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Green supply chain practices and their effects on operational performance: An experimental study in Jordanian private hospitals

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A B S T R A C T

This study aims to identify the level of Green Supply Chain practices and their Impact on Operational Performance of the Jordanian Private Hospitals. The Jordanian private hospital sector consists of 71 private hospitals comprising the study population. The convenience sample was used by distributing the research tool to 280 of the subjects in the study in Jordanian private hospitals. The responses received were 257 responses. Moreover, the analyses related to the research were performed using version 24 of SPSS and AMOS software, and test hypotheses structural equation modeling (SEM) was used. The results indicated that green supply chain practices have an impact on operational performance. Based on the study results, the researchers recommend managers to increase operational efficiency by Integrate sustainability parameters into product design requirements and assess them throughout the design process.

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1. Introduction

Over the last two decades, environmental considerations have become more important for businesses (Mitra &Datta, 2014). When first confronted with calls to be more sustainable in their operations, businesses often looked inside (Darnall, Jolley, & Handfield, 2008; Daily, Bishop, Massoud, 2012). The need to extend environmental initiatives to the supply chain level has grown in prominence as environmental concerns have risen (Linton, Klassen, & Jayaraman, 2007; Vachon, &Klassen, 2008; Lee, Min, &Yook, 2015). As a result of globalization, businesses throughout the globe are under increasing pressure to change their operations to remain competitive and environmentally responsible (Choi, Min, & Joo, 2018; Ogunlela, 2018). Awareness of environmental concerns among the general public is growing, which has implications for all sectors of industry (Özkan, Akyürek, &Toygar, 2013). Organizations are under constant pressure from their stakeholders to increase their green supply chain operations to gain a competitive advantage (Yunus&Michalisin, 2016; Laari, Töyli, &Ojala, 2017). Supply chain performance, competitive advantage, long-term survival, profitability, and business performance are all impacted by environmental and climate changes that have occurred recently (Khaksar, Abbasnejad, Esmaeili, &Tamošaitien, 2016, Al-Awamleh et al., 2022; Muthaher, 2017; Wei & Angkasa, 2016). As a result, businesses must now consider the GSCM and develop a corporate environmental strategy for all products and processes to reduce waste and pollution. Industries that want to reduce their environmental footprint may discover that their ability to manage complex supplier relationships limits their ability to do so (Darnall, & Cho, 2019), so one way to reduce environmental effects is to develop Green Supply Chain Management (GSCM) practices and control business activities from raw material suppliers to end customers, as well as the

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relationship that joins these partners together in green supply chains through their activities. This provides a platform for both corporate excellence and environmental sustainability (AlTaweel & Al-Hawary, 2021; Al-Hawary & Al-Syasneh, 2020; Hussain, & Malik, 2020). GSCM is a developing subject whose significance has increased over the last several years due to the rapidly changing business environment and the global nature of supply chains. Nowadays, the competitive nature has transferred from individual firms to supply chains, and environmental management techniques have followed suit. Organizations that embrace GSCM seek to improve environmental and financial performance, IR, and eco-design or design for environmental practices (Zhu & Sarkis, 2004). The modern business environment is being influenced by many factors, one of which is the growing focus on sustainability among corporate bodies. Businesses and the general public face additional pressure since their consumers desire sustainable goods and services (Al-Hawary et al., 2017; Tuttle and Heap, 2008). That's why environmental sustainability has become one of the world's most pressing problems to solve. This study aims to examine the impact of Green supply chain practices on operational performance.

2. Literature review and building of the study hypotheses

2.1 Green supply chain practices

The notion of a green supply chain is relatively new. It is built around two concepts: supply chain management and environmental management. The incorporation of environmental management into supply chain management is known as green supply chain management. It tries to keep wastes contained inside the supply chain system to save energy and prevent the discharge of hazardous elements into the environment. To address how an organization's supply chain procedures affect the environment, GSCM blends ecological concerns with supply chain management concepts. Organizations are becoming increasingly conscious of the need to tightly integrate supply chain and environmental management systems in allowing a sustainable business strategy. Many people are now looking for ideas and direction on how to create a sustainable supply chain (Aityassine et al., 2022; Rahamneh et al., 2023; Al-khawaldah et al., 2022; ANGELA & CHIRCHIR, 2013). Green supply chain practices are included in the concept, which connects manufacturers with supply chain partners (both suppliers and customers) to encourage environmental sustainability across the supply chain. They concluded that, in general, adopting GSCM methods by manufacturing firms leads to enhanced environmental and economic performance, which in turn has a beneficial influence on operational performance. Organizational performance is enhanced by operational performance (ANGELA & CHIRCHIR, 2013).

Green Supplier Chain Management is the practice of organizations attempting to reduce negative environmental consequences in their supply networks. It also involves taking social problems into account in the supply chain, such as ensuring suppliers have appropriate working conditions or that commodities are supplied ethically and equitably across the supply chain. Buying from local suppliers may help assist local economic revitalization, which is an economic part of sustainable SCM. The emphasis of organizations' sustainable supply chain efforts varies, with some emphasizing environmental challenges and others emphasizing social elements (ANGELA & CHIRCHIR, 2013). GSCM refers to the process of organizing and coordinating flows across a supply chain with the major purpose of boosting material flow, decreasing lead times and material costs, and improving product quality and response (Aityassine et al., 2021; Suri, & Burke, 2020). Studying population business performance and how to improve business performance in light of surrounding environmental changes, through supply chain practices, with the existence of contemporary global challenges and the prevalence of the COVID-19 global epidemic, which ruined many organizations, reduced performance levels and global production, and was reflected at its general level. For that reason, it was important to develop a new strategy for the organization's advancement and survival. Therefore, supply chain management strategies play a key role in ensuring the organization's survival and continuity in the face of rapidly changing external conditions (Alhalalmeh et al., 2021; Aityassine et al., 2021). A green supply chain involves reducing the need to make new purchases and increasing the efficiency with which green products are recycled, reused, and replaced (Pinto, 2020). Organizational performance may be affected in the long run by how well environmental issues are managed. Since this is a matter of worry and struggles for many businesses, these firms are actively working to adopt a green supply chain strategy. So, businesses can do more for the environment by adopting green supply chain strategies (Alhalalmeh et al., 2021; Rahmi, 2018).

2.2 Operational performance

OP is the performance associated with a company's internal operations, including productivity, product quality, and customer happiness (Yu et al., 2014; AL-Zyadat et al., 2022). It also refers to the consequences achieved by specialized operational skills (Tan et al., 2007). OP also referred to enhancements implemented by a company in reaction to a shifting competitive climate (AlTaweel & Al-Hawary, 2021; Flynn et al., 2010). According to Ho et al. (2002), OP relates to manufacturing capabilities and resources that should concentrate on enhancing competitive objectives that are expressed in strategic orientation. In today's world, businesses should strive to operate in some of the most efficient and productive manner possible to meet the changes in these dynamic and unstable situations to enhance their operational performance (OP) (Al- Quran et al., 2020; Slack et al., 2004). According to Green et al. (2012), OP is assessed using many indicators, such as quality, delivery, flexibility, innovation, stock levels, quality of products, line of products, resource utilization, better efficiency, reduced lead times, and enhanced employee satisfaction.

2.3 GSCM and operational performance

Organizations now operate under complex regulatory frameworks, face rising pressure from stakeholders, and must meet ever-higher standards for environmental performance. To thrive in today's market, firms must include environmentally conscious strategies—also known as "green business practices"—into their standard operating procedures and provide evidence of proactive management of the environmental implications of their operations. However, this is no simple feat. The implementation of eco-friendly procedures in businesses is hampered by several obstacles. These "supply chain" obstacles must now be identified, analyzed, and managed by manufacturing company business managers for their companies' business processes to be efficient and successful in resolving environmental problems (Kalpande & Toke, 2020)

Several academics argue that organizations adopt GSCPs mostly out of a desire to boost their performance; however, GSCP deployment harms bottom-line results (Feng et al., 2018). In addition to GSCP adoption, tools like JIT and TQM have been shown to help boost performance. Research by Green et al. (2019a) on American manufacturers indicated that GSCPs, JIT, and TQM all worked together to create a more productive environment. Although previous research has considered TQM and JIT to be precursors of GSCPs, this investigation instead models these concepts as mediating factors. GSCM is projected to improve OP by enhancing product quality, reducing the level of inventory, as well as increasing delivery efficiency. Yu et al. (2014) showed that GSCM methods had beneficial benefits on OP's flexibility, distribution, quality, and expenses. GSCM methods allow for the enhancement of operational efficiencies, the recovery of waste material, and the recruitment of new suppliers and customers. As a result, these approaches enable enterprises to cut costs and delivery time via collaboration with customers and suppliers, as well as lower stock levels, hence boosting OP (Zailani et al., 2012a; Lee et al., 2012; Laosirihongthong et al., 2013). Optimized OP is anticipated to boost organizational performance through cost savings and revenue growth (Laosirihongthong et al., 2013). OP's outstanding operational efficiency has been identified as a source of competitive advantage and excellent company success (Terjesen et al., 2011). In addition, company performance will be enhanced by the effective usage of operations that enables firms to fulfill production-related objectives regarding product quality that adheres to requirements, cost management, quantity and product flexibility, and delivery accuracy (Yu and Ramanathan, 2016). In addition, Lin et al. (2011) argued that OP symbolizes the foundation of efficient distribution and production, which in turn implies financial benefits. Akgul et al. (2015) noted that organizations that want to maintain their competitiveness in the market and achieve greater performance should enhance their OP in terms of price, quality, and delivery. Improved OP leads to fewer faulty goods, enhanced quality, less expenses, and greater output. The findings of Green et al. (2012), who discovered a favorable correlation between green purchasing and economic performance. Similar findings were reported by Mitra and Datta (2014) and Yadlapalli et al. (2018). They discovered that supplier cooperation is associated with sustainable product design, which has a beneficial effect on economic performance. So the research hypotheses can be as:

H_1: *There is an impact of Green Supply Chain practices on operational Performance of the Jordanian Private Hospitals.*

More specifically

H_{11}: *There is an impact of green design on operational performance of the Jordanian private hospitals.*
H_{12}: *There is an impact of green purchasing on operational performance of the Jordanian private hospitals.*
H_{13}: *There is an impact of green process on operational performance of the Jordanian private hospitals.*
H_{14}: *There is an impact of green distribution on operational performance of the Jordanian private hospitals.*
H_{15}: *There is an impact of green reverse logistics on operational performance of the Jordanian private hospitals.*

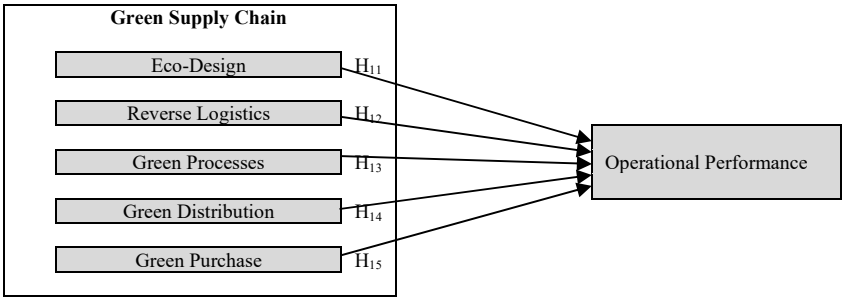

Fig. 1. Conceptual framework

3. Design and Methods

A quantitative approach based on the cross-sectional study method was used to assess the impact of green supply chain dimensions on the operational performance of Jordanian private hospitals. The research data was collected from two main sources. Secondary sources were used to formulate the theoretical framework of the research and to support its results through a comprehensive review of the relevant literature. The primary data was obtained through the research tool distributed to the

research sample. The study population consisted of officials at the senior and middle levels of the operations of the Jordanian private hospitals. This Jordanian private hospital sector consists of 71 private hospitals distributed in the governorates of Jordan and constitutes a competitive advantage for it within the countries of the Middle East as it is one of the main destinations for medical tourism (Al-Nawafah et al., 2022). The wide geographical spread of these hospitals and the financial resources of the research were constraints for applying a comprehensive survey method to collect primary data. Therefore, the sampling method was applied in collecting data necessary to analyse the impact of the green supply chain on the operational performance of the Jordanian private hospitals.

The convenience sample was used by distributing the research tool to 280 of the subjects in the study in Jordanian private hospitals. The responses received were 257 responses, as it was found during the initial review of those responses that they included 8 incomplete and 16 with answers following a repetitive pattern. After excluding those responses from the total responses, the final valid sample subject to analysis was obtained which consisted of 233 responses. Valid responses for analysis constitute a response rate of 83.2% of the total distributed over the sample. Table 1 shows the demographic characteristics of the final research sample.

Table 1
Sample profile (N= 233)

Variables	Categories	N	%
Gender	Male	142	60.9
	Female	91	39.1
Age group	< 30	17	7.3
	30-40	81	34.8
	41-50	102	43.7
	> 50	33	14.1
Qualification	Bachelor's	90	38.6
	Master's	130	55.8
	PhD	13	5.6
Job experience	< 10	22	9.4
	10-20	150	64.3
	> 20	61	26.3

The research survey was developed in the form of a self-administered questionnaire distributed electronically to the sample via e-mail. The questionnaire included three sections, where the first one includes the categorical demographic variables, i.e., gender, age group, qualification and job experience. The second section included the variables of the green supply chain whose items were borrowed from (Assumpção et al., 2022). The green supply chain items were divided into five first-order constructs: (1) eco-design (ED1-ED4), (2) reverse logistics (RL1-RL4), (3) green processes (GPR1-GPR4), (4) green distribution (GD1-GD4), and (5) green purchase (GPU1-GPU4). The third section consisted of five items allocated for measuring operational performance which was developed based on the opinion of Sahoo (2022). All items assigned to measure the research variables had taken the five-point Likert scale as a basis for the responses, where its lower bound (1) refers to the option "strongly disagree" and its upper bound (5) refers to the option "strongly agree".

Moreover, the analyzes related to the research were performed using version 24 of SPSS and AMOS software. This software allows for extracting the necessary statistics to achieve the research objectives and test hypotheses using structural equation modeling (SEM). Before extracting measures and indicators of the impact of green supply chain dimensions on the operational performance of Jordanian private hospitals, the validity and reliability of the research instrument were assessed through confirmatory factor analysis (CFA). Descriptive statistics associated with the research variables were calculated in the second stage of the analysis. In the third and final stage, the structural model was evaluated to test hypotheses and extract effect coefficients.

4. Results

4.1 Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) is a pre-test for the implementation of structural equation modeling (SEM) that was used to examine the research's hypotheses (Griffiths et al., 2022). CFA is based on indicators for evaluating the validity and reliability of the instrument and the model used in the research. Moreover, it is evidence of how the research model is consistent with the basic theory (Zahran et al., 2023; Jokiniemi et al., 2022). The results in Table 2 report the values of the convergent and discriminant validity indicators, along with the composite reliability values of the instrument used in collecting primary data to test the impact of green supply chain dimensions on the operational performance of Jordanian private hospitals. The results of Table 2 showed that the loadings values of the observed variables on their latent first-order constructs were within the range (0.637-0.834). These values were suitable for item retention as they exceeded the lower threshold of 0.50 (Shrestha, 2021). Moreover, the results indicated that the average variance extracted (AVE) for the latent constructs of the first order was greater than the accepted minimum value of 0.50 (Dos-Santos, 2022). Accordingly, the measurement instrument used to test the impact of the green supply chain on operational performance was considered to have convergent validity (Burns & Becker, 2022). To verify the discriminant validity, the multitrait-multimethod (MTMM) matrices were followed by comparing AVE with the maximum shared variance (MSV), as well as comparing the square root of AVE with

the correlation coefficients between the research constructs (Boudlaie et al., 2022; Rönkkö& Cho, 2022). The results of table 2 showed that the values of AVE were greater than the values of MSV. Besides, the results proved that the square root values of AVE were all greater than the values of the correlation between the research constructs. According to the MTMM, the model of measuring the impact of the green supply chain on the operational performance of Jordanian private hospitals has discriminant validity. For composite reliability, the McDonald's Omega coefficient was used to assess the reliability of the measuring instrument. The results showed that the values of these indicators ranged between 0.804 and 0.877, which means that they exceed the minimum threshold of 0.70 (Lai, 2021). Accordingly, the measurement model used in the research had appropriate composite reliability levels. In addition to validity and reliability indicators, CFA provides the possibility of verifying the constructional validity of the measurement model, the results of which were shown in Fig. 2.

Table 2
Results of measurement model validity and reliability

Constructs	Items	Loadings	AVE	MSV	√AVE	C.R
Eco-design	ED1	0.682	0.506	0.322	0.712	0.804
	ED2	0.715				
	ED3	0.693				
	ED4	0.754				
Reverse logistics	RL1	0.739	0.533	0.301	0.730	0.820
	RL2	0.667				
	RL3	0.802				
	RL4	0.706				
Green processes	GPR1	0.762	0.605	0.403	0.778	0.859
	GPR2	0.814				
	GPR3	0.722				
	GPR4	0.809				
Green distribution	GD1	0.782	0.549	0.392	0.741	0.829
	GD2	0.731				
	GD3	0.675				
	GD4	0.771				
Green purchase	GPU1	0.834	0.578	0.339	0.760	0.844
	GPU2	0.637				
	GPU3	0.794				
	GPU4	0.764				
Operational performance	OP1	0.725	0.589	0.422	0.768	0.877
	OP2	0.702				
	OP3	0.821				
	OP4	0.766				
	OP5	0.817				

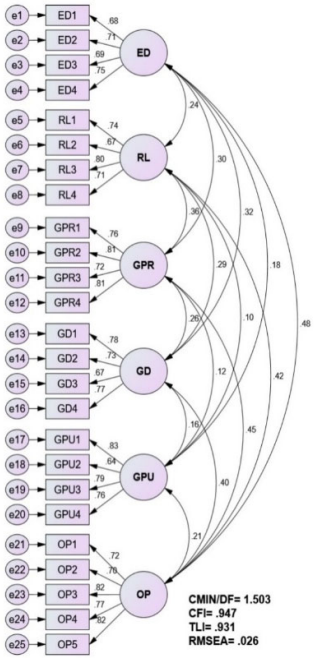

Fig. 2. Result of confirmatory factor analysis

Fig. 2 illustrated that the ratio of chi-squared to degrees of freedom (CMIN/DF) in the measurement model was 1.503, which is more than the permissible upper limit of 3 (Shipley & Douma, 2020). The values of the comparative fit index (CFI) and the Tucker–Lewis index (TLI) were 0.947 and 0.931, respectively, which means that they were higher than the minimum value of those indicators of 0.90 (Mohammad et al., 2020; Ximénez et al., 2022). The root mean square error of approximation (RMSEA) was 0.026, which is greater than the lower threshold of the indicator 0.80 (Mohammad, 2020; Mukhlis et al., 2022; Gao et al., 2020). According to the results of Figure 2, the model for measuring the impact of the green supply chain on operational performance used in this research had acceptable levels of constructional validity and was consistent with the research theory.

4.2 Descriptive Analysis

One of the primary objectives of the research was to assess the level of green supply chain variables and the operational performance of Jordanian private hospitals. Therefore, the means were calculated to determine the general trend of the responses, along with the standard deviations used to examine the degree of dispersion of the responses. Moreover, Pearson's correlation matrix was extracted to evaluate the multicollinearity between green supply chain dimensions as the independent variable. Table 3 lists the results of descriptive statistics extracted to achieve the objectives of this research.

Table 3
Results of descriptive statistics

Constructs	M	SD	ED	RL	GPR	GD	GPU	OP
ED	3.62	0.836	1					
RL	3.74	0.932	0.415***	1				
GPR	3.65	0.824	0.503***	0.534***	1			
GD	3.70	0.902	0.466***	0.552***	0.515***	1		
GPU	3.60	0.880	0.235*	0.331**	0.351**	0.284**	1	
OP	3.77	0.911	0.614***	0.638***	0.604***	0.598***	0.315*	1

Note: ED: eco-design; RL: reverse logistics; GPR: green processes; GD: green distribution; GPU: Green purchase; OP: operational performance. * $p< 0.05$; ** $p< 0.01$; $p< 0.001$.

The results of Table 3 indicated that the dimensions of the green supply chain were within the moderate and high levels. Reverse logistics (M= 3.74, SD= 0.932) was in first place and at a high level. Similarly, the green distribution (M= 3.70, SD= 0.902) was at a high level, but in second place. Otherwise, the rest of the dimensions were within the moderate level, where green processes (M= 3.65, SD= 0.824) ranked third, followed by eco-design (M= 3.62, SD= 0.836) ranked fourth, then green purchase (M= 3.60, SD= 0.880) ranked fifth. The results also confirmed that the level of operational performance of the Jordanian private hospitals was at a high level (M= 3.77, SD= 0.911). Regarding the correlation between the variables of the research, the results of Table 3 demonstrated that it was within moderate levels. The correlation between green supply chain dimensions and operational performance ranged between R= 315 and R= 0.638. Besides, the correlation between green supply chain dimensions was within the range of (0.235-0.552). Based on these results, it was clear that the multicollinearity between the dimensions of the independent variable, i.e., the green supply chain, did not exist, as the correlation between them is less than 0.80 (Taavoni et al., 2023).

4.3 Structural Equation Modeling

To estimate the standard parameters of the constructional validity of the research hypothesis testing model, structural equation modeling (SEM) was used to extract the goodness of fit indicators. SEM is used to infer whether the saturated model is consistent with the effect model (Shi et al., 2019). Fig. 3 illustrates the results of the goodness of fit indicators to verify the constructional validity of testing the impact of the green supply chain on operational performance.

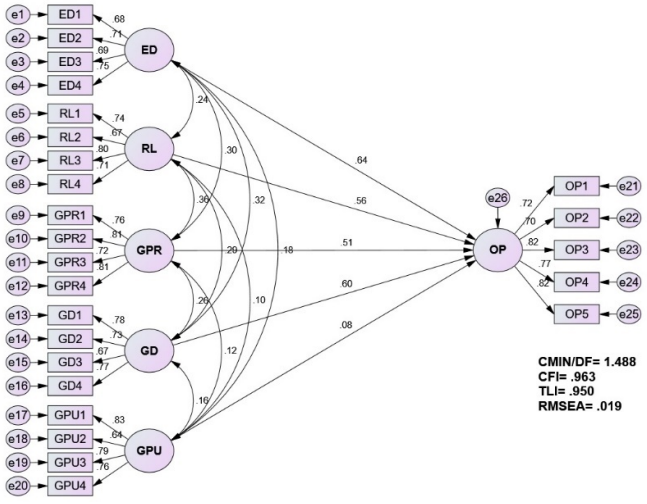

Fig. 3. SEM for the impact of the green supply chain on operational performance

Fig. 3 provided the detailed results required to evaluate the impact test model using SEM. The ratio of chi-squared to degrees of freedom was 1.488, thus it is lower than the high threshold of 3 (Harahap et al., 2022; Shipley & Douma, 2020). Both CFI and TLI were 0.963 and 0.950. Based on Ximénez et al. (2022), the values of CFI and TLI were appropriate as they exceed the acceptable minimum for these indices of 0.90. Regarding RMSEA, the results indicated that it was less than 0.08, the upper value allowed for this indicator (Gao et al., 2020). Accordingly, these results prove that the impact evaluation model is constructionally valid. Table 4 shows the standardized and unstandardized regression parameters calculated to assess the impact of green supply chain dimensions on operational performance.

Table 4
Standardized and unstandardized path coefficients

Hypotheses			B	S. E	β	CR	P
ED	→	OP	0.715	0.045	0.637	15.88***	0.000
RL	→	OP	0.651	0.050	0.560	13.02**	0.002
GM	→	OP	0.592	0.053	0.511	11.16**	0.008
GD	→	OP	0.688	0.048	0.602	14.33***	0.000
GP	→	OP	0.133	0.055	0.083	2.42	0.095

Note: ED: eco-design; RL: reverse logistics; GPR: green processes; GD: green distribution; GPU: Green purchase; OP: operational performance. * $p<$ 0.05; ** $p<$ 0.01; $p<$ 0.001.

The results of Table 4 confirmed the support of the majority of research hypotheses. The first hypothesis (H_{1a}) argued the impact of eco-design on operational performance. This hypothesis was supported by the existence of an impact of eco-design on operational performance (β= 0.637. CR= 15.88, P= 0.000). The second hypothesis (H_{1b}) referred to the impact of reverse logistics on operational performance. The results supported this hypothesis, implying that reverse logistics had an impact on operational performance (β= 0.560, CR= 13.02, P= 0.002). The third hypothesis (H_{1c}) considered that green processes had an impact on operational performance. The results indicated support for this hypothesis and that green processes had an impact

on operational performance (β= 0.511, CR= 11.16, P= 0.008). Moreover, the fourth hypothesis (H_{1d}) showed that the green distribution impacted operational performance. The results confirmed support for this hypothesis that there was an impact of green distribution on operational performance (β= 0.602, CR= 14.33, P= 0.000). Otherwise, the research considered that green purchase had an impact on operational performance (H_{1e}). The results of testing this hypothesis were different than expected, as the results demonstrated that the green purchase did not impact the operational performance (β= 0.083, CR= 2.42, P= 0.095) at the significance level of 0.05.

5. Conclusion and Discussion

Operational efficiency can be raised by eco-design, or the design of products with minimal environmental impact. Waste and resource consumption can be reduced, along with energy costs, with the use of eco-design solutions that also improve efficiency. As a result, we may reduce expenses and boost productivity. Businesses that use eco-design principles may see an increase in brand recognition and consumer loyalty, which in turn could lead to increased sales and profits. By considering environmental impact during product development, businesses may reap financial and ecological benefits. Incorporating environmental concerns and business objectives throughout the product design stage offered potential benefits for business performance related to Eco-design and Eco-innovation (Cicconi, 2020). Rodrigues et al. (2018) investigated how the introduction of Eco-design might possibly alter important business performance results. Tools and strategies from the field of Eco-design have been shown in other research to aid in the implementation of management and operational principles (Pigosso et al., 2013).

The link between reverse logistics and operational success is intricate and intertwined. Effective reverse logistics operations may enhance supply chain efficiency by eliminating waste and maximizing the value of returned or surplus items, resulting in improved operational performance through lower costs and higher profits. Furthermore, establishing a simple and easy-to-use return procedure may considerably increase customer satisfaction, which can boost operational performance by improving sales, customer loyalty, repeat business, and good word-of-mouth referrals. Companies that stress sustainability and environmental responsibility in their reverse logistics processes may improve their brand reputation while also enhancing operational performance by increasing market share and earning a competitive advantage. Overall, successful reverse logistics operations may improve operational performance by increasing efficiency, improving customer happiness, and enhancing brand reputation. In the study titled Green supply chain initiatives among certified companies in Malaysia and environmental sustainability: Investigating the outcomes" showed that reverse logistics positively affects operational outcomes.(Eltayeb et al., 2011). Saruchera and Asante-(2021) Darko's study investigates the link between reverse logistics, organizational culture, and company operational effectiveness. The writers give actual evidence to demonstrate how these elements might affect a company's success. They discovered that a favorable corporate culture and efficient reverse logistics procedures may improve a company's operational success.

Green process has the ability to significantly improve a company's operational performance. Green manufacturing used in pharmaceutical firms to lessen the environmental impact of their operations may save costs by minimizing energy use, eliminating waste, and employing more environmentally friendly products and methods, resulting in enhanced operational performance (García-Salirrosas & Rondon-Eusebio, 2022; Hazaea et al., 2022). Adopting eco-friendly technology and practices may also help a company's brand reputation and market position by displaying a commitment to sustainability and environmental responsibility. Greater client loyalty, repeat business, and favorable word-of-mouth recommendations may all lead to increased sales and market share. Furthermore, the desire to create new and creative green manufacturing processes may boost a company's competitiveness and lead to the creation of new technologies and processes, further boosting operational performance. Overall, green manufacturing has the potential to have a significant influence on operational performance by lowering costs, strengthening brand reputation, and increasing competitiveness.

Some research combines the Theory of Inventive Problem Solving (TRIZ) with other methodologies, such as Life Cycle Assessment (LCA) and Life Cycle Engineering (LCE), to assist design engineers in developing, evaluating, and selecting the best solution to meet the business's objectives for eco-product and sustainable manufacturing.(Cicconi, 2020). The study context is concerned with the combination of user-centered design, eco-design, and product customization. This collaborative approach intends to aid in the development of innovative manufacturing ideas such as thermoplastic composites made from recycled resources.(Cicconi, 2020). Management practices are fundamentally linked to the integration of eco-design at the strategic and tactical levels of product development, whereas operational practices are product-specific and intimately linked to the technical features and characteristics of a specific product's design and life cycle (or line of products). (Pigosso et al., 2013). While the management methods are process-oriented and general, they are thus applicable to any sort of manufacturing company—regardless of the individual qualities of the product (Rodrigues et al., 2018).

Green distribution has the ability to significantly improve a company's operational performance. Green distribution may save costs by streamlining transportation and storage procedures to reduce waste and enhance energy efficiency, resulting in improved operational performance. Furthermore, by offering environmentally friendly shipping and packaging alternatives, green distribution may promote consumer satisfaction, resulting in greater sales, customer loyalty, and repeat business. Green distribution methods, which reflect a commitment to sustainability and environmental responsibility, may also boost a company's brand reputation and market position, contributing to higher market share and a competitive edge in the market.

Overall, green distribution has the potential to have a significant influence on operational success by lowering costs, improving brand reputation, and increasing customer happiness. Another study implies that the operational results indicate the direct influence of green supply chain activities on a company's operational success. Cost reductions, product quality improvements, delivery improvements, and flexibility are examples of operational results.(Eltayeb et al., 2011). In a study in China, resources such as energy, gasoline, raw materials, and water must be used efficiently, as well as goods that produce consumer value must be manufactured and distributed effectively. Many Chinese export firms have explored GLM in the expectation of increasing their environmental, financial, and operational performance due to the growing need for environmental protection in overseas markets (Lai et al., 2012).

Green purchasing may increase a company's operational efficiency in a number of ways. By selecting environmentally friendly products that are energy-efficient, have a longer lifespan, or are made from recyclable materials, green purchasing can reduce expenses and improve operational performance. By supplying environmentally sustainable products and services, green purchasing may also boost consumer satisfaction and lead to increased sales, customer loyalty, and repeat business. Green purchasing practices, which demonstrate a commitment to sustainability and environmental responsibility, may also enhance a company's brand recognition and market position, leading to an increase in market share and a competitive edge in the marketplace. These advantages of green purchasing demonstrate the importance of procurement and supply chain management to an organization's overall operational success. By carefully examining the environmental impact of their purchasing decisions, businesses can simultaneously improve their operational efficiency and have a positive effect on the environment (Ricardianto et al., 2022; Becker et al., 2022)

According to one research, embracing enterprise resource planning in the period of the COVID-19 pandemic, as well as environmental protection practices such as green purchasing and green production, improves operational performance. Green purchasing and green production have a direct impact on operating performance.(Santoso et al., 2022). Green buying enables manufacturers to engage with suppliers to create supply chain procedures both upstream and downstream, resulting in increased efficiency in the company's operations. (Yu et al., 2019). According to a study of 351 supply chain management professionals from various manufacturing companies in Saudi Arabia, green supply chain management practices such as green purchasing, green manufacturing, and green logistics have a direct and positive impact on operational performance in the manufacturing industry.(El-Garaihy et al., 2022). Green purchasing also decreases raw materials, develops suppliers, and eliminates sources in order to increase efficiency in green supply chain practices that will improve the company's operational performance.(Dubey, Rameshwar, Surajit Bag, 2014). Furthermore, a survey of 81 manufacturing companies in East Java, Indonesia, titled "The Impact of Green Supply Chain Management Practices on Firm's Environmental and Operational Performance and The Moderating Effects of Top Management," discovered that green purchasing improves operational performance.

6. Recommendations

Recommendations for private hospital administrators who aspire to improve operational efficiency include incorporating sustainability requirements into product design specifications and evaluating them throughout the design process. When developing a product, consider its entire lifespan, from raw materials to disposal. Collaborate with suppliers and stakeholders to ensure eco-friendly materials and production processes. Private hospitals must establish a method for handling returns, recycling, and outdated items, and provide incentives, such as future purchase discounts, to encourage consumers to return outdated or obsolete items. In addition to collaborating with third-party logistics companies that specialize in the disposal and recycling of ecologically friendly products. Regarding Green process, the administration of private hospitals must utilize energy-efficient manufacturing techniques and equipment and decrease waste whenever possible by employing lean production techniques and recycling. Consider the use of renewable energy sources in the manufacturing process. Regarding Green Purchasing, the administration of private hospitals must establish a sustainability criterion for selecting suppliers and products and incentivize suppliers to adopt sustainable practices by offering preferential treatment in future contracts or higher prices for environmentally friendly items.

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