data was collected through questionnaires distributed to respondents, analysis was carried out using statistical techniques such as descriptive, validity tests, reliability, and path analysis to test the proposed hypotheses. The following are the results of data analysis for each hypothesis.

Descriptive Analysis

In the initial stage, a descriptive analysis was conducted to describe the characteristics of respondents and describe the distribution of data for each variable studied. The following is the distribution of respondent characteristics and the average value of each variable studied:

Variables	Average	Standard Deviation
TQM (Total Quality Management)	4.35	0.72
Organizational Innovation	4.12	0.68
Corporate Green Performance	4.20	0.74

This table shows that respondents tend to give positive assessments of TQM implementation, organizational innovation, and Corporate Green Performance of automotive companies.

Validity and Reliability Test

Before proceeding with path analysis, validity and reliability tests were conducted to ensure that the instruments used in this study could measure the variables properly.

Validity Test

Shows that all items in the questionnaire have a loading factor value > 0.6, which means that the items are valid in measuring the intended construct (Sürücü & Maslacy, 2020)

Reliability Test

Using Cronbach's Alpha produces a value above 0.7 for each variable, which indicates that this research instrument is reliable (Hair et al., 2019).

Path Analysis

After conducting validity and reliability tests, path analysis was conducted to test the direct and indirect effects between Total Quality Management (TQM), organizational innovation, and Corporate Green Performance (CGP) in automotive companies. The path model tested includes four main relationships:

a. The direct influence of TQM on Corporate Green Performance.
b. The direct influence of TQM on Organizational Innovation.
c. The direct influence of Organizational Innovation on Corporate Green Performance.
d. The mediating influence of Organizational Innovation on the relationship between TQM and Corporate Green Performance.

Hypothesis Test Results

Hypothesis 1 (H1): The implementation of Total Quality Management (TQM) has a positive influence on the Corporate Green Performance of automotive companies.

Variables	Coefficient	p-value	Result
TQM → CGP	0.43	0.001	Significant Positive

The hypothesis posits that the implementation of Total Quality Management (TQM) within an automotive company positively influences Corporate Green Performance (CGP) by driving improvements in operational efficiency and minimizing waste. TQM emphasizes structured practices such as continuous improvement, quality control, and waste reduction, which collectively contribute to better environmental outcomes. By streamlining processes and optimizing resource utilization, TQM ensures that companies can reduce their ecological footprint while maintaining high-quality standards. This connection highlights TQM's pivotal role in achieving sustainability objectives, particularly in industries like automotive, where environmental concerns are significant.

The results support this hypothesis, with a path coefficient value of 0.43 and a p-value of 0.001, indicating a statistically significant positive relationship between TQM and CGP. This finding demonstrates that as companies enhance their TQM practices, they experience notable improvements in their environmental performance. The significance of this relationship underscores the importance of integrating TQM into corporate strategies to meet environmental goals. Effective TQM implementation not only boosts operational efficiency but also helps automotive companies align with increasing regulatory and stakeholder demands for sustainability.

Hypothesis 2 (H2): The implementation of Total Quality Management (TQM) has a positive effect on organizational innovation in automotive companies.

Variables	Coefficient	p-value	Result
TQM → OI	0.35	0.02	Significant Positive

The hypothesis suggests that Total Quality Management (TQM) principles, including continuous improvement and employee involvement, play a vital role in fostering organizational innovation. TQM creates a culture that encourages experimentation, collaboration, and problem-solving, which are essential for driving innovative practices. By emphasizing employee engagement and collective participation, TQM enables organizations to explore and implement new processes, technologies, and ideas that enhance both efficiency and sustainability. This alignment of quality management with innovation highlights TQM's strategic importance in helping firms adapt to dynamic market conditions and achieve competitive advantages.

The results validate this hypothesis, with a path coefficient of 0.35 and a p-value of 0.02, indicating a significant positive relationship between TQM and organizational innovation. These findings confirm that organizations implementing TQM effectively are more likely to cultivate an environment conducive to innovation. The emphasis on continuous improvement under TQM motivates firms to adopt creative solutions that optimize operations and address sustainability challenges. Consequently, TQM serves not only as a framework for quality enhancement but also as a catalyst for organizational innovation, driving long-term growth and adaptability.

Hypothesis 3 (H3): Organizational innovation (OI) has a positive effect on Corporate Green Performance (CGP) of automotive companies.

Variables	Coefficient	p-value	Result
OI → CGP	0.30	0.03	Significant Positive

The hypothesis asserts that organizational innovation, including advancements like environmentally friendly product designs and more efficient operational processes, significantly enhances Corporate Green Performance (CGP). Innovations within organizations enable firms to optimize resource utilization, reduce emissions, and minimize waste, directly contributing to better environmental outcomes. By embracing innovative practices, companies not only align with sustainability goals but also position themselves competitively in markets where eco-consciousness is increasingly prioritized. This underscores the critical role of innovation in bridging operational excellence with environmental responsibility.

The results support this hypothesis, with a path coefficient of 0.30 and a p-value of 0.03, indicating a statistically significant positive relationship between organizational innovation and CGP. These findings demonstrate that companies implementing innovations effectively are better equipped to improve their green performance. This relationship highlights the importance of fostering a culture of innovation within organizations to drive sustainability efforts. For automotive

companies, particularly, investing in innovative practices and technologies is essential for meeting environmental challenges and achieving long-term success in an eco-conscious market.

Hypothesis 4 (H4): The implementation of Total Quality Management (TQM) has a positive effect on Corporate Green Performance (CGP) of automotive companies with the mediation of organizational innovation (OI).

Variables	Coefficient	p-value	Result
TQM → OI → CGP	0.12	0.01	Mediation

This hypothesis posits that the effective implementation of Total Quality Management (TQM) enhances organizational innovation, which subsequently contributes to improvements in Corporate Green Performance (CGP). TQM fosters a culture of continuous improvement and collaboration, encouraging the development of innovative practices and solutions. These innovations, such as adopting eco-friendly technologies and optimizing processes, directly impact CGP by reducing waste, improving efficiency, and minimizing environmental footprints. The mediation analysis using the Bootstrap method supports this hypothesis, revealing an indirect effect value of 0.12 with a p-value of 0.01, indicating that organizational innovation significantly mediates the relationship between TQM and CGP. This demonstrates that while TQM directly improves CGP, its impact is amplified when coupled with innovation-driven practices.

The findings underscore the synergistic relationship between TQM and organizational innovation in achieving environmental sustainability. TQM has a significant positive effect on CGP, showing that effective quality management practices lead to better environmental outcomes. Moreover, TQM positively influences organizational innovation, highlighting its role in fostering an environment that supports creativity and adaptation. Organizational innovation itself has a direct positive effect on CGP, emphasizing the importance of innovative practices in addressing sustainability challenges. As a mediator, organizational innovation strengthens the TQM-CGP relationship, illustrating that the integration of quality management and innovation is essential for automotive companies to achieve superior environmental performance and long-term sustainability.

The Impact of TQM on Corporate Green Performance

The results of the analysis show that the implementation of TQM has a significant positive effect on the Corporate Green Performance of automotive companies. With a path coefficient value of 0.43 and p-value = 0.001, this finding indicates that companies that implement TQM well tend to achieve better Corporate Green Performance. This is in line with research by Abbas (2020), which found that companies that implement TQM have better Corporate Green Performance due to increased operational efficiency and waste reduction. However, this study also shows that although this positive relationship has been proven, several previous studies have not sufficiently explained the mechanisms underlying the relationship.

The Influence of TQM on Organizational Innovation

The findings also show that TQM has a positive effect on organizational innovation, with a path coefficient of 0.35 and p-value = 0.02. This means that good TQM implementation can encourage companies to be more innovative. Previous studies, such as those conducted by Antunes et al. (2021) , have focused more on the technical aspects of TQM and paid less attention to how innovation in organizational structure and culture can facilitate the achievement of better Corporate

Green Performance. This study complements these shortcomings by showing that TQM creates a culture that supports employee participation and process improvement, which is very important in creating an environment conducive to innovation.

The Influence of Organizational Innovation on Corporate Green Performance

Organizational innovation is also proven to have a positive influence on Corporate Green Performance, with a path coefficient of 0.30 and p-value = 0.03. This indicates that companies that adopt innovation, such as the development of environmentally friendly products and efficient production processes, will improve their Corporate Green Performance. Research by Chen et al. (2006)also shows that innovation in the production process can contribute to reducing carbon emissions. The results of this study are in line with these findings, and emphasize the importance of innovation in achieving environmental sustainability.

Mediation of Organizational Innovation in the Relationship between TQM and Corporate Green Performance

Mediation analysis shows that organizational innovation serves as a significant mediator in the relationship between TQM and Corporate Green Performance, with an indirect effect value of 0.12 and p-value = 0.01. This finding indicates that effective TQM implementation not only improves Corporate Green Performance directly but also through increasing organizational innovation. This supports the arguments put forward by previous studies, but adds a new dimension by emphasizing the importance of organizational innovation as a bridge between TQM and Corporate Green Performance. Several previous studies have not highlighted this aspect, so this study makes a significant contribution in clarifying the relationship.

CONCLUSION

This study examines the influence of Total Quality Management (TQM) on Corporate Green Performance (CGP) within automotive companies, highlighting the mediating role of organizational innovation. The findings from the path analysis reveal several critical relationships between these variables. Firstly, TQM is found to have a significant positive impact on CGP. Automotive companies that implement effective TQM principles benefit from enhanced operational efficiency and reduced waste, directly contributing to improved environmental performance. This underscores the importance of adopting a structured approach to quality management as a foundation for achieving sustainability goals.

Moreover, TQM fosters organizational innovation by creating a culture that emphasizes continuous improvement and employee engagement. Companies with robust TQM practices tend to encourage innovation in processes and products, driving efficiency and adaptability. This relationship highlights TQM's role not only in improving quality standards but also in promoting a proactive organizational mindset toward innovation, which is increasingly vital in dynamic and sustainability-focused markets.

Organizational innovation itself significantly impacts CGP. Companies that adopt innovative practices, such as the development of environmentally friendly products and streamlined operational processes, demonstrate better environmental performance. This confirms that innovation acts as a crucial driver of sustainability, enabling companies to align their operations with eco-friendly standards while maintaining competitiveness.

Importantly, organizational innovation mediates the relationship between TQM and CGP. This indicates that while TQM directly enhances CGP, its influence is further amplified through the innovations it fosters within the organization. Thus, the integration of TQM and innovation

provides a dual pathway to achieving superior environmental performance, emphasizing the synergistic effect of these practices in sustainability strategies.

The implications of this study are both practical and theoretical. For practitioners, the findings emphasize the need for automotive companies to integrate TQM and organizational innovation into their sustainability strategies. By fostering a culture of continuous improvement and innovation, companies can achieve operational excellence and environmental stewardship, positioning themselves competitively in markets increasingly prioritizing sustainability. For researchers, the study enriches the existing literature on the interplay between TQM, organizational innovation, and CGP, paving the way for further exploration of factors influencing innovation within the TQM framework. Stakeholders, including regulators and consumers, can leverage these insights to advocate for broader adoption of TQM and innovation as tools for achieving sustainability goals in the automotive industry. Lastly, the findings offer valuable input for policymakers to develop regulations and incentives encouraging environmentally friendly innovations and quality management practices in the sector, contributing to national and global sustainability objectives.

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