# The effect of top management commitment on improving operational performance through green purchasing and green production

*by* Sautma Ronni Basana

**Submission date:** 09-Jun-2023 03:18PM (UTC+0700)
**Submission ID:** 2112365119
**File name:** al_performance_through_green_purchasing_and_green_production.pdf (610.93K)
**Word count:** 9662
**Character count:** 57367

Uncertain Supply Chain Management 10 (2022) 1479–1492

Contents lists available at GrowingScience

Uncertain Supply Chain Management

homepage: www.GrowingScience.com/uscm

# The effect of top management commitment on improving operational performance through green purchasing and green production

**Sautma Ronni Basana[a], Hotlan Siagian[a], Sahnaz Ubud[b] and Zeplin Jiwa Husada Tarigan[a*]**

[a] *Faculty Business, and Economics, Petra Christian University, Jl.Siwalankerto 121-131, Surabaya, Indonesia*
[b] *Entrepreneurship Department, BINUS Business School Undergraduate Program, Bina Nusantara University, Jakarta, Indonesia 11480*

**ARTICLE INFO**

*Article history*:
Received March 23, 2022
Received in revised format April 25, 2022
Accepted June 14 2022
Available online
June 14 2022

*Keywords*:
*Green purchasing*
*Green production*
*Top management commitment*
*Operational performance*

**ABSTRACT**

This research has investigated the impact of top management commitment to enhance operational performance through green purchasing and green production Practices in the manufacturing industry. The study has surveyed 122 from 578 manufacturing companies domiciled in East Java, Indonesia, using a questionnaire designed with a seven-point Likert scale. Data analysis used the partial least square. The result reveals that top management commitment affects green purchasing, green production practices, and operational performance. Furthermore, operational performance is directly affected by green purchasing and green production. The green purchasing affects green production. In addition, top management commitment indirectly improves operational performance through green purchasing and green production. This result provides essential insight for the manager in the manufacturing industry that top management commitment and practicing green purchasing, and green production enhances operational performance. Furthermore, this research extends the acceptance of previous research related to top management commitment, green purchasing, and green production in improving operational performance. The novelty of this study is the revelation of the mediating role of green purchasing and green production in the influence of top management commitment on operational performance. Hence, this study contributes to enriching the current research in supply chain management.



## 1. Introduction

In recent years, environmental protection has gotten a lot of attention, and scientists have emphasized the importance of limiting global warming. As a result, international leaders from more than 40 countries have attended the global climate summit. The Summit emphasized how these climate goals would create well-paying jobs, drive technological innovation, and assist developing countries in adapting to the effects of climate change (Whitehouse, 2021). Based on the suggestion, numerous groups began to demonstrate care for the environment because of the growing global awareness of the need for environmental preservation (Kalyar et al., 2020). This eco-friendly philosophy of nurturing the Earth's source has reached a tipping point, putting pressure on businesses to start thinking critically about establishing ecologically responsible business practices. Green supply chain practices are considered to have a potential contribution throughout the supply chain process, from suppliers to manufacturers to customers, and until the product is disposed of (Siagian & Tarigan, 2021; Yu et al., 2014; Nguyen et al., 2022). The cost of procuring raw materials, energy usage, waste management, and environmental harm can all be reduced through cost effective techniques, boosting the company's operational performance (Santoso et al., 2022). Green purchasing is one of the ways to address the issue of environmental sustainability. Research has claimed that the economic value of environmentally sustainable development improves operational performance (Ambekar et al., 2021; Dubey et al.,

* Corresponding author
E-mail address zeplin@petra.ac.id (Z. J. H. Tarigan)


doi: 10.5267/j.uscm.2022.6.008

2013; Masa'deh et al., 2017). The implementation of environmental regulations that the Ministry has made of Environment and Forestry and the provision of warnings for those who violate ecological rules (Novitasari and Tarigan, 2022).

Practicing green purchasing and green production requires a capital investment and introducing a new strategy and policy dealing with environmental issue concerns. Hence, a top management commitment is essential to adopting green purchasing and green production. The goal of green purchasing and production, among others, is to apply environmentally friendly business practices with consumers and suppliers to limit the risk of environmental damage through its products, services, and activities (Abdallah & Al-Ghwayeen, 2020). Manufacturing behavior shifts in response to consumer behavior shifts; therefore, green product development and green production process have become hot topics for manufacturers. It can be found in a variety of businesses. For example, the Philips Alto II incandescent lamp has the lowest mercury content, up to 1.7 milli-grams per lamp (Zhang et al., 2019). Green production plays a crucial role in industrial organizations' environmental business strategy (Abdallah & Al-Ghwayeen, 2020). The demand for ecological products increases as people become more conscious of environmental protection. Green purchasing and production help manufacturers enhance their environmental image and increase the value of their products. Green purchasing and production allow manufacturers to engage with suppliers to create supply chain procedures upstream and downstream, resulting in increased operational performance (Yu et al., 2019). Due to the firm's expansion and greater awareness from customers and other stakeholders, the manufacturing organization's green purchasing and production issues are becoming an emerging concern. Hence, the research and practice of green purchasing and green production is a vital and emerging issue to study filling the gap in the green supply chain practices (Dubey et al., 2017).

The discussion above demonstrates how top management commitment, green purchasing, and green production directly improve the company's operational performance. However, previous studies had only looked at or observed the direct association between the two factors. Furthermore, to the authors' best knowledge, no study has looked at all four variables relationships simultaneously. This study develops a model that addresses all four constructs simultaneously to investigate the impact of top management commitment on operational performance via the mediation of green purchasing and green production. The research methodology for this study is unique in that it explores the mediating role of green supply chain integration, which includes green purchasing and green production. The novelty of this study is, firstly, to examine the extended acceptance of those previous studies in a different population, i.e., manufacturing industry, and secondly, to investigate the mediating role of green purchasing and green production in improving the operational performance of the manufacturing companies. The findings of this study are expected to bring fresh insights that practicing environmental protection benefits the corporation in improving operational performance in the manufacturing industry. Furthermore, this research could enrich the existing supply chain management research.

## 2. Literature Review

The top management commitment concept aligns with TPB (Theory of Planned Behaviour), which describes behavior based on the individual's will. TPB behavioral performance occurs when an individual's activity has a goal and purpose. Then, an individual's behavior is the product of a logical cognitive process in which the individual evaluates information internally and then applies it to his external behavior. Intentions, which are determined by attitudes (behavior), subjective norms, and perceived behavioral control, can explain and predict individual behavior. The importance of a person's perception of the features of how an individual intends to accept technology is emphasized by TPB (Chu & Chen, 2016). The RBV theory is used in this work to define operational performance. According to RBV theory, organizations that are unique or have unique resources can significantly boost a company's operations. RBV attempts to explain the competitive advantages businesses must have to be sustainable: valuable, rare, impossible to replicate, and well-organized. Resource-based view dictated the corporate resources or assets as, among others, infrastructure, competencies, and capabilities. In comparison, adequate operational resources include logistics, communications, infrastructure, the adoption of just-in-time operations, and the provision of logistics services (Lyu et al., 2019).

### *2.1 Green supply chain practices*

Green supply chain practices hold an action to respond to the genuine interests of the environment through the design, procurement, manufacture, distribution, use, recycling, and disposal of the company's goods and services (Yu et al., 2014). It simply lays out green practices, but it also lays out holistic improvement and environmental practices performance at all levels of management and in all manufacturing areas (Diabat & Govindan, 2011; Yu et al., 2019). Green supply chain practice encompasses techniques, methodologies, and planning instruments, executing, and regulating that assist businesses in being socially responsible and sustainable through environmental protection (Nguyen et al., 2022; Achillas et al., 2018). Supply chain integration practices have been shown to increase a manufacturing company's business performance, both directly and indirectly, by increasing supply chain resilience, flexibility, and responsiveness (Siagian et al., 2021). The supply chain integration encompasses the interconnection of suppliers, production, and distribution to achieve the same goal of meeting client demand (Basana et al., 2022).

### 2.2 Top management commitment

Many academics have looked into the presence of top management commitment to the company's success. Top management entails active communication and debate across functions to alter their various duties to achieve company objectives (Sandberg & Abrahamsson, 2010). The company's top management must fully comprehend the potential of supply chain operations as a driver of change. Top management support is essential to support implementing and accepting a system in the organization. The strength of corporate management support for implemented programs is critical because it can help to create an organizational culture and atmosphere conducive to improvement (Lee et al., 2016). Support from top management is required to provide the necessary financial resources and resources and cultivate a productive culture within the organization. The support of top management has a favorable impact on the implementation of enterprise resource management; without top management's support, capabilities, and knowledge, the system's implementation will fail (Lee et al., 2016). Tops management support in the firm can play an essential role in generating value for the organization, especially when improving the positive impact of supply chain integration on supply chain performance (Shee et al., 2018).

Top management commitment is measured using six indicators as follows: 1) clear company policies in setting company goals, 2) willingness to develop employees, 3) provide adequate training for employees, 4) management's willingness to achieve, 5) management's desire to provide resources when needed, and 6) management's ability to evaluate the system regularly (Tarigan, Siagian, & Jie, 2020). Top management is made up of the persons who are in charge of the organization's rules and regulations. Top management's responsibilities are derived from the organization's mission, goals, strategies, and business processes. Top management commitment and personal involvement are required in developing and implementing clear and consistent values and quality objectives that are aligned with the company's objectives, as well as developing and implementing well-defined systems, methods, and performance measures to achieve these objectives (Shee et al., 2018).

### 2.3 Green purchasing

Green purchasing refers to purchasing techniques that focus on minimizing waste sources and achieving recycling and reclamation when a product is purchased without compromising environmental needs by destroying components. On the other hand, green purchasing focuses on evaluating environmental performance in supplier selection and providing advice on improving their performance and acquiring environmentally friendly products (Santoso et al., 2021; Lee, 2021). Green purchasing can thus help ensure that suppliers build environmentally friendly oriented capabilities (S. Li et al., 2019; Zhang et al., 2019). Therefore, green purchasing is part of the supply chain's sourcing-reduction and recycling operations, and green purchasing can help reduce waste and encourage product recycling. Several studies on green purchasing have been published in the literature. Green supply chain management refers to a set of activities in the supply chain flow related to a company's environmental concerns, such as green purchasing, green design, green production, green distribution, and green marketing ((Masa'deh et al., 2017; Yildiz Çankaya & Sezen, 2019). Green logistics, or green purchasing, are other terms for the green supply chain. The goal is to reduce waste from production, packing, and transportation by purchasing and using environmentally friendly ma-terials (Cosimato & Troisi, 2015). Green purchasing can be defined as the activity of procuring raw materials of a company by considering the impact of environmental damage or purchasing raw materials to consciously care for the environment by reducing waste sources and reusing materials and still paying attention to product quality and still paying attention to customer satisfaction (González-Benito et al., 2016). Green purchasing has a strategic function in maintaining environmental sustainability (Tarigan & Siagian, 2021). Concerning the procurement function, green purchasing has six internal roles, namely, 1) building supplier awareness, 2) building a supplier system to care about the business environment, 3) collaborating with suppliers in sharing knowledge regarding the environment, 4) explaining to suppliers about green production, suppliers are required to have environmental requirements, and 5) suppliers actively contribute to the environment protection (Cosimato & Troisi, 2015). In addition, green purchasing represents the extent to which the company has established policies requiring suppliers to supply environmentally friendly raw materials, sets clear green material criteria, raw materials are more environmentally friendly, and the company collaborates with suppliers on an ongoing basis (Siagian et al., 2021). Besides, the implementation of green purchasing activities minimizes pollution control expenses associated with the company's reputation and improves the environmental performance of companies, according to the research (Kalyar et al., 2020; Novitasari and Tarigan, 2022). In addition, Govindan et al. (2014) said that environmental friendliness, green purchasing, or procurement might be construed as incorporating environmental factors into purchasing policies, programs, and actions to reduce waste and assist in achieving GSCP. The authors adopted the green purchasing assessment from previous research by Hsu et al. (2014) with the following measurement items: 1) buy environmentally friendly products from suppliers, 2) prioritizing suppliers who implement environmentally friendly management systems, 3) requires that suppliers be certified by ISO 14001, 4) prioritize the purchase of recyclable products, 5) avoid buying environmentally unfriendly materials such as lead or toxic materials, 6) applying environ-mental friendliness criteria is one of the requirements in evaluating suppliers.

### 2.4 Green production

The concept of green extends to almost every process, from acquiring raw materials to production, storing, packaging, shipping, and product distribution (Sdrolia & Zarotiadis, 2019). The primary purpose of green production is sustainability which implies that every manufacturing sector should nurture natural resources for future generations. Furthermore, the

manufacturing industry should know where its responsibilities will end and how its toxic emissions have affected the environment. According to Zhu & He (2017), green product development has long been recognized as an essential topic in sustainable supply chain management, as evidenced by several works of literature. Companies employ technologies like design for environment, design for dissembling, and life cycle analysis to limit the hazardous influence on the environment. From the exposure of green production literature, previous research by Pinto (2020) used the indicators of green production as follows: 1) attempt to eliminate waste in the production process, 2) trying to reduce environmental pollution, 3) trying to implement the recycling process, 4) implementing environmentally friendly production processes, 5) reduce material costs on target, 6) the production process runs efficiently or quickly, 7) improve the timely delivery of goods, 8) not using toxic materials, 9) using technology to make the production process environmentally friendly.

### *2.5 Operational Performance*

The business performance success is judged primarily on cost, quality, flexibility, and delivery. Operating performance has also been shown to promote a firm's competitiveness among supply chain companies, with each company improving overall operational efficiency and impacting performance (Siagian et al., 2022). Supply chain management (SCM) has a distinct impact on business performance that is both favorable and independent. However, operational, and financial aspects influence operational performance (Santoso et al., 2022). Financial performance is projected to improve due to combining SCM and business performance, such as improved sales and profits (Lee, 2021). Operational performance refers to metrics like productivity, product quality, and customer happiness tied to a company's internal operations (Tarigan & Siagian, 2021). According to operational performance, manufacturing businesses' capabilities and resources should be focused on growing priority enhancements that affect strategic capabilities (Abdallah & Al-Ghwayeen, 2020; Siagian and Tarigan, 2021). Firm performance is defined as a broad concept covering various dimensions of company operations, management, and competitive advantage (Tarigan, Siagian, & Jie, 2020). The performance measurement is based on financial performance, customer satisfaction, customer complaints, and non-financial performance (Tseng & Liao, 2015). Firm performance is something the company produces in a certain period regarding the standards set. Its measurement indicators determine the company's competitiveness as a form of its operational performance, including improved efficiency, quality improvement, productivity improvement, and cost savings (Cosimato & Troisi, 2015).

Operational performance in the procurement function is determined by several measurement items, including companies getting high-quality raw materials, companies getting the lower price of raw materials, companies getting materials with fast lead times, and lower total costs to provide efficiency for the company (González-Benito et al., 2016). Supply chain performance, which is determined as operational performance, is related to reducing manufacturing/service costs, delivery reliability, and conformance quality. Manufacturing performance is also defined in customer satisfaction, delivery, flexibility, and speed (Sundram et al., 2018). The supply chain performance stated by (Gawankar et al., 2017) related to purchasing is material efficiency, supply chain integration, supply chain flexibility, product quality, partnership quality, and product innovation. Firm performance is the goal of a company determined by two dimensions, namely market share performance and financial performance (Al-Shboul et al., 2017). Operational competitive capabilities indicators reduce cost, improve quality, delivery, and flexibility (Famiyeh et al., 2018). Performance is a function of two variables, efficiency, and effectiveness. Firm performance is defined as how the company achieves its market goals and overall objectives. The firm's performance is the actual results or output produced by a company, measured, and compared with the expected outcome (Sundram, 2011). A clear definition of firm performance is needed in clarifying the multidimensional relationship between supply chain integration and firm performance (Basana et al., 2022). Existing supply chain integration is increasingly focused on testing the benefits of supply chain integration associated with operations and business together (Tseng & Liao, 2015). Operational performance and business performance are two measures of firm performance. Specifically, operational performance refers to an increase in a company's response to a changing environment relative to its competitors (Al-Shboul et al., 2017).

In contrast, business performance refers to financial performance related to return on investment, profitability, and net profit (Novitasari & Tarigan, 2022). The firm performance itself is the actual results or output produced by a company, which is then measured and compared with the expected results or outcome (Sundram, 2011). In this study, the operational performance is assessed by adopting the indicators used as follows: 1) improve the quality of the product, 2) reduce lead time or faster delivery process, 3) improve its competitive position in the market, 4) improve product development, 5) Increase sales in international markets.

### *2.6 Formulation and formation of hypotheses*

#### *2.6.1 Top management commitment and green purchasing*

A study focused on ISO certified suppliers in Malaysia revealed that top management commitments and supplier relationships have significant positive associations with green purchasing practices (Shaharudin et al., 2018). Furthermore, top management commitment was an essential driver of green purchasing (Blome et al., 2014). Yen & Yen, (2012) examine internal motives that influence companies' adoption of green purchasing, such as top management commitments and partnerships with suppliers and external motives that include regulatory and customer pressures. Furthermore, a study by Basana et al. (2022) in the 3-star hotel in East Java found that top commitment management positively influences the adoption

of green hotel and supplier and customer integration management. Moreover, a survey on 81 manufacturing companies in East Java, Indonesia, found that top management commitment directly influences green purchasing and supply chain practices, and green purchasing affects supply chain management practices and operational performance (Siagian et al., 2021). Hence, the following hypothesis is proposed:

**H1:** Top management commitment affects green purchasing

*2.6.2 Top management commitment and green production*

A study has been conducted by Burki et al. (2019) on 181 ISO 14000 certified Turkish exporting firms, including textile, chemical, food, and electrical, located in the Izmir region (Turkey). The result indicated that top management commitment is essential in succeeding the green process innovation on the exporting firms. The green process innovation is part of green production. Another study on the Indian automotive industry with 96 respondents indicated that top management commitment directly and positively affects green product innovation (Bhatia & Jakhar, 2021). The green product innovation in his study showed that the term of green product innovation resembles green production in this study. Findings from a study of 148 Chinese manufacturing firms indicated that top management championship has a positive and significant relationship with green culture and green practices, including green production (Li et al., 2019). These arguments propose the following hypothesis:

**H2:** Top management commitment influences green production

*2.6.3 Top management commitment and operational performance.*

Top management commitment to mission statements modulates mission impact on firm performance through communication, company-wide engagement, setting targets, and revisions on time (Williams et al., 2014). Top management commitment has a significant relationship with the performance of new products (Mokhtar & Yusof, 2010). Research by Caroline et al. (2016) shows a significant relationship between top management and performance. A study by (Siagian et al., 2020) indicated that effective leadership affects business performance. In addition, a study by Semuel et al. (2017) also suggested that leadership positively improves the firm performance in the manufacturing industry in Indonesia. Beside effective leadership practices in a manufacturing company contribute to improving organizational performance (Tarigan et al., 2021). Moreover, a study by Jade et al., (2021) suggested that transformational leadership could enhance firm performance in the manufacturing industry. This study was conducted on the manufacturing industry in East Java, Indonesia. Therefore, the hypothesis is formulated as follows:

**H3:** Top management commitment affects operational performance.

*2.6.4 Green purchasing and operational performance*

Green purchasing is also considered a strategic function in manufacturing companies (Tarigan & Siagian, 2021). Green purchasing practices are also responsible for acquiring environmentally friendly materials of appropriate quality at the right price (Santoso et al., 2022). Then green purchasing evaluates vendors and management to reduce the cost of materials to improve the quality of environmental friendliness as a manufacturing process at the beginning (Ambekar et al., 2021). Dubey et al. (2013) stated that most internal suppliers from both manufacturing and retail apply significant pressure to outside suppliers to practice environmentally friendly supply chain activities effectively. Various case studies from companies in Europe and Australia have shown that green procurement practices are used as a tool to achieve a competitive advantage to improve operational and financial performance. Green purchasing minimizes the use of raw materials, develops suppliers, and reduces source sources to create efficiency in green supply chain practice activities that will improve the company's operational performance (Dubey et al., 2017; Sundram et al., 2018; Nguyen et al., 2022). Furthermore, a study by Siagian et al. (2021) has surveyed 81 manufacturing companies in East Java, Indonesia, and found that green purchasing improves operational performance. Green purchasing is a policy of top management by implementing the procurement function to care for the environment, and green purchasing in companies has a positive and significant impact on operational performance (González-Benito et al., 2016). Green purchasing influence on competitive operational outcomes is related to reducing cost, improving quality, delivery time, and flexibility (Famiyeh et al., 2018; Siagian et al., 2022). Based on this discussion, the following hypothesis is proposed:

**H4:** Green purchasing improves operational performance.

*2.3.6 Green production and operational performance.*

Sezen and Çankaya (2013) states that green production and innovation processes reduce the impact on the environment and increase the company's competitive advantage and green image. The company's competitive advantages include the quality of the production process that produces environmentally friendly goods (Siagian et al., 2022). Dubey et al. (2017) argue that green manufacturing, also green production, consists of design processes, product design, and high efficiency. The company's production capacity increases and improves the company's operational performance. Green manufacturing can have the

ability to reduce costs, introduce new technologies and improve the work environment (Gawankar et al., 2017). Furthermore, the company can improve its performance through environmentally friendly production from its factories and the entire production chain process (Foo et al., 2019). Hence, the fifth hypothesis is determined as follows:

**H5:** Green production affects operational performance.

*2.3.6 Green purchasing and green production*

Green purchasing focuses on working with suppliers to develop environmentally friendly products and ensuring purchased products meet the company's environmental friendliness criteria. The criteria include reducing or eliminating hazardous items, reducing waste of natural resources, and helping to realize recycling and recovery of material purchases (or reusable materials) (Pinto, 2020). Younis et al. (2016) suggest that green purchasing can also be defined as an environmental purchasing initiative that aims to ensure the purchase of products and materials that comply with the company's environmental friendliness criteria. The criteria include reducing excessive use of natural re-sources, recycling, reusing, and life-cycle costs of a product (Hsu et al., 2014). Based on the above discussion, the seventh hypothesis is postulated.

**H6:** Green purchasing affects green production.

*2.3.9 Top management commitment and operational performance through the mediation of green purchasing*

Green purchasing practicing consists of hazardous material substitution with the environment-friendly product and can then improve the quality of raw materials to impact the quality performance of goods expected by the company and, in the end, improve the firm performance (Achillas et al., 2018; Dubey et al., 2014; Yu et al., 2015). Green purchasing practices require new resources such as human resources, financial resources. In addition, green purchasing adoption needs a new strategy and policies directing the organization's activities in selecting the supplier capable of fulfilling the green purchasing. The resources allocation, establishment of the policies, and supplier selection procedure constitute the top management responsibility. As indicated by previous studies, the top management commitment affects the success of the green purchasing practices (Blome et al., 2014; Yen & Yen, 2012). Hence, this argument implies that top management commitment affects operational performance through the mediation of green purchasing.

**H7:** Top management commitment affects operational performance through green purchasing.

*2.3.9 Top management commitment and operational performance through green production*

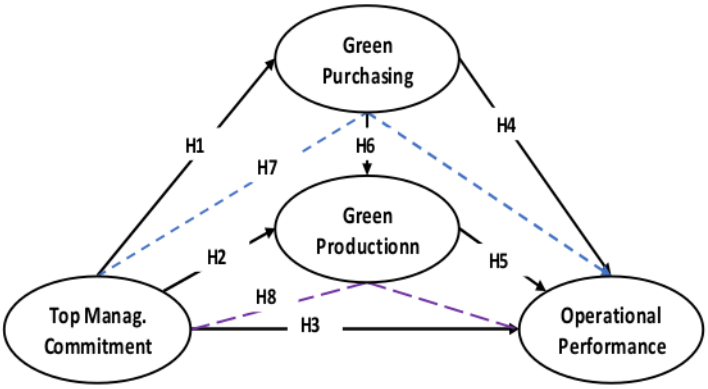
Green production process applications can benefit from competitive environmental friendliness, which can finally satisfy its customers and bring the company to grow more rapidly in implementing its company operations (Achillas et al., 2018). Furthermore, green production can reduce the cost of energy consumption to improve products through their quality (Sezen & Çankaya, 2013). Therefore, the company can gain a competitive advantage through green products because it can sell by-products at relatively lower prices, or companies can modify them to be products with good quality. In the same way, the company can increase flexibility and reduce the company's production costs. On the other hand, top management commitment is highly required to ensure the success of green production since it needs resources allocation such as new technology, human resources, and new capability. As has been discussed previously, top management commitment is required and affects the green production practice (Burki et al., 2019; Bhatia & Jakhar, 2021; Li et al., 2019). Based on this argument, a further hypothesis is postulated as follows.

**H8:** Top management commitment affects operational performance through green production.

*2.3.9 Top management commitment, green purchasing, green production, and operational performance*

It has been noticed previously that top management commitment directly affects green purchasing since it needs new policies from the top management (Achillas et al., 2018; Dubey et al., 2014; K. Yu et al., 2015). The previous research also revealed that top management commitment is essential and required to adopt the green production since it needs the resource allocation, which is the domain of the top management (Burki et al., 2019; Bhatia & Jakhar, 2021; Li et al., 2019). This argument implies that top management indirectly affects operational performance through green purchasing and green production. Hence, the last hypothesis is proposed as follows:

**H9:** Top management commitment indirectly and positively affects operational performance through green purchasing, and green production.




Note. 1) black color line indicates the direct relationship, 2) colored dot line indicates the indirect relationship

**Fig. 1**. Research framework

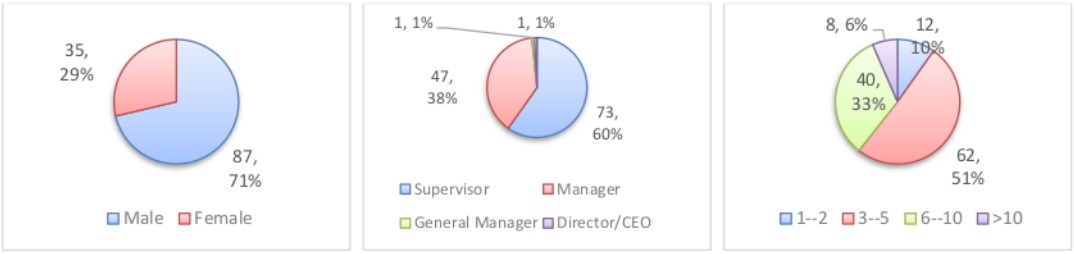
## 3 Research Method

This study collected empirical data through an online and paper-based survey in Indonesia. Notably, a survey questionnaire was built for gathering data from manufacturing companies engaged in food and beverage, textile, and pharmacy in East Java, Indonesia. The survey was distributed to 578 companies, through mail or online and by postal delivery. A list of the companies was selected from the Central Bureau of Statistics of East Java Province (2020). The sample criteria are only those categorized as manufacturing companies. The company is a legal entity with a good financial flow, so it deserves to be used as a survey. The stratified random sampling method was used as the sampling technique. This sampling method is very efficient among probability methods where all groups can be sampled equally. The method divides the population into groups exclusively relevant, appropriate, and meaningful to research or study science (Sekaran & Bougie, 2016). The initial screening survey targeted the managerial level in the manufacturing companies. The letter from the institution was attached to let the respondents understand the purpose of this research. The questionnaires returned were 133; however, 11 respondents were reluctant to fill out questionnaires. Therefore, the usable data was 122, corresponding to a response rate of 21%. All measurement items for each construct have been determined in previous literature and adopted in designing the questionnaire. The questionnaire items lists are separated into two parts: the screening process and the main statement item adapted from the previous literature. The questionnaire is designed with a seven-point Likert scale (1= strongly disagree, 2= disagree, 3= somewhat disagree, 4= neutral, 5= somewhat agree, 6= agree, 7= strongly agree. The respondents were requested to either agree or disagree with their objective opinion. As determined in the literature section, ERP measurement instruments adopted research by Santoso et al. (2022) with green purchasing instruments using Hsu et al. (2014). Green production instruments use Pinto (2020), and operational performance instruments use Lai & Wong (2012). Green purchasing with six items, five items, green production with nine items, ERP with seven items, operational performance with five items.

## 4. Results

### *4.1 Descriptive Statistics*

The first stage of analysis is descriptive analysis to observe the profile of the respondents in terms of gender, job position, and working experiences. Fig. 2 illustrates the composition of respondents' profiles. The respondents consist of males and females. The majority of them are male, indicating that it is in line with the current social culture in the manufacturing industry that most employees are male. The respondent is in charge of the various departments such as the respondent profile.




Gender | Job position | Working experience (in years)

**Fig. 2.** Descriptive statistics

Based on the job position, the respondents have a position which is involved in the company's strategic decision making such as supervisor, up to the director. This composition indicated that they are eligible as respondents and capable of responding to the item statement in the questionnaire. In addition, respondents have sufficient working experience distributed within the range of 1 up to 10 years more. This result indicated that most of the respondents are familiar with the company's operation and decision-making. Based on the department of the respondents, Fig. 3 shows that most respondents oversee the department related to this research requirement and understand the function of the supply chain in the company. Further analysis is to assess the validity and reliability of the measurement model. Data analysis used SmartPLS software version 3.0. The validity test assesses the factor loading for convergent validity and the Forner-Larcker criterion for discriminant validity. An indicator is considered to have convergent validity once it has a factor loading value exceeding 0.50 (Hair et al., 2019).

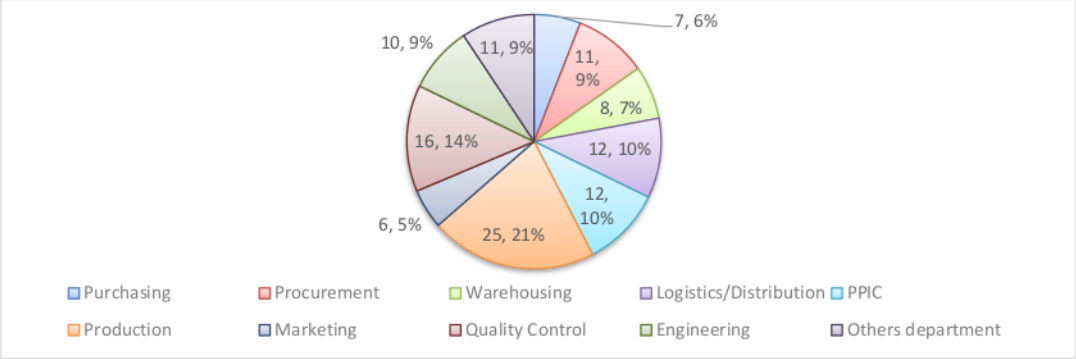



**Fig. 3.** Department Profile

In addition, the value of the outer variance inflation factor (VIF) addresses the collinearity between indicators, with the VIF value requirement being less than 5.0 (Hair et al., 2019). The result indicated that VIF is in the range of 1.540 – 3.748, which implies that those indicators satisfy the VIF requirement values. Besides convergent validity, the measurement item needs to examine the discriminant validity to ensure that all indicators correlate higher than other constructs. The Forner-Larcker criterion is used to address the discriminant validity, as shown in Table 1. The square root value of the AVE of each construct (written in bold) is greater than its correlation with other constructs. Hence the discriminant validity of the indicators is satisfied.

**Table 1**
Validity and reliability of the variables

| Construct | Item number | Mean | Factor Loading | Outer VIF | Composite Reliability | AVE |
|---|---|---|---|---|---|---|
| Top management commitment | TO1 | 6.426 | 0.738 | 1.540 | 0.888 | 0.570 |
| | TO2 | 6.123 | 0.804 | 2.589 | | |
| | TO3 | 5.918 | 0.747 | 2.193 | | |
| | TO4 | 6.402 | 0.728 | 1.715 | | |
| | TO5 | 6.148 | 0.748 | 1.735 | | |
| | TO6 | 6.139 | 0.761 | 1.786 | | |
| Green purchasing | GP1 | 6.049 | 0.771 | 1.965 | 0.880 | 0.551 |
| | GP2 | 5.877 | 0.789 | 1.937 | | |
| | GP3 | 5.492 | 0.724 | 1.783 | | |
| | GP4 | 5.762 | 0.756 | 1.705 | | |
| | GP5 | 6.049 | 0.661 | 1.559 | | |
| | GP6 | 5.508 | 0.744 | 2.101 | | |
| Green production | GPR1 | 5.861 | 0.734 | 3.245 | 0.915 | 0.549 |
| | GPR2 | 5.943 | 0.748 | 2.102 | | |
| | GPR3 | 5.754 | 0.731 | 1.974 | | |
| | GPR4 | 5.951 | 0.881 | 3.748 | | |
| | GPR5 | 5.648 | 0.775 | 3.537 | | |
| | GPR6 | 6.156 | 0.562 | 1.433 | | |
| | GPR7 | 6.098 | 0.790 | 2.725 | | |
| | GPR8 | 6.057 | 0.779 | 2.308 | | |
| | GPR9 | 6.041 | 0.618 | 1.742 | | |
| Operational performance | OP1 | 6.320 | 0.783 | 1.731 | 0.872 | 0.580 |
| | OP2 | 5.840 | 0.578 | 1.237 | | |
| | OP3 | 6.160 | 0.843 | 2.098 | | |
| | OP4 | 6.310 | 0.759 | 1.609 | | |
| | OP5 | 6.130 | 0.815 | 2.001 | | |

The further analysis addresses the inner model assessment of coefficient of determination ($R^2$) and predictive relevance denoted as Q2. Table 2 shows the results of R square measurements with values in the moderate range (0.30 - 0.60). The value of R square is the value obtained using research data from the survey results, while adjusted R square is the value of R square corrected based on the number of samples adjusted. The value of R square measures the extent to which the variance of the influencing variable explains the variance of the variable in question. For example, operational performance has a value of R square 0.562 which means the variance of operational performance can be explained by ERP, green purchasing, and green production up to 56.2%. The rest of the variance, which was not explained in the study, was explained by other variables. The determination coefficient (R2) values have the criteria as follows. The coefficient is unacceptable at the value below 0.19, low 0.19–0.33, moderate 0.33–0.67 and good at 0.67 or more (Chin, 1998). The result in Table 6 indicated the R square value of 0.432, 0.563, and 0.630 which are moderate level.

**Table 2**
R2 and Q2 assessment result

| Variable | R Square | R Square Adjusted | Q Square |
|---|---|---|---|
| Top Management Commitment | - | - | - |
| Green production | 0.563 | 0.555 | 0.295 |
| Green purchasing | 0.432 | 0.427 | 0.220 |
| Operational performance | 0.630 | 0.620 | 0.352 |

Table 2 also shows the value of Q2, which is greater than zero. According to Hair et al. (2017), the value of Q2 greater than zero indicates that the model has an excellent predictive relevance. Therefore, the research model involving the four constructs, namely, top management commitment, green purchasing, green production, and operational performance, have good predictive relevance. Finally, Goodness-of-fit (GoF) in PLS-SEM has no standard statistic like in CB-SEM. The calculation of goodness of fit (GoF) uses the square root of multiplication between the mean of the determination coefficient (R2) and AVE (Henseler & Sarstedt, 2013), as shown in Eq. (1). The result indicated the value of 0.548, which is a good fit (> 0.36).

$$GoF = \sqrt{R^2 x\ AVE} = \sqrt{0.534\ x\ 0.5625} = 0.548 \quad (1)$$

*2.6 The Hypothesis*

Table 2 shows the test result of the hypotheses examination that have been formulated in the previous section. The hypotheses consist of six direct hypotheses and three indirect hypotheses. As shown, all direct hypotheses (H1-H6) were supported. A hypothesis is supported if the T statistics value exceeds 1.96 or p-value less than 0.05 (for a significant level of 5%).

**Table 2**
Direct and Indirect hypothesis Testing Result

| Hypothesis | Path Coefficient | T Statistics | P Values | Supported |
|---|---|---|---|---|
| Top management commitment → green purchasing (H1) | 0.657 | 9.237 | 0.000 | Yes |
| Top management commitment → green production (H2) | 0.231 | 2.767 | 0.006 | Yes |
| Top management commitment → operational performance (H3) | 0.235 | 2.872 | 0.004 | Yes |
| Green purchasing → green production (H4) | 0.578 | 7.355 | 0.000 | Yes |
| Green purchasing → operational performance (H5) | 0.272 | 2.688 | 0.007 | Yes |
| Green production → operational performance (H6) | 0.388 | 4.783 | 0.000 | Yes |
| Top management commitment → green purchasing → operational performance (H7) | 0.179 | 2.581 | 0.010 | Yes |
| Top management commitment → green production → operational performance (H8) | 0.090 | 2.341 | 0.019 | Yes |
| Top management commitment → green purchasing → green production -> operational | 0.147 | 3.419 | 0.001 | Yes |

Furthermore, the direct and indirect hypotheses assessment result is indicated in Table 2. Three indirect hypotheses were proposed, and the result shows all hypotheses (H7-H9) were supported.

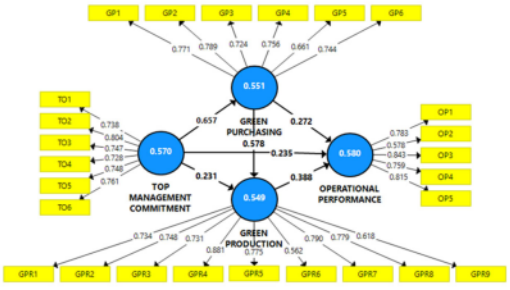



**Fig. 4.** Path Analysis Result

Fig. 4 summarizes the research model with the analysis results using smartPLS software. The yellow boxes represent the indicator of the variable. The value lies on the line between the variable, and the indicator is the factor loading values. Furthermore, the value inside the circle indicates the average variance extracted (AVE), and the value of the line between variables is the path coefficient value.

## 5. Discussion

The first hypothesis (H1) states that top management commitment positively affects green purchasing is supported. This finding implies that top management commitment of the company, such as setting company goals, developing employees, providing adequate training for employees, being willing to achieve the company target, providing resources when needed, and evaluating the activities regularly. This result support previous research that top management commitment improves green performance success (Blome et al., 2014; Shaharudin et al., 2018; Siagian et al., 2021; Yen & Yen, 2012). The second hypothesis (H2) states that top management commitment affects green production is also supported in this study. The strong management commitment in allocating the resources in terms of green production technology, human resources, and goal setting enables the company to adopt the green production system (Chu & Chen, 2016). As defined before, the green production practices include the following activities: eliminating waste in the production process; reducing environmental pollution; implementing the recycling process; implementing environmentally friendly production processes; reducing material costs, production process runs efficiently or quickly; improving the timely delivery of goods; not using toxic materials and using technology to make the production process environmentally friendly. Therefore, those activities require a top management commitment, mainly providing resources, new policies, and company goals. Hence, it is reasonable that top management commitment supports green production practices. This finding extends the acceptance of previous studies by (Bhatia & Jakhar, 2021; Burki et al., 2019; Li et al., 2019).

The third hypothesis (H3) states that top management commitment affects operational performance. The analysis indicated that this statement is empirically supported. As noticed in the literature review, operational performance is measured in terms of improving the quality of the product, reducing lead time or faster delivery process, improving its position to compete in the market, improving product development, and increasing sales in international markets. It can be seen that operational performance needs a strong management commitment in allocating the required resources and policies. Hence, it is reasonable that top management commitment enables the organization to improve operational performance. This finding is consistent with the previous studies (Caroline et al., 2016; Jade et al., 2021; Mokhtar & Yusof, 2010; Semuel et al., 2017; Siagian et al., 2020; Tarigan et al., 2021). Furthermore, the results also revealed that the fourth hypothesis (H4) stating green purchasing affects operational performance is supported. The manufacturing companies purchasing environmentally friendly products used in their product design creates positive profits. In addition, prior notice has indicated that customers have shifted their preference orientation toward environmentally friendly or green oriented products. Hence, it is reasonable that green purchase will improve sales dan performance of the manufacturing companies. This finding extended the acceptance of previous studies that green purchasing affects the operational performance of manufacturing companies (Ambekar et al., 2021; Dubey et al., 2013; Famiyeh et al., 2018; González-Benito et al., 2016; Siagian et al., 2021).

Besides, the fifth hypothesis (H5) is supported, stating that green production affects operational performance. Green production is practiced in waste elimination, reduced environmental pollution, recycling process implementation, environmentally friendly production processes, reduced material costs, efficient production process, timely delivery, avoiding toxic materials usage, and using environmentally friendly technology. Green production enables the manufacturing companies to fulfill the customer preferences in the ecological friendly product, and in the end, increase sale and operational performance. This finding proved the extended acceptance of previous studies suggesting that green production enhances operational performance (Dubey et al., 2014; Foo et al., 2019; Sezen & Çankaya, 2013). Instead, the seventh hypothesis (H6) is supported that green purchasing influences green production. Companies practice environmentally friendly production by reducing or eliminating hazardous materials or materials, reducing excessive use of sources, and encouraging recycling and purchasing reusable materials (Hsu et al., 2014; Pinto, 2020; Younis et al., 2016).

In the literature review section, this study also formulated the hypotheses on the mediating role of green purchasing and green production on the relationship of top management commitment and operational performance. The analysis result revealed that three hypotheses were supported. The hypothesis (H7) test revealed top management commitment improves operational performance in the manufacturing industry through the mediating role of green purchasing. This finding is interpreted as follows. Top management commitment, such as setting company goals and policies and providing resources, enables the organization to practice green purchasing, such as selecting the capable supplier to provide the green-oriented product. This required supplier usually has an ISO 14000 certification and can provide environmentally friendly products. Subsequently, green purchasing will improve the operational performance of the company. In addition, hypothesis H8 is also supported in this study. The interpretation of the finding is addressed as follows. Top management commitment enables the organization to determine the goals and policy of the company to adopt green production, and subsequently, the green production will improve the operational performance. The last hypothesis (H9) stating that top management commitment indirectly improves operational performance through green purchasing and green production is also supported in this study. These three hypotheses are new findings of this study revealing the mediating role of green purchasing and green production on the relationship between top management commitment and operational performance. This result implies that top management

commitment pro-vides multiple impacts on the operating performance of the manufacturing companies, either direct impact or indirect impact. While the direct effect of top management commitment, green purchasing, and green production on operational performance provided an extended acceptance of previous studies as addressed in the literature review section.

## 6. Managerial Implication and Theoretical Contribution

This study revealed exciting findings and could provide essential insight for the managerial level. Firstly, the finding of this study indicated the extended acceptance of various previous studies in different populations and geographical positions. The result indicated that top management commitment directly affects green purchasing, green production, and operational performance. Besides, green purchasing and green production directly enhance operational performance. The essential insight from this finding could be withdrawn as follows. While the adoption of green purchasing and green production still has pros and cons among the practitioners regarding cost and benefit, this study revealed that the adoption of green purchasing and green production, supported by a strong management commitment, could improve the operational performance of the companies. Hence, company management does not need to hesitate to practice green purchasing and green production. Indeed, the adoption of green purchasing and green production requires investment in providing resources such as new production technology. Still, the company will benefit from practicing green adoption at the end and long term in the future. Secondly, the top management commitment has multiple effects on operational performance through the mediating role of green purchasing and green production. It implies that the management's strong commitment to providing the required resources is essential to the success of the green adoption. Otherwise, the benefit of practicing green purchasing and green production will not succeed.

This study contributes to the supply chain management theories, particularly on the relationship of top management commitment, green purchasing, green production, and operational performance. An interesting contribution from the finding in this study is the role of green purchasing and green production, which mediate the relationship of top management commitment and operational performance. Therefore, these findings could enrich the current supply chain management research.

## 7. Conclusion

This research has investigated how Top management commitment improves operational performance through green purchasing and green production in the manufacturing industry in East Java. This study has surveyed 122 manufacturing companies engaged in food and beverage, textile, and pharmacy in East Java, Indonesia. The conclusion of the results is highlighted as follows. The study has developed nine hypotheses to be examined, consisting of six hypotheses of direct relationship and three of indirect relationship between constructs. The result revealed that top management commitment enhanced green purchasing (H1), green production (H2), and operational performance (H3). Furthermore, operational performance is directly affected by green purchasing (H4) and green production (H5). Moreover, green purchasing supports green production (H7). In addition, Top management commitment indirectly improves operational performance through green purchasing (H7) and green production (H8). Lastly, top management commitment indirectly affects operational performance simultaneously through green purchasing and green production (H9). The findings in this study consist of two groups of the result. Firstly, the analysis on the direct relationship between constructs (6 hypotheses) extends the acceptance of previous studies in the population of manufacturing companies, including food and beverage, textile, and pharmacy. Secondly, this study revealed the role of green purchasing and green production, which mediates the influence of top management commitment on operational performance.

This result provides essential insight and paves the way for the manager in the manufacturing industry that practicing environmental protection such as green purchasing and green production enhances operational performance. Therefore, manufacturing companies do not need to hesitate to practice and be involved in ecological protection. The novelty of this study, which does not exist before to the authors' best knowledge, is the revelation of the mediating role of green purchasing and green production in the influence of top management commitment on operational performance. Hence, this study enriches the current supply chain management research, particularly the relationship between top management commitment, green purchasing, green production, and operational performance. Finally, this research has a limitation on the population coverage, which focuses on the manufacturing companies in East Java, Indonesia, and constructs involved in the study model. For future research, the author suggested covering a broader population and industrial sectors such as the service industry and including additional constructs such as digital technology, innovation, and customer relationship management.

## References

Abdallah, A. B., & Al-Ghwayeen, W. S. (2020). Green supply chain management and business performance: The mediating roles of environmental and operational performances. *Business Process Management Journal, 26*(2), 489–512. https://doi.org/10.1108/BPMJ-03-2018-0091

Achillas, C., Bochtis, D. D., Aidonis, D., & Folinas, D. (2018). *Green supply chain management*, 1st ed.; Routledge, London, pp. 30-62, https://doi.org/10.4324/9781315628691

Al-Shboul, M. A. R., Barber, K. D., Garza-Reyes, J. A., Kumar, V., & Abdi, M. R. (2017). The effect of supply chain management practices on supply chain and manufacturing firms' performance. *Journal of Manufacturing Technology Management*, *28*(5), 577–609. https://doi.org/10.1108/JMTM-11-2016-0154

Ambekar, S. S., Deshmukh, U., & Hudnurkar, M. (2021). Impact of purchasing practices, supplier relationships and use of information technology on firm performance. *International Journal of Innovation Science*, *13*(1), 118–130. https://doi.org/10.1108/IJIS-10-2020-0182

Basana, S. R., Suprapto, W., Andreani, F., & Tarigan, Z.J.H. (2022). The impact of supply chain practice on green hotel performance through internal, upstream, and downstream integration. *Uncertain Supply Chain Management*, *10*(1), 169-180, DOI: 10.5267/j.uscm.2021.9.010

Blome, C., Paulraj, A., & Schuetz, K. (2014). Supply chain collaboration and sustainability: a profile deviation analysis. *International Journal of Operations & Production Management*, *34*(5), 639–663. https://doi.org/10.1108/IJOPM-11-2012-0515

Çankaya, S.Y., & Sezen, B. (2019). Effects of green supply chain management practices on sustainability performance. *Journal of Manufacturing Technology Management*, *30(1)*, 98–121. https://doi.org/10.1108/JMTM-03-2018-0099

Chu, T. H., & Chen, Y. Y. (2016). With good We become good: Understanding e-learning adoption by theory of planned behavior and group influences. *Computers & Education*, *92–93*, *37–52*. https://doi.org/10.1016/J.COMPEDU.2015.09.013

Cosimato, S., & Troisi, O. (2015). Green supply chain management. *TQM Journal*, *27*(2), 256–276. https://doi.org/10.1108/TQM-01-2015-0007

Diabat, A., & Govindan, K. (2011). An analysis of the drivers affecting the implementation of green supply chain management. *Resources, Conservation and Recycling*, *55*(6), 659–667. https://doi.org/10.1016/j.resconrec.2010.12.002

Dubey, R., Bag, S., and Ali, S.S., & Venkatesh, V. (2013). Green purchasing is key to superior performance: an empirical study. *International Journal Procurement Management*, *6*(2), 187–210. https://doi.org/10.1504/IJPM.2013.052469

Dubey, R., Gunasekaran, A., & Papadopoulos, T. (2017). Green supply chain management: theoretical framework and further research directions. *Benchmarking: An International Journal*, *24*(1), 184–218. https://doi.org/10.1108/BIJ-01-2016-0011

Gawankar, S. A., Kamble, S., & Raut, R. (2017). An investigation of the relationship between supply chain management practices (SCMP) on supply chain performance measurement (SCPM) of Indian retail chain using SEM. *Benchmarking*, *24*(1), 257–295. https://doi.org/10.1108/BIJ-12-2015-0123

González-Benito, J., Lannelongue, G., Ferreira, L. M., & Gonzalez-Zapatero, C. (2016). The effect of green purchasing on purchasing performance: the moderating role played by long-term relationships and strategic integration. *Journal of Business and Industrial Marketing*, *31*(2), 312–324. https://doi.org/10.1108/JBIM-09-2014-0188

Govindan, K., Kaliyan, M., Kannan, D., & Haq, A. N. (2014). Barriers analysis for green supply chain management implementation in Indian industries using analytic hierarchy process. *International Journal of Production Economics*, *147*(PART B), 555–568. https://doi.org/10.1016/j.ijpe.2013.08.018

Hsu, P. F., Hu, P. J. H., Wei, C. P., & Huang, J. W. (2014). Green purchasing by MNC subsidiaries: The role of local tailoring in the presence of institutional duality. *Decision Sciences*, *45*(4), 647–682. https://doi.org/10.1111/deci.12088

Kalyar, M. N., Shoukat, A., & Shafique, I. (2020). Enhancing firms' environmental performance and financial performance through green supply chain management practices and institutional pressures. *Sustainability Accounting, Management and Policy Journal*, *11*(2), 451–476. https://doi.org/10.1108/SAMPJ-02-2019-0047

Lee, R. (2021). The effect of supply chain management strategy on operational and financial performance. *Sustainability*, *13*(9), 5138. https://doi.org/10.3390/su13095138

Lee, J. C., Shiue, Y. C., & Chen, C. Y. (2016). Examining the impacts of organizational culture and top management support of knowledge sharing on the success of software process improvement. *Computers in Human Behavior*, *54*, 462–474. https://doi.org/10.1016/j.chb.2015.08.030

Li, Y., Ye, F., Dai, J., & Zhao, X. (2019). Sheu, C. The adoption of green practices by Chinese firms: Assessing the determinants and effects of top management championship. *International Journal of Operations and Production Management, 39*(4), 550–572. https://doi.org/10.1108/IJOPM-12-2017-0753

Lyu, G., Chen, L., & Huo, B. (2019). The impact of logistics platforms and location on logistics resource integration and operational performance. *The International Journal of Logistics Management*, *30*(2), 549–568. https://doi.org/10.1108/IJLM-02-2018-0048

Masa'deh, R., Alananzeh, O., Algiatheen, N., Ryati, R., Albayyari, R., & Tarhini, A. (2017). The impact of employee's perception of implementing green supply chain management on hotel's economic and operational performance. *Journal of Hospitality and Tourism Technology*, *8*(3), 395–416. https://doi.org/10.1108/JHTT-02-2017-0011

Nguyen, T.T.T, Nguyen, T.T.T, Tran, T.T., Luong, T.A., & Luu, K.C. (2022). The effect of corporate social responsibility on green supply chain management and firm performance. *Uncertain Supply Chain Management*, *10*(3), 807-818, DOI: 10.5267/j.uscm.2022.3.013

Novitasari, M., & Tarigan, Z.J.H. (2022). The role of green innovation in the effect of corporate social responsibility on firm performance. *Economies*, *10*(5),117. https://doi.org/10.3390/economies10050117

Pinto, L. (2020). Green supply chain practices and company performance in Portuguese manufacturing sector. *Business Strategy and the Environment*, *29*(5), 1832–1849. https://doi.org/10.1002/bse.2471

Sandberg, E., & Abrahamsson, M. (2010). The role of top management in supply chain management practices. *International Journal of Retail and Distribution Management*, *38*(1), 57–69. https://doi.org/10.1108/09590551011016331

Santoso, R. W., Siagian, H., Tarigan, Z.J.H., & Jie, F. (2022). Assessing the benefit of adopting ERP technology and practicing green supply chain management toward operational performance: An evidence from Indonesia. *Sustainability*, *14*, 4944. https://doi.org/10.3390/su14094944.

Sdrolia, E., & Zarotiadis, G. (2019). A comprehensive review for green product term: from definition to evaluation. *Journal of Economic Surveys*, *33*(1), 150–178. https://doi.org/10.1111/joes.12268

Shaharudin, M. R., Zainoddin, A. I., Abdullah, D., Hotrawaisaya, C., Soonthornpipit, H., & Norddin, N. (2020). Factors that influence the green purchasing practices among suppliers of electrical components. *AIP Conference Proceedings*. https://doi.org/10.1063/1.5062692

Shee, H., Miah, S. J., Fairfield, L., & Pujawan, N. (2018). The impact of cloud-enabled process integration on supply chain performance and firm sustainability: the moderating role of top management. *Supply Chain Management*, *23*(6), 500–517. https://doi.org/10.1108/SCM-09-2017-0309

Siagian, H., & Tarigan, Z.J.H. (2021). The central role of IT capability to improve firm performance through lean production and supply chain practices in the COVID-19 era. *Uncertain Supply Chain Management*, *9*(4), 1005-1016, DOI: 10.5267/j.uscm.2021.6.012

Siagian, H., Tarigan, Z.J.H., and Basana, R.B. (2022). The role of top management commitment in enhancing competitive advantage: The mediating role of green innovation, supplier, and customer integration. *Uncertain Supply Chain Management*, *10*(2), 477-494, DOI: 10.5267/j.uscm.2021.12.003

Siagian, H., Tarigan, Z.J.H., & Jie, F. (2021). Supply Chain Integration Enables Resilience, Flexibility, and Innovation to Improve Business Performance in COVID-19 Era. *Sustainability*, *13*, 4669. https://doi.org/10.3390/su13094669

Sundram, V. P. K., Bahrin, A. S., Abdul Munir, Z. B., and Zolait, A. H. (2018). The effect of supply chain information management and information system infrastructure: The mediating role of supply chain integration towards manufacturing performance in Malaysia. *Journal of Enterprise Information Management*, *31*(5), 751–770. https://doi.org/10.1108/JEIM-06-2017-0084

Tarigan, Z.J.H., & Siagian, H. (2021). The effects of strategic planning, purchasing strategy and strategic partnership on operational performance. *Uncertain Supply Chain Management*, *9*(2), 363-372, DOI: 10.5267/j.uscm.2021.2.006.

Tarigan, Z. J. H., Siagian, H., & Jie, F. (2020). The role of top management commitment to enhancing the competitive advantage through ERP integration and purchasing strategy. *International Journal of Enterprise Information Systems*, *16*(1), 53–68. https://doi.org/10.4018/IJEIS.2020010103

Tseng, P. H., & Liao, C. H. (2015). Supply chain integration, information technology, market orientation and firm performance in container shipping firms. *International Journal of Logistics Management*, *26*(1), 82–106. https://doi.org/10.1108/IJLM-09-2012-0088

Whitehouse. (2021). *President Biden invites 40 world leaders to leaders' summit on climate*, The White House, https://uk.usembassy.gov/president-biden-invites-40-world-leaders-to-leaders-summit-on-climate/

Yen, Y. X., & Yen, S. Y. (2012). Top-management's role in adopting green purchasing standards in high-tech industrial firms. *Journal of Business Research*, *65*(7), 951–959. https://doi.org/10.1016/J.JBUSRES.2011.05.002

Yu, W., Chavez, R., Feng, M., & Wiengarten, F. (2014). Integrated green supply chain management and operational performance. *Supply Chain Management*, *19*, 683–696. https://doi.org/10.1108/SCM-07-2013-0225

Yu, Y., Zhang, M., & Huo, B. (2019). The impact of supply chain quality integration on green supply chain management and environmental performance. *Total Quality Management and Business Excellence*, *30*(9–10), 1110–1125. https://doi.org/10.1080/14783363.2017.1356684

Zhang, Q., Zhao, Q., & Zhao, X. (2019). Manufacturer's product choice in the presence of environment-conscious consumers: brown product or green product. *International Journal of Production Research*, *57*(23), 7423–7438. https://doi.org/10.1080/00207543.2019.1624853

Zhu, W., & He, Y. (2017). Green product design in supply chains under competition. *European Journal of Operational Research*, *258*(1), 165–180. https://doi.org/10.1016/j.ejor.2016.08.053

# The effect of top management commitment on improving operational performance through green purchasing and green production

ORIGINALITY REPORT

| 10% | 10% | 8% | 4% |
|---|---|---|---|
| SIMILARITY INDEX | INTERNET SOURCES | PUBLICATIONS | STUDENT PAPERS |

PRIMARY SOURCES

| | | |
|---|---|---|
| 1 | www.1.m.growingscience.com<br>Internet Source | 2% |
| 2 | www.researchgate.net<br>Internet Source | 2% |
| 3 | ouci.dntb.gov.ua<br>Internet Source | 1% |
| 4 | hdl.handle.net<br>Internet Source | 1% |
| 5 | www.m.growingscience.com<br>Internet Source | 1% |
| 6 | www.abacademies.org<br>Internet Source | 1% |
| 7 | Steven Hadikusuma, Hotlan Siagian. "The Influence of IT Capability on Operational Performance Through Internal and External Integration: Evidence from Indonesia", Organizations and Markets in Emerging Economies, 2022 | 1% |

Publication

| | | |
|---|---|---|
| 8 | Thanatchaphan Petcharat, Adisorn Leelasantitham. "A Retentive Consumer Behavior Assessment Model of the Online Purchase Decision-Making Process", Heliyon, 2021<br>Publication | 1 % |
| 9 | Submitted to Mapua Institute of Technology<br>Student Paper | 1 % |
| 10 | www.growingscience.com<br>Internet Source | 1 % |

| | | | |
|---|---|---|---|
| Exclude quotes | On | Exclude matches | < 1% |
| Exclude bibliography | On | | |