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The effect of green supply chain management on the environmental sustainability performance of the pharmaceutical Jordanian industry

Mohammad Salameh Almasarweh
The University of Jordan
Corresponding author email: m.almasarweh@ju.edu.jo

***Abstract*---**Purpose: The study's goal is to investigate how a green supply chain (green purchasing, green operations, green selling, green distribution, and green marketing) can affect environmental performance in Jordanian pharmaceutical industries firms.Design/Methodology/Approach: The survey unit of analysis is made up of 50 out of 245 managers who work at Pharmaceutical Manufacturing Organizations and were available at the time the questionnaires were distributed. The normality, validity, and reliability of the study tool were confirmed, followed by a descriptive analysis and the calculation of the correlation between variables. Finally, the impact of Green Supply Chain was tested using multiple regressions.Finding:The study's findings indicate that the green supply chain has a positive impact on the environmental performance of Jordanian pharmaceutical companies. Green selling has the greatest impact on environmental performance, followed by green purchasing, green labeling, green distribution, and green operations.Recommendations: The study suggests that Jordanian Pharmaceutical Manufacturing Organizations incorporate Green Supply Chain into their supply chain management strategic plans. Practical and Managerial Implications:Implementing a Green Supply Chain in Jordanian Pharmaceutical Industries Firms increased Environmental Performance. As a result, incorporating Green Supply Chain into Supply Chain Management strategies will increase competitive advantages. Originality/value: Originality/Value: Although the green supply chain is a popular concept, little is known about its current status in Jordan, aside from a few case studies. The study investigates the extent of green supply chain practices in Jordanian pharmaceutical companies' factories and their impact on environmental performance. The study also highlights the link

between green supply chain dimensions/practices and environmental performance.

***Keywords*---**green supply chain, environmental performance, Jordanian pharmaceutical industries firms.

Introduction

The concept of a green supply chain first appeared in the late 1990s.. It consists of purchasing, operation, distribution, marketing and selling functions with green characteristics innovations in each step, which make value creation through the whole supply chain. improvement of sales revenues, and customer satisfaction make the supply chain more beneficial and reducing the negative effect on the environment, therefore, enhance the impression of local pharmaceutical production. The same is true for the pharmaceutical industries, which have a sharp rise of pollution when medication and other chemicals are disposed of in sewage effluent or other harmful ways, so the green supply chain kills two enemies with one bullet; the enviro nmental pollution through the supply chains as well as their risks. [1]observed the companies which have adopted the green supply chain management to decrease ecological risks and increase environmental efficiency, hence market share expands. [2]stressed that green supply chain management can be described as the pursuit of improving the performance of the environment over the supply chain. [3]discovered that green supply chain management practices in healthcare encompass all efforts made to ensure the environmental confirmation of their services, which stipulated ecological requirements. observed that environmental practices need entire participation and collaboration cross-sector from participants. [4] illustrated that the inconstant environmental requirements impact manufacturing operations and increase attention to develop effective environmental management strategies for the supply chain.[5]presented that the concept of supply chain management is becoming more complex and competitive. In this condition, it has become very important to analyze the whole life cycle effect on all processes and products and to be included with the product recovery mechanism as well.[6]noticed the organization's performance at a local and international level, which is responsible for support society, the economy, and the environment will do better. [7] balanced that the outbound part of the green supply chain during all processes (green marketing, environment-friendly packaging, and distribution) initiates the link between improvement of green supply chain performance and promotion of the competitiveness of the organization. [8] the main competitive model can give the best environmental resources and operations comparison with other conditions, which integrate efficiency throughout the supply chain as the 3Rs concept (reduction, reuse, and recycling).therefore, this study aims to investigate the effect of green supply chain (Green purchasing, Green operations, Green selling, Green Distribution, and Green marketing) practices on environmental Performance in Jordanian Pharmaceutical Industries Firms.

Literature review

Green purchasing is the procurement of environmentally friendly product ingredients and raw materials, as well as data collection on suppliers who consider environmental standards to maximize the value-added of sustainable (green) products**.**Previous studies have confirmed a positive association between Green Purchasing and environmental performance ([9];[10];[11];[12]). This leads to the following hypothesis:H1-1: There is a positive relationship between Green Purchasing and Environmental performance. Green operations are the environmental executions in operations, which use good manufacturing practices standards to produce products and minimizing the waste of manufacturing, pollutions, and recyclable products.Previous studies have confirmed a positive association between Green Operations and environmental performance [13];[9]; [14]). This leads to the following hypothesis:H1-2: There is a positive relationship between Green Operations and Environmental performance. Green selling is the outbound process that includes environmental awareness, ecofriendly packaging, green marketing activities, and the adoption of suitable prices of green products. Previous studies have confirmed a positive association between Green Selling and environmental performance ([15]; [9]; [10]; [11];). This leads to the following hypothesis:H1-3: There is a positive relationship between Green Selling and environmental performance. Green Distribution: Manufactured products must arrive on time, and the market must be informed of the products' availability, features, and capabilities. This necessitates the use of appropriate distribution and marketing systems. Environmental concerns must be taken care of by offering environmentally friendly products through environmentally-friendly distribution and marketing systems. Green distribution can be accomplished through green packaging, green transportation, and green logistics[16]Green packaging, according to[17] entails downsizing packaging and the use of green packaging materials.Previous studies have confirmed a positive association between Green Distribution and environmental performance ([13]; [18]; [17]). This leads to the following hypothesis:H1-4: There is a positive relationship between Green Distribution and environmental performance. Green marketing is any marketing activity of an organization that aims at creating a positive effect or removes a negative effect of a particular product on the environment. It also brings an organization close to its clients, particularly clients with a particular interest in consumer rights and the environment.Previous studies have confirmed a positive association between Green Marketing and environmental performance ([13][18]). This leads to the following hypothesis:H1-5: There is a positive relationship between Green Marketing and environmental performance.

Environmental Performance

Climate change, environmental degradation, and natural resource scarcity are some of the major challenges that humankind. As contributors to the conception of such challenges, manufacturing organizations have been forced to develop Cleaner operations and production processes. Exploring the opportunities that currently used best practices may offer to address environmental challenges, and how they can be adapted and implemented to meet sustainability requirements, is a common starting point for developing better strategies to support environmental sustainability[19].Environmental performance definition a holistic activity that

reflects the institution's ability to exploiting its capabilities on long-term goals. ISO has defined environmental performance as per ISO 14001 specifications However, they are standard results for the institution's management of its environmental aspects. According to [20]at the French ESSEC University. defined environmental performance as being A system that allows the improvement of the relationship between value and cost to achieve strategic goals .environmental Performance is a relationship between sets of services linked to activities in terms of quality and productivity [21]. [22] also defined it as an exploitation of resources without any depletion.environmental performance has a plethora of shapes, scales, and dimensions and it is related to industrial activities and processes, services for the organizations. It is environmental efficiency and environmental effectiveness. Environmental efficiency is delivering goods and services that meet human needs while lessening the environmental impacts on manners that preserve resource density by controlling the life cycle of the product or service and making it environmentally friendly by easily recycling or disposal [23]

Reliability

To ensure the consistency of the tools, the Cronbach alpha equation was used on the study sample, to find out the coefficient of internal consistency for each of the fields of Green Supply Chain Management and the scale of Environmental Performance and the scale as a whole , to find out about these values Table (1) shows that:

Table (1)

Reliability Statistics		
Dimentions	Cronbach's Alpha	N of Items
Green Purchasing	.934	5
Green Operations	.942	5
Green Selling	.939	5
Green Distribution	.916	4
Green Markting	.916	4
Environmental Performance	.906	**6**
All dimentions	.985	29

Table (1) shows the reliability coefficients for the items with high loading, where sufficient values are found to conduct the study.

Q: Which of the dimensions has the greatest influence on environmental performance?
To answer this question, the determination coefficient was calculated for each dimension of the green supply chain related to this question, as shown in table (2):

Table (2)

Dimentions	R	R Square	Adjusted R Square	Std. Error of the Estimate
Green Purchasing	.675	.455	.444	.59459
Green Operations	.659	.434	.422	.60621
Green Selling	.684	.468	.456	.58779
Green Distribution	.614	.377	.364	.63596
Green Markting	.681	.464	.453	.58976
All dimentions	.749	.560	.510	.55780

Table (2) shows that the correlation coefficient between the independent variable (Green Purchasing) and the dependent variable (enviromental performance) was (0..675), the coefficient of determination (R2) was (0..455), and the adjusted determination coefficient (Adjusted R2) was (0..444), indicating that the independent variable (Green Purchasing) could explain (45.5 percent) of the changes in the dependent variable (enviromental performance). According to Table (2), the effect of Green Selling has a significant impact on environmental performance and The effect ratio was (46.8 percent) on the dependent variable (environmental performance), and the Green Distribution had a lower effect on environmental performance. The effect ratio on the was (37.7 percent).Means and standard deviations for all dimentions ranked in descending order according to the means

Table (3)

Dimantion	N	mean	median	S.D	Degree of agree	Rank
Green Operations	50	2.984	3.1	1.00597	Medeum	4
Green Distribution	50	2.99	3	.99227	Medeum	3
Green Markting	50	2.99	3	.99227	Medeum	3
Green Purchasing	50	2.992	3	0.974751	Medeum	2
Green Selling	50	2.996	3	.99999	Medeum	1
Environmental Performance	50	2.7233	2.8333	.79725	Medeum	

The means ranged from (2.996-2.723) with medeum levels degree, with the highest mean for domain (1) "Green Selling," followed by mean (2.992) for domain (2) "Green Purchasing," followed by mean (2.99) for domain (3) "Green Distribution & Green Marketing," followed by mean (2.99) for domain (4) "Green Operations." H1: There is a positive relationship between environmental performance elements of pharmaceutical manufacturing organizations and Green Supply Chain practices (Green purchasing, Green operations, and Green selling, Green Distribution, and Green Marketing) at (0.05).

Table (4)

Model	Sum of Squares	Df	Mean Square	F	Sig
Regression	17.455	5	3.491	11.220	.000*
Residual	13.690	44	.311		
Total	31.145	49			

Table (4) shows that the value (F = 11.220) and statistically significant (0.00) are both less than the level of statistical significance (0.05). As a result, a simple linear regression model is appropriate for estimating the causal relationship between the independent variable (Green Supply Chain practices) and the dependent variable (environmental performance). A summary of the simple linear regression Model Summary analysis.

H1-1: Green purchasing and environmental performance have a positive relationship. The outcome of the ANOVA table Green Purchasing

Table (5)

Model	Sum of Squares	Df	Mean Square	F	Sig
Regression	14.175	1	14.175	40.094	.000*
Residual	16.970	48	.354		
Total	31.145	49			

* Statistically significant at the level of statistical significance (α ≤ 0.05

Table (5) shows that the value (F = 40.094) and statistically significant (0.00) are both less than the level of statistical significance (0.05). As a result, a simple linear regression model is appropriate for determining the causal relationship between the independent variable (Green Purchasing) and the dependent variable (Environmental performance). A summary of the simple linear regression Model Summary analysis. H1-2: Green operations and environmental performance have a positive relationship.

The result for ANOVA table Green Operations

Table (6)

Model	Sum of Squares	Df	Mean Square	F	Sig
Regression	13.506	1	13.506	36.751	.000*
Residual	17.639	48	.367		
Total	31.145	49			

* Statistically significant at the level of statistical significance (α ≤ 0.05)

Table (6) shows that the value (F = 36.751) and statistically significant (0.00) are both less than the level of statistical significance (0.05). As a result, a simple linear regression model is appropriate for estimating the causal relationship between the independent variable (Green Operations) and the dependent variable

(Environmental performance). A summary of the simple linear regression Model Summary analysis.

H1-3: There is a positive relationship between Green Selling and environmental performance.

Table (7)

Model	Sum of Squares	Df	Mean Square	F	Sig
Regression	14.561	1	14.561	42.147	.000*
Residual	16.584	48	.345		
Total	31.145	49			

* Statistically significant at the level of statistical significance (α ≤ 0.05)

Table (7) shows that the value (F = 42.147) and statistically significant (0.00) are both less than the level of statistical significance (0.05). As a result, a straightforward linear regression model is appropriate for determining the causal relationship between the independent variable (Green Selling) and the dependent variable (environmental performance). A summary of the simple linear regression Model Summary analysis.

H1-4: Green Distribution and environmental performance have a positive relationship.

Table (8)

Model	Sum of Squares	Df	Mean Square	F	Sig
Regression	11.732	1	11.732	29.006	.000*
Residual	19.413	48	.404		
Total	31.145	49			

* Statistically significant at the level of statistical significance (α ≤ 0.05)

Table (8) shows that the value (F = 428.942) and statistically significant (0.00) are both less than the level of statistical significance (0.05). As a result, a straightforward linear regression model is appropriate for determining the causal relationship between the independent variable (Green Distribution) and the dependent variable (environmental performance). A summary of the simple linear regression Model Summary analysis.

H1-5: There is a positive relationship between Green Marketing and environmental performance.

Table (9)

Model	Sum of Squares	Df	Mean Square	F	Sig
Regression	14.450	1	11.732	41.545	.000*
Residual	16.695	48	.404		
Total	31.145	49			

* Statistically significant at the level of statistical significance (α ≤ 0.05)

Table (9) shows that the value (F = 41.545) and statistically significant (0.00) are both less than the level of statistical significance (0.05). As a result, a straightforward linear regression model is appropriate for determining the causal relationship between the independent variable (Green Marketing) and the dependent variable (environmental performance). A summary of the simple linear regression Model Summary analysis.

Discussion and conclusion

This study shows the extent to which Green Supply Chain Management are applied in the Pharmaceutical Jordanian industry and the degree of their impact on the Environmental Performance adopted in Pharmaceutical Jordanian industry. The study indicates that many of the results for industrial companies in Jordan have achieved an advanced level of Environmental Performance and achieved high oGreen purchasing, Green operations, and Green selling, Green Distribution, and Green Marketing through the application of Green Supply Chain Management .The results were consistent with an acceptable percentage in terms of environmental performance.The results showed that the performance of the first hypothesis,There is a positive relationship between Green Supply Chain practices (Green purchasing, Green operations, and Green selling, Green Distribution, and Green Marketing) between environmental performance elements of the pharmaceutical manufacturing organizations, at (α≤0.05),so the first hypothesis and all hypothesis is accepted.the results of this study, in terms of the extent to which the Green Supply Chain is applied to theenvironmental performance, are in consistent with some studies (i.e. Thummalapalli (2019); Jia & Wan (2019); Hijuzaman & Rahay (2018);Verma & Gangele (2012) .The higher level of the Green Supply Chain Management applied, the better environmental performance of industrial companies, which are statistically significant. Green Supply Chain Management strategy has had no impact on reducing environmental pollution. However, Green Supply Chain Management has not yet reached the stage of reducing environmental pollution. The current research findings support the notion that the manufacturing industry, particularly in Jordan, should improve lean thinking and approaches in order to compete. This study also created awareness to researchers regarding the role of Green Supply Chain Management and techniques in boosting production benefits. Further studies can be conducted to evaluate various barriers in the implementation of Green Supply Chain Management practice by considering cultural, technical, organizational and economic factors in manufacturing companies. Attention should be paid to a comparative study of the extent of Green Supply Chain Management for small and large companies, and expand research on the impact of Green Supply Chain Management on environmental performance. The findings may be important to industries who desire to implement the Green Supply Chain Management process in their business and for organizations to identify factors that impact Green Supply Chain Management implementation. This study also created awareness to researchers regarding the role of Green Supply Chain Management and techniques in boosting production benefits. Further studies can be conducted to evaluate various barriers in the implementation of Green

Supply Chain Management Practice by considering cultural, technical, organizational and economic factors in manufacturing companies.

Recommendations

This study suggests that Jordanian Pharmaceutical Manufacturing Organizations incorporate Green Supply Chain into their supply chain management strategic plans. The study advises Jordanian Pharmaceutical Manufacturing Organizations to integrate all Green Supply Chain sub-variables because they achieve greater environmental effects when combined. The study suggests that Jordanian Pharmaceutical Manufacturing Organizations establish an independent office to monitor the implementation and integration of Green Supply Chain into Supply Chain management strategic plans. The study advises Jordanian Pharmaceutical Manufacturing Organizations to focus on long-term competitiveness by implementing green purchasing, green operations, green selling, green distribution, and green marketing. The study suggests conducting additional research to investigate the impact. The current study was carried out in Jordanian Pharmaceutical Manufacturing Organizations. The study suggests generalizing the findings to the Jordanian Pharmaceutical Manufacturing Industry and the rest of the world. The study suggests broadening the analysis of other sectors and industries in future research, where including other industries within the same study will allow us to generalize the results to all industries. The study suggests that researchers look into the impact of green supply chains on competitive advantages and environmental performance.Further research suggestion; in response to several researchers (e.g. ALmasarweh , 2019; ALmasarwehet al, 2021), a comparative study should be conducted among different sectors in developed and developing countries to extract the best practices such as in using Green Supply Chain Management in the Environmental Performance and then implementing them appropriately.

Reference

1. R. I. Van Hoek, “From reversed logistics to green supply chains,” *Supply Chain Manag. An Int. J.*, 1999.
2. S. K. Srivastava, “Green supply-chain management: a state-of-the-art literature review,” *Int. J. Manag. Rev.*, vol. 9, no. 1, pp. 53–80, 2007.
3. James Kwame Mensah, “International Journal of Productivity and Performance Management,” *Int. J. Product. Perform. Manag.*, vol. 64, no. 4, pp. 551–567, 2015, [Online]. Available: http://dx.doi.org/10.1108/17410400510622223%5Cnhttp://
4. A. J. Deshmukh and H. Vasudevan, “Emerging Supplier Selection Criteria in The Context of Traditional VS Green Supply Chain Management,” *Int. J. Manag. Value Supply Chain.*, vol. 5, no. 1, pp. 19–33, 2014, doi: 10.5121/ijmvsc.2014.5103.
5. A. Deshmukh, H. Vasudevan, and D. J. Principal, “Analysis of Supplier Selection Criteria in Traditional as well as Green Supply Chain Management in Indian MSMEs,” *Int. J. Bus. Quant. Econ. Appl. Manag. Res.*, vol. 3, no. 3, pp. 73–85, 2016.
6. A.-A. A. Sharabati, “Effect of corporate social responsibility on Jordan pharmaceutical industry’s business performance,” *Soc. Responsib. J.*, 2018.

7. P. Rao and D. Holt, “Do green supply chains lead to competitiveness and economic performance?,” *Int. J. Oper. Prod. Manag.*, 2005.
8. C. L. Tan, S. H. M. Zailani, S. C. Tan, and M. R. Shaharudin, “The impact of green supply chain management practices on firm competitiveness,” *Int. J. Bus. Innov. Res.*, vol. 11, no. 4, pp. 539–558, 2016.
9. O. Hijuzaman and A. Rahayu, “The effect of green supply chain management implementation to marketing performance through company competitiveness (study on paper industry in West Java),” in *Journal of Physics: Conference Series*, 2018, vol. 1013, no. 1, p. 12165.
10. H. L. Wei, P. H. Ju, and Y. A. Angkasa, “Implementing green supply chain management to achieve competitive advantage,” in *2016 5th IIAI International Congress on Advanced Applied Informatics (IIAI-AAI)*, 2016, pp. 755–758.
11. E. Khaksar, T. Abbasnejad, A. Esmaeili, and J. Tamošaitienė, “The effect of green supply chain management practices on environmental performance and competitive advantage: a case study of the cement industry,” *Technol. Econ. Dev. Econ.*, vol. 22, no. 2, pp. 293–308, 2016.
12. U. S. Thummalapalli, “The Influence of Green Supply Chain Management on the Competitive Advantage: Case of Japanese Auto Manufacturing Company (Toyota),” *Unpubl. Res. Degree Master Bus. Adm. Ritsumeikan Asia Pacific Univ. Japan*, 2019.
13. B. O. Muma, R. B. Nyaoga, R. B. Matwere, and E. Nyambega, “Green supply chain management and environmental performance among tea processing firms in Kericho County-Kenya,” *Int. J. Econ. Financ. Manag. Sci.*, vol. 2, no. 5, pp. 270–276, 2014.
14. A. A. Hervani, M. M. Helms, and J. Sarkis, “Performance measurement for green supply chain management,” *Benchmarking An Int. J.*, 2005.
15. X. Jia and M. Wang, “The Impact of Green Supply Chain Management Practices on Competitive Advantages and Firm Performance,” in *Environmental Sustainability in Asian Logistics and Supply Chains*, Springer, 2019, pp. 121–134.
16. B. O. Muma, “Green Supply Chain Management and Environmental Performance among Tea Processing Firms in Kericho County- Kenya,” *Int. J. Econ. Financ. Manag. Sci.*, vol. 2, no. 5, p. 270, 2014, doi: 10.11648/j.ijefm.20140205.11.
17. C. Ninlawan, P. Seksan, K. Tossapol, and W. Pilada, “The implementation of green supply chain management practices in electronics industry,” in *World Congress on Engineering 2012. July 4-6, 2012. London, UK.*, 2010, vol. 2182, pp. 1563–1568.
18. M. Al-Odeh and J. Smallwood, “Sustainable supply chain management: Literature review, trends, and framework,” *Int. J. Comput. Eng. Manag.*, vol. 15, no. 1, pp. 85–90, 2012.
19. J. A. Garza-Reyes, V. Kumar, S. Chaikittisilp, and K. H. Tan, “The effect of lean methods and tools on the environmental performance of manufacturing organisations,” *Int. J. Prod. Econ.*, vol. 200, pp. 170–180, 2018.
20. P. Lorino, “Concevoir l’activité collective conjointe: L’enquête dialogique. Etude de cas sur la sécurité dans l’industrie du bâtiment. Activités 6 (1), 87-110.” 2009.
21. M. D. R. Barajas E, C. Rodríguez C, and H. García J, “Environmental performance of the assembly plants industry in the north of Mexico,” *Policy Stud. J.*, vol. 35, no. 2, pp. 265–289, 2007.

22. B. Fura, “Improving ISO 14001 Environmental Management Systems.,” *Polish J. Environ. Stud.*, vol. 22, no. 6, 2013.
23. R. Van Berkel, “Cleaner production and eco-efficiency initiatives in Western Australia 1996–2004,” *J. Clean. Prod.*, vol. 15, no. 8–9, pp. 741–755, 2007.
24. Widana, I.K., Dewi, G.A.O.C., Suryasa, W. (2020). Ergonomics approach to improve student concentration on learning process of professional ethics. *Journal of Advanced Research in Dynamical and Control Systems*, *12*(7), 429-445.
25. Widana, I.K., Sumetri, N.W., Sutapa, I.K., Suryasa, W. (2021). Anthropometric measures for better cardiovascular and musculoskeletal health. *Computer Applications in Engineering Education*, *29*(3), 550–561. https://doi.org/10.1002/cae.22202
26. Exposto, L. A. S., & Januraga, P. P. (2021). Domestic waste characteristics and the management systematic review. *International Journal of Health & Medical Sciences*, *4*(2), 253-259. https://doi.org/10.31295/ijhms.v4n2.1731