

# Uncertain Supply Chain Management

homepage: [www.GrowingScience.com/uscm](http://www.GrowingScience.com/uscm)

## Competitive strategy development through green supply chain practices

Abdel-Aziz Ahmad Sharabati<sup>a\*</sup>, Nada Mahmoud Almokdad<sup>a</sup>, Ahmad Marei<sup>a</sup> and Hesham Abusaimh<sup>b</sup>

<sup>a</sup>Business Faculty, Middle East University, Amman, Jordan

<sup>b</sup>IT Faculty, Middle East University, Amman, Jordan

### ABSTRACT

#### Article history:

Received March 19, 2023

Received in revised format June 17, 2023

Accepted July 22 2023

Available online

July 22 2023

#### Keywords:

Green Supply Chain

Green Purchasing

Green Operations

Green Selling

Competitive Strategies

Differentiation Strategy

Cost Leadership Strategy

Responsiveness Strategy

Pharmaceuticals Manufacturing

Industry

Jordan

Nowadays, the topic of preserving the environment and serving local communities is a hot issue. Hence, this study aims to explore how the green supply chain affects Jordan's pharmaceutical manufacturing industry's ability to compete globally. This study's research methodology is quantitative, descriptive, and cause-effect. Data was gathered from a sample of 124 managers selected randomly from a pool of 300 managers working in 10 out of 14 pharmaceutical manufacturing organizations. The study tool underwent evaluations for normality, validity, and reliability before the data were subjected to descriptive analysis and a correlation analysis was performed between variables. Finally, hypothesis testing was conducted through the application of multiple regression analysis. The findings show that green practices affect competitive strategy, where green operations were having the highest effect on competitive strategies, then green purchasing, and green selling, respectively. The study's conclusions show that the adoption of a green supply chain improves the competitiveness of the Jordanian pharmaceutical manufacturing sector. Accordingly, the study recommends that Jordanian pharmaceutical manufacturing companies should include green supply chain practices in their daily supply practices to increase the competitiveness of the organizations.

© 2023 Growing Science Ltd. All rights reserved.

## 1. Introduction

The standards for the environment have altered during the past few decades, and the concern about the balance between preserving the environment and conducting business activities is increasing, which forced organizations to convert their activities to be more environmentally-friendly (Green Activities) (Bennett & Nunes, 2008). In the late 1990s, the traditional supply chain model was abandoned in favor of the green supply chain (GSC) (Khan & Qianli, 2017). It explains how to be environmentally-friendly in all activities related to procurement, operation, and selling through innovative ideas and practices in each step. Consequently, using the GSC enhances organizations' competitive position through differentiation, cost leadership, and responsiveness (Chen & Paulraj, 2004; Chopra & Meindl, 2001).

Companies that use GSC management reduce environmental risks, boost environmental effectiveness, and enhance their market share (Van Hoek, 1999; Khuyen et al., 2017). GSC management aims to increase the effectiveness of supply chain-related environmental operations (Srivastava, 2007; Gunasekaran et al., 2008). The GSC starts with eco-design, which is the idea of an ecological program to offer a product's life cycle with environmental safety and health, this enhances the organization's performance and its competitive advantage (Rao, 2008; Hervani et al., 2005). The methods of GSC management in healthcare encompass all actions taken to ensure that their services are environmentally confirmed and meet specified ecological parameters (Gopal & Thakkar, 2012). All stakeholders across sectors must actively engage in and collaborate on environmental practices (Xie & Breen, 2012). Constant environmental regulations have an impact on industrial

\* Corresponding author

E-mail address [APharmaArts@gmail.com](mailto:APharmaArts@gmail.com) (A.-A. A. Sharabati)

processes and draw more attention to the need for supply chain environmental management approaches (Deshmukh & Vasudevan, 2014). Supply chain management is a competitive and increasingly complicated notion. Analysis of the whole product life cycle procedures and materials utilized at each phase is therefore crucial (Deshmukh & Vasudevan, 2016). All businesses, no matter what they do or where they operate, should be concerned about environmental concerns including pollution and waste (Sharabati, 2018). The concept of GSC management can be further developed into sustainable supply chain management, which concentrates on the three bottom lines simultaneously: contributions to the environment, society, and the economy for long-term sustainable growth of the business and incorporates sustainability into the primary business operations of the supply chain (Dai et al., 2021).

The performance of the supply chain is improved, and competitive advantage is created, by greening the processes of the inbound (procurement and supply), the operations (production and services), and the outgoing (green packaging, green marketing, and green distribution) (Rao & Holt, 2005; Michelsen & de Boer, 2009). In addition to improving reputation and brand image in the market, the GSC aids businesses in differentiating their goods and positioning themselves as environmentally friendly (KIOKO, 2015). The environmental resources competitive model, which includes (reduction, reuse, and recycling) can be used for operations comparison, which leads to being more efficient (Tan & Shaharudin, 2016). Increased competitive advantage, increased profitability, and increased market share are all benefits of integrating environmental supply chain management within daily practices (Hijuzaman et al., 2018). A group of distinguishing traits used by businesses to capture the market is characterized as having a competitive edge. Additionally, the capacity to add value to generate products that respect the environment (Hartono et al., 2018). GSC management helps organizations to deliver safe and healthy products/services that satisfy customers, improve organizations' image, increase loyalty, and improve a competitive position (Jia & Wang, 2019). The quality of the GSC relationships, the green absorptive capacity, and the green market orientation all have an impact on the green competitive advantage (Lin et al., 2020).

Finally, the pharmaceutical industry and other manufacturing industries use processes to transform inputs into outputs through operations, which produce different types of waste that affect society and the environment. Unfortunately, the Good Production Practices (GMP) regulations that are used in the pharmaceutical business focus more on good manufacturing procedures than logistical procedures. Good practices have, however, been spread to logistics and other sectors during the previous few decades. Determining how Jordanian pharmaceutical companies apply GSC practices to all processes (green operations, green purchasing, and green selling) as well as how they affect their competitive strategies (cost leadership, differentiation, and responsiveness) is the goal of the current study. This study's objective is to provide wise recommendations to the organization's owners and managers on how to be eco-friendly and to use the GSC to improve their organizations' competitive position. This research is one of the few studies which investigate using GSC practices in the pharmaceutical industry to enhance competitive strategy in Jordan.

## **2. Literature Review**

This section starts with defining the study variables GSC and competitive strategies, followed by previous studies that help hypotheses development, then the study model.

### *2.1. Green Supply Chain*

It is the whole collection of business activities carried out inside and outside one or more corporate environments that enable the satisfaction of consumer demand for an item or service (Logistics Bureau, 2015). The GSC has concerns in both supply chain management and environmental management by including a green component that entails monitoring the effect and connections between the supply chain and the environment (Martusa & Meythi, 2013). Allaying the GSC improves the client base, lowers operating costs, and decreases environmental deterioration. The primary driving forces for the adoption of a GSC are resources, the desired economic gain, governmental requirements, and consumer awareness (Kioko, 2015). Organizations that use GSC management often reduce their negative environmental impact through their practices and responsible use of resources and energy. Achieving those goals while minimizing costs, and improving performance, and quality (Yahyazadehfar et al., 2017). A GSC is a modern management style that concerns resource efficiency and environmental influence along the whole supply chain. It was established on the tenets of both economic value creation and sustainable development (Zheng et al., 2020). Technology innovation, organizational characteristics, and environmental factors all have an impact on the adoption of GSC management, which has various positive effects (Lin et al. 2020). The complementing function of the company structure in the value generation of GSC management practices may be explained by a resource-based perspective (Jell-Ojobor & Raha, 2022). The GSC, which covers sustainable design, procurement, manufacturing, packaging, marketing, and distribution, i.e., the implementation of environmental management concepts is the complete set of supply chain operations. The GSC is broken down into green selling, green operations, and green purchasing in this study.

#### *2.1.1 Green Purchasing*

Green purchasing encompasses items with unique qualities (Baenasa et al., 2010). By employing inbound logistics solutions that incorporate an environmental design for acquired commodities, green purchasing fosters collaboration between companies and suppliers to minimize the detrimental ecological influence (Zhu et al., 2011). Internal suppliers, organizational management, an ecological audit, and green buying may all be used by an organization to choose a supplier who complies with environmental standards for raw materials and environmental activities (Rostamzadeh et al., 2014). Choosing suppliers

and incoming procedures that are ecologically friendly for manufacturing or production with the least amount of energy and resources used is a part of green procurement and purchasing (Al-Khawaldah et al., 2022). Green purchasing refers to the procuring of raw materials that have a lower impact on the environment, and learning about suppliers that take environmental requirements into account to enhance the value-added of green products and services.

### 2.1.2. Green Operations

It refers to using processes and activities to produce products and services with minimal adverse effects on the environment and society (Sharabati, 2021). GSC analyses waste reduction and material recycling to lower the resources used in operations, including materials, energy, water, and harmful sources (Baenasa et al., 2010). The GSC operational operations support environmental solutions, which lower risks, boost innovation, accelerate adoption, and increase supplier alignment for improved process results (Hijuzaman et al., 2018). The purpose of GSC management is to turn input into output with added value to satisfy client requests (Al-Atrash, 2018). The supply chain's entire management phase includes green operations (Jum'a et al., 2022). Green operations have garnered a lot of attention recently as environmental issues become more apparent (Yang et al., 2022). Finally, green operations are environmentally friendly processes including manufacturing and producing products and services using minimum resources with minimal waste, pollution, and recyclable material and products.

### 2.1.3. Green Selling

Producing environmentally friendly designs and their packaging as part of outbound activities results in finished goods that meet high environmental requirements (Zhu et al., 2011). Green selling includes matching green marketing and green consumption with environmentally friendly standard guidance for products and services marketing activities, addressing the needs of the customers for green consumption, after-sales support, and prompt consumer feedback (Jia & Wang, 2019). Green selling, a form of GSC management, may be a powerful tool for fostering competition (Sharabati, 2021). Because green selling is seen as a part of the product and process portion of GSC management, this is still valid in the context of enterprises (Tran, 2022). Finally, green selling is the outbound process that entails the adoption of reasonable prices for green products, eco-friendly packaging, green marketing initiatives, and environmental awareness.

## 2.2. Competitive Strategies

The targeted market's high degree of satisfaction with the company's goods and services is a competitive advantage (Ambe, 2010). Strategies can change to develop a long-lasting competitive capacity (Goetsch & Davis, 2014), strategy is the company's distinct position in comparison to its competitors (Al-Hawajreh & Attiany, 2014). According to Porter (Porter, 2008; Porter & Van der Linde, 1996; Porter & Linde, 1995), it is an effort made by a corporation to position itself against rivals in the same sector and/or other industries (Kumlua, 2014). Organizational abilities that have been developed to provide consumers with more value than rivals are referred to as competitive advantages (Al-Atrash, 2018). Products with competitive advantages provide clients with great quality, lower pricing, and a flexible manufacturing system to meet the demands of various customers and maintain their competitiveness (Jia & Wang, 2019). The capacity of the firm to spend its resources, cost, differentiation, market features, and product are all factors that contribute to the competitive advantage (Al-Khawaldah et al., 2022; Hsu & Hu, 2009). The effectiveness of the production method used to create the company's environmentally friendly products is one of its competitive advantages (Santoso et al., 2022; Somsuk et al., 2013). The firms' skills that provide a valuable position in comparison to rivals are the last source of competitive advantage. Differentiation, cost leadership, and responsiveness are examples of competitive advantages in this study.

### 2.2.1. Differentiation Strategy

Prior studies have shown how high-value product lines and radical green product strategies may work together to improve value-seeking market differentiation (Brindley & Oxborrow, 2014). To include everything that influences the customer's sense of value, the differentiation strategy is a special offer that may go more for both services and product characteristics (Heizer et al., 2014). It raises the value for customers and distinguishes the company's goods and services from those of its rivals (Yoo et al., 2015). Organizational innovation requires developing and revamping procedures and product features to set oneself apart from competitors (Al-Atrash, 2018). To boost product and service innovation and reduce operational costs related to the eco-differentiation market, supply chains are using radical green product innovation methodologies (Ye & Lau, 2022). Differentiation is the ability of the company to improve the quality of its goods via innovative design and features, a flexible manufacturing schedule, and long-term partnerships with reliable suppliers to create something unique compared to competitors.

### 2.2.2. Cost Leadership Strategy

When a business offers the same items as its rivals but at a cheaper price, the cost may be viewed as a competitive advantage (Ambe, 2010). To obtain efficiencies and approach lower costs against rivals, cost advantage as a strategy that develops internal capabilities is beneficial (Sirmon et al., 2011). Competitive with rival businesses by successfully managing operational expenses and supply chain activities, such as management, transportation, and material costs, is known as the competing cost approach (Council, 2012; Verma & Gangele, 2012). The cost-competitive strategy aims to fill a niche by focusing on a specific client or local market (Wheelen & Hunger, 2017). To govern their supply chains and consider industrial contexts, modern businesses that want to differentiate themselves via competitive marketing must use hybrid strategies of differentiation and cost leadership (Laari et al., 2017). A cost leader's low-cost position results in greater returns at lower

prices as compared to rivals. The phrase "cost as a competitive advantage" refers to an organization's capacity to provide goods at the lowest cost possible while maintaining quality (Al-Atrash, 2018). If the firm can achieve and sustain total cost leadership and command prices that are at or near the industry average, it will fare better than average (Darius, 2022). Finally, cost leadership is the capacity of a business to employ resources and procedures.

### 2.2.3. Responsiveness Strategy

It is the combination of distribution, logistics, and process functions (Thatte et al., 2013). Businesses have looked into every possibility to quickly satisfy consumer demand while depending on suppliers' ability to modify volume (Al-Hawajreh & Attiany, 2014). The response is founded on two guiding ideas, one of which is the organization's adaptability to changes in demand, such as those in quantity or standards. Second, it considers how quickly the company can meet this demand (Al-Atrash, 2018). On the other hand, it is the capability to deliver rapid services and react quickly to client needs (Alhmarneh, 2019). To increase business performance and gain a competitive advantage, green responsiveness, and green innovation are viewed as the primary organizational resources (Habtemariyam & Kero, 2022). Finally, responsiveness refers to an organization's capacity to react swiftly to market developments, deliver items on schedule in comparison to rivals, and do so by maintaining an adequate inventory and providing online customer services.

### 2.3. Previous Studies

The relationship between GSC practices and competitive strategies is the key area of interest in this study. According to previous research, it is possible to think about the GSC system from four dimensions that include green logistics, green procurement, green development, and green distribution. The relationship between GSC management, competitive strategies, and company effectiveness was investigated in this study. The competitive advantage is found to be highly impacted by each of these four structures, and green manufacturing and green logistics are also found to considerably affect business outcomes (Liu et al., 2012). Similar studies examine the connection between corporate performance and environmental awareness, and GSC management (green purchasing, customer collaboration, and investment recovery). The findings reveal that internal environmental orientation acts as a key motivator for investment recall procedures, even if both external and internal environmental standards have a beneficial and large influence on green procurement and consumer cooperation. Competition pressure confirms that consumer collaboration has a favorable impact on organizational effectiveness (Chan et al., 2012). Due to the implementation of GSC methods, large manufacturing companies have increased and maintained their profitability, market share, goodwill, and competitive advantage (Chan et al., 2012; Katuta, 2012). GSC Management has emerged as a potentially important technique for confirming the advantage and enhancing hierarchical execution. Organizations need to consider cutting-edge key behaviors to boost reasonable association and the advantage with the ongoing expansion of competition in the current global market (Martusa & Meythi, 2013).

According to Masoumik et al. (2014), internal managing environment, aligning strategies, environmental initiatives, and capacity-based management all have a positive impact on GSC practices and CAs. In recent years, environmental management has given corporations a bigger competitive advantage. GSC integration boosts environment incremental innovation, but only consumer integration significantly boosts environment revolutionary innovation (Dai et al., 2015). Adoption of GSC management reduces operating expenses and environmental damage while raising consumer awareness (Kioko, 2015). An investigation into the relationships between competitive advantage, green suppliers, and green innovation in Iran's cement industry found a positive link between the factors (Khaksar et al., 2015). Supply chain performance, competitive advantage, and the interaction between the two are positively impacted by GSC management (Muthaher, 2015). Because of this, businesses should comply with environmental regulations in partnership with their suppliers and clients (Mbaabu, 2016). This is because a GSC results in faster delivery, fewer delays, lower prices, and a focus on quality (Alizadeh et al., 2017). There have been many research papers on the connection between GSC management and performance results, particularly about SCA and economic and environmental performance (Çetin & Knouch, 2018). Manufacturing companies' GSC initiatives have a strong influence on long-term competitive advantage. The sustainable competitive advantage of a cement manufacturing firm increases when green technology activities are improved (Githinji & Naomi 2018). However, competition has little impact on the effectiveness of marketing (Hijuzaman et al. 2018).

GSC management practices are associated with non-financial performance and competitive advantages that affect business performance in a good manner (Jia & Wang 2019). Since there is a significant relationship between GSC management and competitive advantage, it is believed that implementing cost-benefit and consumer value improvement at the same time will be more effective than doing it separately (Sadurdeen & Sutha, 2019). By demonstrating how GSC management may result in a competitive advantage and how being green can affect total productivity, it has favorable implications for the industrial sector (Thummalapalli, 2019). The green market orientation, green absorptive capacity, and GSC relationship quality all affect the availability of a green supply chain competitive advantage (Lin et al., 2020). GSC and Jordanian pharmaceutical manufacturing businesses' comparative advantages are strongly tied. While they do a bad job at green operations, they vigorously practice green purchasing and selling. Green operations have the most influence on competitive advantage, followed by green purchasing and then green selling. Additionally, GSCM has no discernable influence on reliability or cost, while having the most impact on quality, innovation, and time (Sharabati, 2021). GSC practices are impacted by institutional influences as well as environmental orientation. GSC procedures used by manufacturing firms greatly improve financial and environmental results (El-Garaihy et al., 2022). Competitive advantage was significantly impacted by GSC management's green buying, production, and marketing strategies (Al-Khawaldah et al., 2022). GSC management is impacted by green

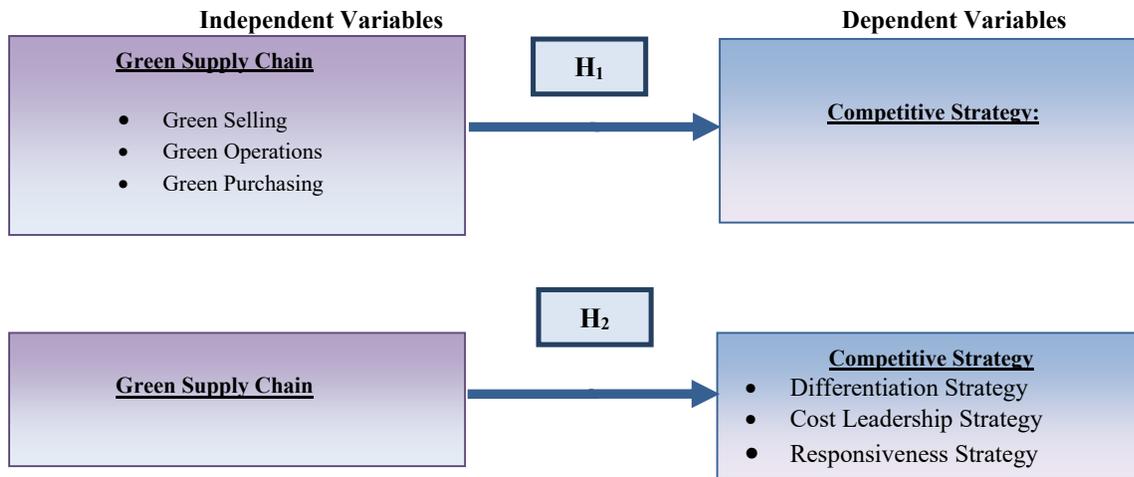
drivers, green enablers, and green practices. The main forces for GSC practices are pressure from the public, suppliers, and competitors. The flow of the supply chain is affected by green enablers and drivers. Green drivers have a greater impact on GSC upstream, whereas green enablers have a greater impact downstream (Sabat et al. 2022).

In conclusion, the researchers are attempting to determine how the competitive strategies components of cost leadership, differentiation, and responsiveness of the pharmaceutical manufacturing organizations in Jordan are impacted by GSC practices dimensions (green purchasing, green selling, and green operations). The dimensions of the current study's model are based on earlier studies. The following hypotheses were created as a result:

**H<sub>1</sub>:** Green Supply Chain practices (Green purchasing, Green selling, and Green operations) affect the competitive strategies of the pharmaceutical manufacturing industry in Jordan.

**H<sub>2</sub>:** Green Supply Chain practices affect the competitive strategies (Cost leadership, Differentiation, and Responsiveness) of the pharmaceutical manufacturing industry in Jordan.

Additionally, to explore the influence of GSC activities on the competitive strategies of pharmaceutical manufacturing organizations, the study models were created based on previous studies such as those (Rao & Holt, 2005; Chan et al., 2012; Lee et al., 2012; Xie & Breen, 2012; Kioko, 2015; Tan et al., 2016; Famiyeh et al., 2018; Jia & Wang, 2019) (Fig. 1).



**Fig. 1.** Study Model

### 3. Methodology

#### 3.1. Study Design

The present study falls within the cause-and-effect and descriptive research categories. The goal of the current study is to ascertain how GSC practices - Green Purchasing, Green Operations, and Green Selling- affect Jordanian pharmaceutical manufacturing businesses' competitive strategies (differentiation, cost leadership, and responsiveness). A questionnaire that was created based on prior literature is used to gather the data. The 14 Jordanian pharmaceutical manufacturing companies that will be members of the Jordanian Association of Pharmaceutical Manufacturers in 2021 make up the study's population. These businesses employ a total of around 300 managers and supervisors.

#### 3.2. Study Tools

In the current investigation, both secondary and primary data were utilized. Books, studies, journals, articles, working papers, dissertations, theses, and the Internet were used to gather secondary data. Using a questionnaire that was created based on prior research and expert interviews, primary data was gathered from managers and supervisors working in pharmaceutical manufacturing firms. The questionnaire, which includes two sections, was then refereed by the panel of judges. Demographic factors including age, gender, education, experience, position, and division are included in the first section. The dependent variable Competitive Strategies (Differentiation, Cost Leadership, and Responsiveness), and the independent variable Green Supply Chain (Green Operations, Green Purchasing, and Green Selling), all measured via Five Likert scales, ranging from value to importance, were used to gauge respondents' perceptions of all sub-variables.

#### 3.3. Data Collection

Data were gathered via a questionnaire from In Jan 2023 to March 2023, there were 142 out of 300 managers and supervisors employed by 10 out of the 14 organizations that were members of the Jordanian Association of Pharmaceutical Manufacturers. The gathered information was examined and coded using SPSS 25 for additional analysis.

### 3.4. Demographic analysis

The demographic analysis is shown in Table 1 based on the frequency and percentage of the participants' valid responses to questions on gender, age, experience, education, position, and division. Most of the respondents are males (52.8%) with ages less than 40 accounting for 54.9%. The employees work in marketing and sales (37.3%) or operations and quality (32.4%). The education of the respondents is a bachelor's (69.7%) and they have experience of less than 10 years (45.1%) working as a supervisor (47.9%).

**Table 1**  
Demographic Analysis

	Dimension	Frequency	Percent
Gender	Male	75	52.8
	Female	67	47.2
	Total	142	100.0
Age years	Less than 30	49	34.5
	Less than 40	51	35.9
	Less than 50	27	19.0
	More than 50	15	10.6
	Total	142	100.0
Division	Supply chain	26	18.3
	Finance	17	12.0
	Marketing & Sales	53	37.3
	Operations & Quality	46	32.4
	Total	142	100.0
Education	Diploma	8	5.6
	Bachelor	99	69.7
	Master	34	23.9
	PhD	1	.7
	Total	142	100.0
Experience Years	Less than 10	64	45.1
	between 10-20	54	38.0
	between 21-30	16	11.3
	more than 30	8	5.6
	Total	142	100.0
Position	Supervisor	68	47.9
	Director	29	20.4
	Senior Manager	43	30.3
	General Manager	2	1.4
	Total	142	100.0

## 4. Data Analysis Results

Before testing the hypotheses, the data were examined for validity, reliability, and correlations between variables using SPSS 25 after being collected from respondents via a questionnaire.

### 4.1. Validity Test

The validity is verified by using three methods: content, face, and construct validity. By compiling the data from a variety of sources, including academic research, books, papers, journals, and websites, the content validity has been verified. When the questionnaire's face validity has been supported by the expert judgments that arbitrate it. Confirming construct validity is done using Kaiser Meyer Olkin (KMO) Principal Component Factor Analysis.

#### *Construct Validity (Principal Component Factor Analysis)*

The validity of the constructs is validated using Kaiser Meyer Olkin (KMO) Principal Component Factor Analysis (Cerny & Kaiser, 1977; Stephanie Glen, 2016). Explanation and conformity have both been studied using principal component analysis. If the factor loading is greater than 0.40, it is deemed acceptable (Hair et al., 2014; Sharabati et al., 2022). The sampling is considered suitable and accepted if the Kaiser Meyer Olkin (KMO) value is more than 0.6, it is between 0.8 and 1. KMO values are used to assess harmony, inter-correlations, and sample adequacy. Another instrument used to judge appropriateness is Bartlett's of Sphericity, which demonstrates the use of component analysis and has a significance criterion of less than 0.05 at a 95% confidence level. Variance serves as a proxy for a factor's level of explanatory power (Cerny & Kaiser, 1977; Kaiser et al., 1974). According to Table 2 below, the loading factor for GSC dimensions ranges from 0.499 to 0.825, so all items are accepted. KMO rating between 61.4% and 80.2% with a high  $\chi^2$ , which shows data harmony. The explanation power of constructed items ranges from 44.395% to 63.356%. Bartlett's Sphericity significance is less than 0.05, which shows that factor analysis is suitable for the analysis. For competitive strategies dimensions factor loading ranges from 0.662 to 0.857, so all items are accepted. KMOs range between 0.749 and 0.838 with high  $\chi^2$ , which shows data harmony. The explanation power of constructed items ranges from 53.090% to 58.558%. Bartlett's Sphericity significance is less than 0.05, which shows that factor analysis is suitable for the analysis. Finally, factor loading for constructs is higher than 0.60. KMO of the variables is higher than 0.60. In addition, the variation ranged between 73.054% and 78.804%. The explanatory power of GSC

dimensions is 80.3% and the explanatory power of competitive strategies dimensions is 86.5%. Bartlett's Sphericity significance is less than 0.05, which shows that factor analysis is suitable for the analysis.

#### 4.2. Reliability Test and descriptive analysis

Using Cronbach's alpha, the reliability of data has been evaluated. Reliable tools have an alpha over 0.60 and are regarded as approved if it is greater than 0.60 (Hair Jr et al., 2018; Sharabati et al., 2022).

**Table 2**

Descriptive, Validity, and Reliability Analysis of Supply Chain Sub-Variables Items

Item	Mean	S.D.	F1	KMO	Ch <sup>2</sup>	df	Sig.	Var	Alpha
G.Purchasing1	4.01	1.285	0.721	0.802	313.887	10	0.000	63.356	0.851
G.Purchasing2	3.86	1.177	0.791						
G.Purchasing3	3.51	1.159	0.825						
G.Purchasing4	3.43	1.041	0.819						
G.Purchasing5	3.42	1.131	0.819						
G.Operations1	3.80	1.229	0.753	0.614	113.508	10	0.000	63.044	0.655
G.Operations2	3.87	1.003	0.726						
G.Operations3	3.04	0.952	0.537						
G.Operations4	3.72	0.837	0.499						
G.Operations5	4.13	1.093	0.693						
G.Selling1	3.24	1.202	0.570	0.732	100.974	10	0.000	44.396	0.677
G.Selling2	3.54	0.994	0.662						
G.Selling3	3.53	0.987	0.667						
G.Selling4	3.47	0.928	0.727						
G.Selling5	3.59	1.046	0.696						
Differentiation1	4.18	1.119	0.857	0.838	231.698	10	0.000	58.558	0.821
Differentiation2	3.98	0.978	0.784						
Differentiation3	3.89	0.987	0.773						
Differentiation4	3.77	0.999	0.731						
Differentiation5	3.96	1.048	0.669						
Cost1	3.08	1.480	0.695	0.749	184.884	10	0.000	53.090	0.768
Cost2	3.58	0.910	0.698						
Cost3	3.61	1.111	0.776						
Cost4	3.56	1.158	0.764						
Cost5	3.80	1.000	0.704						
Responsiveness1	3.88	0.949	0.762	0.807	213.974	10	0.000	56.695	0.807
Responsiveness2	3.77	1.128	0.819						
Responsiveness3	3.59	1.046	0.786						
Responsiveness4	3.60	1.079	0.728						
Responsiveness5	3.81	1.045	0.662						
Green Purchasing	3.65	0.920	0.857	0.706	146.533	3	0.000	73.054	0.803
Green Operation	3.70	0.665	0.826						
Green Selling	3.46	0.691	0.880						
<b>Green Supply Chain</b>	3.60	0.650							
Differentiation	3.96	0.785	0.828	0.699	222.681	3	0.000	78.804	0.865
Cost Leadership	3.53	0.827	0.913						
Responsiveness	3.73	0.789	0.919						
<b>Competitive Strategies</b>	3.74	0.710							

#### 4.3. Descriptive statistics

Table 2 shows that the means for both GSC dimensions items and competitive strategies items are moderate to highly implemented with an acceptable standard deviation. Therefore, the Jordanian Pharmaceutical manufacturing industry is concerned about both.

#### 4.4. Relationship between Green Supply Chain and Competitive Strategies

The link between variables has been examined using the bivariate Pearson Correlation Test. Table (3) below demonstrates the high correlations among the GSC sub-variables, where  $r$  varies from 0.540 to 0.652. The connections between the Competitive strategies dimensions are high, with values between 0.609 and 0.807. Finally, the link between total GSC and total competitive strategies is high, where  $r$  equals 0.809. These values indicate that the correlation is high and significant among the variables.

**Table 3**  
Correlations between Green Supply Chain and Competitive Strategies Variables

Variables/Sub-Variables	1	2	3	4	5	6	7	8
1 Green Purchasing								
2 Green Operation	.540**							
3 Green Selling	.652**	.593**						
4 Green Supply Chain	.887**	.806**	.864**					
5 Differentiation	.625**	.642**	.578**	.719**				
6 Cost Leadership	.615**	.508**	.675**	.703**	.609**			
7 Responsiveness	.645**	.526**	.700**	.732**	.624**	.807**		
8 Competitive Strategies	.708**	.628**	.734**	.809**	.836**	.911**	.914**	1

\*\* Significant level at 0.01.

4.5. Hypothesis Testing

Before proceeding with hypotheses testing, the next tests have to be performed to establish the regressions analysis validity after validating reliability, correlation, and validity between independent and dependent variables (Sekaran & Bougie, 2016; Sharabati et al., 2022). The model does not deviate from this premise, as seen in Fig. 2 , the histogram indicates that the figure shows the data's normal distribution. The shape shows a bell-shaped curve.

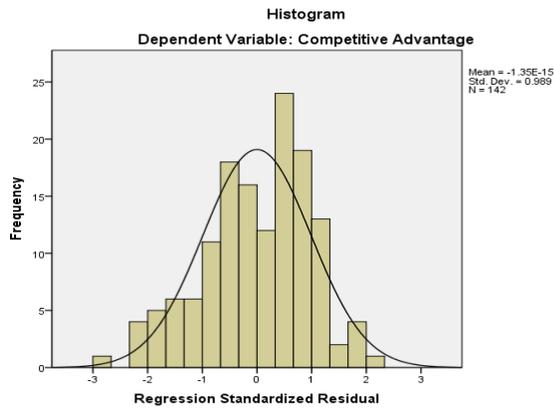


Fig. 2. Normality Test

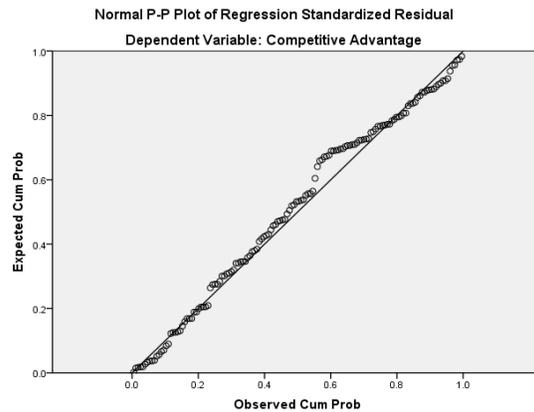


Fig. 3. Linearity Tests

Fig. 3 illustrates the linearity test, demonstrating the linear connection between the green supply chain and competitive strategies. The data does not deviate from this presumption in this situation. Multicollinearity is tested using the variance inflation factors (VIF), tolerance. When the tolerance is higher than 10% and the VIF is lower than 10, the assumption of multicollinearity is not violated. As shown in Table 3, the tolerance is higher than 0.10 and the VIF is lower than 10. This suggests that the data is free from multicollinearity issues.

**Table 3**  
Multicollinearity

Model		Collinearity Statistics	
		Tolerance	VIF
1	Green Purchasing	0.538	1.859
	Green Operation	0.607	1.647
	Green Selling	0.493	2.029

Multiple Regressions

**H<sub>1</sub>:** Green Supply Chain practices (Green purchasing, Green selling, and Green operations) affect the competitive strategies of the pharmaceutical manufacturing industry in Jordan.

Table 4 and Table 5 represent regressing GSC dimensions against total competitive strategies. Table 4 shows that the correlation among them is high where r equals 81.2% and the explanation of variance is 65.9%, where R<sup>2</sup>=0.659, F=88.984, Sig.=0.000. This result indicates that GSC significantly and positively affects competitive strategies. While Table 5 shows that green selling is having the highest effect on competitive strategies, where β=0.384, t=5.421, Sig.=0.000, followed by green purchasing, where β=0.341, t=5.027, Sig.=0.001, then green operations, where β=0.217, t=3.401, Sig.=0.000.

**Table 4**  
Regressing Green Supply Chain against Competitive Strategies

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	F	Sig.
1	0.812 <sup>a</sup>	0.659	0.652	88.984	0.000 <sup>a</sup>

**Table 5**  
Regressing Green Supply Chain Sub-Variables against Competitive Strategies

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	0.559	0.213		2.626	0.010
Green Purchasing	0.263	0.052	0.341	5.027	0.000
Green Operation	0.232	0.068	0.217	3.401	0.001
Green Selling	0.394	0.073	0.384	5.421	0.000

T-Tabulated=1.960

**H<sub>2</sub>:** Green Supply Chain practices affect the competitive strategies (Cost leadership, Differentiation, and Responsiveness) of the pharmaceutical manufacturing industry in Jordan.

Table 6 and Table 7 represent regressing competitive strategies dimensions against total GSC. Table 6 shows that the correlation among them is high where  $r$  equals 81.4% and the explanation of variance is 66.2%, where  $R^2=0.662$ ,  $F=90.023$ ,  $Sig.=0.000$ . This result indicates that competitive strategies significantly and positively affect GSC. While Table 7 shows that differentiation is having the highest effect on GSC, where  $\beta=0.385$ ,  $t=6.066$ ,  $Sig.=0.000$ , followed by responsiveness, where  $\beta=0.322$ ,  $t=3.681$ ,  $Sig.=0.000$ , then cost leadership, where  $\beta=0.203$ ,  $t=2.356$ ,  $Sig.=0.020$ .

**Table 6**  
Regressing Competitive Strategies Against Green Supply Chain

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	F	Sig.
1	0.814 <sup>a</sup>	0.662	0.654	90.023	0.000 <sup>a</sup>

**Table 7**  
Regressing Competitive Strategies Sub-Variables Against Green Supply Chain

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	0.756	0.178		4.253	0.000
Differentiation	0.327	0.054	0.395	6.066	0.000
Cost Leadership	0.159	0.068	0.203	2.356	0.020
Responsiveness	0.265	0.072	0.322	3.681	0.000

T-Tabulated=1.960

## 5. Results Discussion

The results of this research indicate that GSC sub-variables are implemented at a medium level in Jordanian pharmaceutical manufacturing enterprises. Among the sub-variables, Green Operations has the greatest implementation rate, followed by Green Purchasing and finally Green Selling. The pharmaceutical business has a medium rate for GSC sub-variables due to the lack of GSC technology and managers' ignorance of the value of integrating green supply chain techniques. Moreover, given that the Jordanian pharmaceutical business always strives for competitiveness and toward the adoption of high-quality standards, the results demonstrate a high implementation of Competitive Advantage Dimensions. The Differentiation component has the greatest level of implementation, followed by Responsiveness and Cost Leadership. Cost Leadership is being implemented at a medium level since not all businesses choose to experiment with cost leadership or a mix of approaches. Furthermore, responsiveness has the lowest implementation since it is extremely difficult for the supply chain to adapt to market changes consistently and quickly. These results are supported by much previous literature such as a company's total competitive advantage is strongly impacted by its use of green supply chains. (Khaksar et al., 2015; Alizadeh et al., 2017). An examination of a green supply chain reveals that it has a moderate effect on the competitive advantage of sub-variable differentiation (Azizi et al., 2016). A green supply chain has a moderate effect on sub-variable cost leadership's competitive advantage (Çetin & Knouch, 2018; Azizi et al., 2016). The examination of the green supply chain demonstrates that it has a medium influence on the benefit of sub-variable responsiveness in terms of competitiveness. (Famiyeh et al., 2018). Finally, the green supply chain has a considerable influence on the competitive advantage dimensions even with a low implementation rate.

## 6. Conclusion

The goal of the current study is to ascertain how the GSC would impact the competitiveness of Jordanian pharmaceutical manufacturing companies. Additionally, it aims to address the key question: Do GSC components (Green purchasing, Green operating, and Green selling) affect the factors that give Jordanian pharmaceutical manufacturing organizations a competitive advantage (Differentiation, Cost Leadership, and Responsiveness)? A questionnaire was created by the researchers to gather information. The questionnaire's reliability and validity have been evaluated. Multiple regression analysis and correlation have both been used to examine the study's central claim. The results of the research demonstrate that GSC enhances Jordanian pharmaceutical manufacturing organizations' comparative advantage. The rate of adoption of green operations is greatest, followed by green purchasing and lastly green selling. The study's results also show that the GSC has a favorable medium influence on Jordanian pharmaceutical manufacturing organizations' competitive advantage. Additionally, Green Operations, Green Purchasing, and Green Selling all have the greatest implementation rates.

**Study Limitations and Recommendations:** The study was conducted on managers of Jordanian pharmaceutical manufacturing companies in Amman, Jordan. Therefore, it is suggested that comparable studies be conducted on Jordan's other businesses as well as the pharmaceutical sector in other nations, particularly Arab nations.

**Practical Implications:** The three GSC dimensions (Green Operations, Green Purchasing, and Green Selling) must be implemented jointly by firms to maximize the benefits of competitive advantage, according to this study's recommendations. Additionally, firms have to have a separate office to monitor GSC adoption and integration into supply chain management strategy.

**Study Contribution:** This study is one of the few that looked at how the GSC affected competitive strategies in the Jordanian pharmaceutical manufacturing sector. It attempts to raise awareness of how the GSC can help organizations operate better.

## References

- Al-Atrash, S. (2018). The Impact of Supply Chain Control Tower on Competitive Advantages of the Jordanian Pharmaceutical Manufacturing Industry. Unpublished thesis in Middle East University-Jordan.
- Al-Hawajreh, K. M., & Atiany, M. S. (2014). The Effect of Supply Chain Responsiveness on Competitive Advantage: A Field Study of Manufacturing Companies in Jordan. *European Journal of Business and Management*, 6(13), 151-162.
- Alhmarneh, G. Y. (2019). The Impact of Total JIT on Services Quality of Private Hospitals. Unpublished thesis in Middle East University-Jordan.
- Alizadeh, R., Yahyazadehfar, M., Aghajani, H.A., & Ghadikolaie, A.S. (2017). Explaining the Effect of Green Supply Chain Actions on Competitive Advantage of Pharmaceutical Companies Listed in Tehran Stock Exchange. *Journal of Administrative Management, Education and Training (JAMET)*, 13(3), 27-36.
- Ambe, I. (2010). Agile supply chain: a strategy for Competitive Advantages. *Journal of Global Strategic Management*, 7(7), 5-17.
- Amemba, C. S. (2013). Green supply chain best practices in the hospitality industry in Kenya. *Global Journal of Commerce & Management Perspective*, 2(3), 7-18.
- Azizi, R. Maleki, M. Moghadam, M. M., and Machado, V. C. (2016). The Impact of Knowledge Management Practices on Supply Chain Quality Management and Competitive Advantages. *Management and Production Engineering Review*, 7(1), 4-12.
- Baenas, J. M. H., De Castro, R., Battistelle, R. A. G., & Junior, J. A. G. (2011). A study of reverse logistics flow management in vehicle battery industries in the midwest of the state of São Paulo (Brazil). *Journal of Cleaner Production*, 19(2-3), 168-172. *Doi*. 10.1016/j.jclepro.2010.08.018.
- Bennett, D. J., & Nunes, B. T. S. (2008). Green operations: Diagnosing environmental initiatives in the automotive industry. In *3rd World Conference on Production and Operations Management* (pp. 1719-1734).
- Cerny, B., & Kaiser, H. (1977). A study of a measure of sampling adequacy for factor-analytic correlation matrices. *Multivariate behavioral research*, 12(1), 43-47.
- Çetin, O., & Knouch, M. (2018). Sustainable Competitive Advantage in Green Supply Chain Management. *Sustainability and Social Responsibility of Accountability Reporting Systems: A Global Approach*, 347-367. [https://doi.org/10.1007/978-981-10-3212-7\\_19](https://doi.org/10.1007/978-981-10-3212-7_19)
- Chan, R. Y. K., He, H., Chan, H. K., & Wang, W. Y. C. (2012). Environmental orientation and corporate performance: The mediation mechanism of green supply chain management and the moderating effect of competitive intensity. *Industrial Marketing Management*, 41, 621-630. DOI: 10.1016/j.indmarman.2012.04.009.
- Chen, I., & Paulraj, A. (2004). Understanding supply chain management: critical research and a theoretical framework. *International journal of production research*, 42(1),131-163.
- Chopra, S., & Meindl, P. (2001). *Supply chain management: Strategy, Planning, and operation*. 5<sup>th</sup> edition. Prentice-Hall, USA.
- Council, C. (2012). Supply-chain operations reference model. *Overview of SCOR version, 11(0)*, 1-976.
- Dai, J., Cantor, D. E., & Montabon, F. L. (2015). How Environmental Management Competitive Pressure Affects a Focal Firm's Environmental Innovation Activities: A Green Supply Chain Perspective. *Journal of Business Logistics*, 36(3), 242–259. DOI: 10.1111/jbl.12094.
- Deshmukh, A., & Vasudevan, H. (2014). Emerging Supplier Selection Criteria in the Context of Traditional Vs Green Supply Chain Management. *International Journal of Managing Value and Supply Chains (IJMVSC)*, 5(1), 19-30. DOI: 10.5121/ijmvsc.2014.5103.
- Deshmukh, A., & Vasudevan, H. (2016). Analysis of Supplier Selection Criteria in Traditional As Well As Green Supply Chain Management in Indian MSMEs. *International Journal of Business Quantitative Economics and Applied Management Research*. 3(2349-5677), 74-82.
- Famiyeh, S., Kwarteng, A., Asante-Darko, D., & Dadzie, S. A. (2018). Green supply chain management initiatives and operational competitive performance. *An International Journal*, 25(2), 607-631. <https://doi.org/10.1108/BIJ-10-2016-0165>.
- Githinji & Naomi, W. (2018). Effect of Green Supply Chain Practices on Sustainable Competitive Advantage of Cement Manufacturing Companies, Kenya. *Official KCAU Institutional Repository*. <http://41.89.49.13:8080/xmlui/handle/123456789/1396>
- Goetsch, D. L., & Davis, S. B. (2014). *Quality management for organizational excellence*. Upper Saddle River, NJ- Pearson.

- Gopal, P. R. C., & Thakkar, J. (2012). A Review of Supply Chain Performance Measurement. *International Journal of Productivity and Performance Management*, 61(5), 518-547. DOI 10.1108/17410401211232957.
- Gunasekaran, A., Lai, K. H., & Cheng, T. E. (2008). Responsive supply chain: a competitive strategy in a networked economy, *Omega*, 36(4), 549-564.
- Hair Jr, J., Sarstedt, M., Hopkins, L., & G. Kuppelwieser, V. (2014). Partial least squares structural equation modeling (PLS-SEM) An emerging tool in business research. *European Business Review*, 26(2), 106-121.
- Hartono, U., Witjaksono, A. D., & Erta (2018). Analysis of Green Supply Chain Management Implementation on Competitiveness, Environmental Performance, and SMEs Performance. *Advances in Social Science, Education, and Humanities Research*, 226,1489-1492.
- Heizer, J., Render, P., & Al-Zu'bi, Z. (2014). *Operations Management, Arab World Edition*. Pearson Education Limited, England.
- Hervani, A. A., Marilyn, M. H., & Joseph, S. (2005). Performance measurement for the green supply chain management. *Benchmarking an International Journal*, 12(4), 330-353.
- Hijuzaman, O. Rahayu, A., & Kusnendi (2018). The effect of green supply chain management implementation to marketing performance through company competitiveness (study on the paper industry in West Java). *4th International Seminar of Mathematics, Science and Computer Science Education IOP Publishing*, 1013, 012165. pp, 1-8. Doi:10.1088/1742-6596/1013/1/012165.
- Hsu, C. W., & Hu, A. H., (2009). Applying hazardous substance management to supplier selection using the analytic network process. *Journal of Cleaner Production*, 17(2), 255 -264.
- Jia, X., & Wang, M. (2019). The Impact of Green Supply Chain Management Practices on Competitive Advantages and Firm Performance. *The National Natural Science Foundation of China*, 7177418, 121-133. [https://doi.org/10.1007/978-981-13-0451-4\\_7](https://doi.org/10.1007/978-981-13-0451-4_7).
- Katuta, J. (2012). Green supply chain strategy and sustainable Competitive advantage of large manufacturing firms in Nairobi, Kenya. The University of Nairobi Research Archive.
- Khaksar, E., Abbasnejad, T., Esmaili, A., & Tamošaitienė, J. (2016). The effect of green supply chain management practices on environmental performance and competitive advantage: a case study of the cement industry. *Technological and Economic Development of Economy*, 22(2), 293-308. DOI:10.3846/20294913.2015.1065521
- Khan, S. A. R., & Qianli, D. (2017). Impact of green supply chain management practices on firms' performance: an empirical study from the perspective of Pakistan. *Environmental Science and Pollution Research*, 24, 16829-16844. DOI 10.1007/s11356-017-9172-5
- Khuyen, P. T. M., & Yen, P. T. M. (2017, November). Green Supply Chain-Solutions to Improve the Competitiveness of Thainguyen Tea. In *Proceedings of the Sixth International Conference on Entrepreneurship and Business Management (ICEBM 2017), Hanoi, Vietnam* (pp. 16-17).
- Kioko, M. T. (2015). Green Supply Chain Management Practices and Competitiveness of Logistics Firms in Mombasa County. Unpublished Research Project Proposal of Master of (MBA), the University of Nairobi, Kenya.
- Kumlu, Ö. (2014). The effect of intangible resources and competitive strategies on the export performance of small and medium-sized enterprises. *Procedia-Social and Behavioral Sciences*, 150, 24-34.
- Laari, S., Töyli, J., & Ojala, L. (2017). Supply chain perspective on competitive strategies and green supply chain management strategies. *Journal of cleaner production*, 141, 1303-1315. DOI: 10.1016/j.jclepro.2016.09.114.
- Lee, S. M., Tae Kim, S., & Choi, D. (2012). Green supply chain management and organizational performance. *Industrial Management & Data Systems*, 112(8), 1148-1180.
- Liu, L., Tang, M., & Xue, F. (2012). The Impact of Manufacturing Firms' Green Supply Chain Management on Competitive Advantage. *Trans Tech Publications, Switzerland*, 472-475, 3349-3354. DOI: 10.4028/www.scientific.net/AMR, 472-475.3349.
- Martusa, R., & Meythi (2013). Green Supply Chain Management: Strategy to Gain Competitive Advantage. *Journal of Energy Technologies and Policy*, 3(11), 334-340.
- Masoumik, S. M., Abdul-Rashid, S. H., & Olugu, E. U. (2014). Gaining competitive advantage through strategic green supply chain management: From a literature review towards a conceptual model. *International Journal of Supply Chain Management*, 3(3), 49-58.
- Mbaabu, D.K. (2016). A Concept Paper of Green Supply Chain Management Practices in Kenya. *DBA Africa Management Review*, 6(3), 74-84.
- Michelsen, O., & de Boer, L. (2009). Green procurement in Norway; a survey of practices at the municipal and county level. *Journal of Environmental Management*, 9, 160-167. DOI: 10.1016/j.jenvman.2009.08.001.
- Muthaher, O. (2015). Effect of Green Supply Chain Management Practices on Supply Chain Performance and Competitive Advantage. *GBSE Journal*.
- Porter, M. E. (2008). *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. Free Press, New York.
- Porter, M. E. C., & Linde, V. D. (1995). Green and Competitive: Ending the Stalemate. *Harvard Business Review (September-October)*, 120-134.
- Porter, M., & Van der Linde, C. (1996). Green and competitive: Ending the stalemate in Welford R and Starkey R. *Business and the Environment*. London, Earthscan, 61-77.
- Rao, P. (2008). Greening the supply chain: a new initiative in South East Asia. *International Journal of Operations and Production Management*, 22(6), 632-655. <https://doi.org/10.1108/01443570210427668>.

- Rao, P., & Holt, D. (2005). Do green supply chains lead to competitiveness and economic performance? *International Journal of Operations and Production Management*, 25(9), 898–916. DOI: 10.1108/01443570510613956.
- Rostamzadeh, R., Govindan, K., Esmaceli, A., & Sabaghi, M. (2014). Application of fuzzy VIKOR for evaluation of green supply chain management practices. *Ecological Indicators*, 49, 188-201. <http://dx.doi.org/10.1016/j.ecolind.2014.09.045>
- Sadurdeen, A. R., & Sutha, J. (2019). Impact of Green Supply Chain Management on Competitive Advantage of Business Organizations in Sri Lanka. Hierarchical Planning and Information Sharing Techniques in Supply Chain Management. DOI: 10.4018/978-1-5225-7299-2.ch004
- Sharabati, A. A. A. (2018). Effect of corporate social responsibility on Jordan pharmaceutical industry's business performance. *Social Responsibility Journal*, 14(3), 566-583. DOI 10.1108/SRJ-12-2016-0221.
- Sharabati, A. A. A. (2021). Green Supply Chain Management and Competitive Advantage of Jordanian Pharmaceutical Industry. *Sustainability*, 13(23), 13315.
- Sirmon, D., Hitt, M., Ireland, R., & Gilbert, B. (2011). Resource orchestration to create Competitive Advantages: Breadth, depth, and life cycle effects. *Journal of Management*, 37(5), 1390-1412.
- Somsuk, N., Pongpanich, P., & Teekasap, S. (2013). Determining and Classifying Drivers of Sustainable Competitive Advantages in Green Supply Chain Management: Resource-Based and Relational Views. *IEEE IEEM*.
- Srivastava, S. (2007). Green supply-chain management: a state-of-the-art literature review. *International Journal of Management Reviews*, 9(1), 53–80. DOI: 10.1111/j.1468-2370.2007.00202. x.
- Tan, C. L., Zailani, S. H. M., Tan, S. C., & Shaharudin, M. R. (2016). The impact of green supply chain management practices on firm competitiveness. *International Journal of Business Innovation and Research*, 11(4), 539-554.
- Thatte, A., Rao, S., & Ragu-Nathan, T. (2013). Impact of SCM practices of a firm on supply chain responsiveness and Competitive Advantages of a firm. *Journal of Applied Business Research*, 29(2).
- Thummalapalli, U. S. (2019). The Influence of Green Supply Chain Management on the Competitive Advantage: Case of Japanese Auto Manufacturing Company (Toyota). Unpublished Research for the Degree of Master of Business Administration, Ritsumeikan Asia Pacific University, Japan.
- Van Hoek, R. (1999). From reversed logistics to green supply chains. *Supply Chain Management*, 4(3), 129-134.
- Verma, A., & Gangele, A. (2012). An Empirical Study of the Investigation of Green Supply Chain Management Practices in the Pharmaceutical Industry and Their Relation Drivers, Practices, and Performances. *International Journal of Mechanical Engineering and Technology (IJMET)*, 3(3), 654-668.
- Wheelen, T. L., Hunger, J. D., Hoffman, A. N., & Bamford, C. E. (2017). Strategic management and business policy (p. 55). Boston: Pearson.
- Xie, Y., & Breen, L. (2012). Greening community pharmaceutical supply chain in the UK: a cross-boundary approach. *Supply Chain Management: An International Journal*, 17(1), 40–53. DOI 10.1108/13598541211212195.
- Yahyazadehfar, R. M., Aghajani, H. A., & Ghadikolaie, A. S. (2017). Explaining the Effect of Green Supply Chain Actions on Competitive Advantage of Pharmaceutical Companies Listed in Tehran Stock Exchange. *Journal of Administrative Management, Education and Training (JAMET)*, 13(3), 27-35.
- Yang, C., Lu, C. Haider, J.J. & Marlow, P.B. (2013). The effect of green supply chain management on green performance and firm competitiveness in the context of container shipping in Taiwan. *Transportation Research Part E*, 55-73. <http://dx.doi.org/10.1016/j.tre.2013.03.005>.
- Zhu, Q., Geng, Y., Sarkis, J., & Lai, K. H. (2011). Evaluating green supply chain management among Chinese manufacturers from the ecological modernization perspective. *Transportation Research Part E: Logistics and Transportation Review*, 47(6), 808-21.

