

# **The impact of green logistics practices on firm performance: Evidence from Turkish healthcare industry**

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## **Abstract**

This research aims to investigate relationship between green logistics practices and firm performance in healthcare organizations. For this purpose, a conceptual model is developed from related literature. Then, data were collected through a questionnaire-based survey from hospital managers in Turkey. Data is analyzed with explanatory factor analysis and regression methods.

**Keywords:** Green logistics, Firm performance, Hospitals

## **Introduction**

Logistics activities are vital for both manufacturing and service organizations to be competitive in today's market conditions. Its main objective is to have the right amount of material or product at the right time and at the right place (Simchi Levi et al. 2008, p. 1). Traditionally, cost were the only factor in planning logistics activities to achieve this objective. However, increased emphasis on green issues makes it also necessary for the firms to consider the environmental damage created by their sourcing and distribution operations (e.g. Dekker et al. 2012). For this purpose, various organizations have implemented some sort of green logistics practices. Of course, the degree of application is not same for all firms. For instance, while some firms follow a proactive strategy, some others try to meet only regulatory requirements (Murphy and Poist, 2000). In short, not all organizations are eagle to do their best for green logistics. To the best of our knowledge, this is the case because the relationship between green logistics practices and firm performance is not very clear. For example, while some studies indicate it as very advantageous (e.g. Rao and Holt, 2005), some others reveal that green logistics does not provide any economic contribution (e.g. Laosirihongthong et al. 2013) to a company.

Therefore, we believe that a research exploring the relationship between green logistics and firm performance could be a valuable source of information for the managers that plan to implement green logistics practices. By using this knowledge, they can make a better decision

on developing a strategy for green logistics practices. Although this information is very important for all industries, we believe that having this knowledge is more important for healthcare industry as it is more crucial to implement green logistics practices in this industry. This is because materials and equipment used in this industry are potentially more harmful to the environment. Interestingly, we observe that no research is conducted to investigate the relationship between green logistics and firm performance in this industry. For this purpose, in this research, we aim to investigate this relationship.

## Research framework and hypotheses

The research framework and associated hypotheses are shown in Figure 1.

We believe that green logistics practices and their impact on firm performance may be influenced by hospital type. For this purpose, it is added as a control variable into the research framework shown in Figure 1.

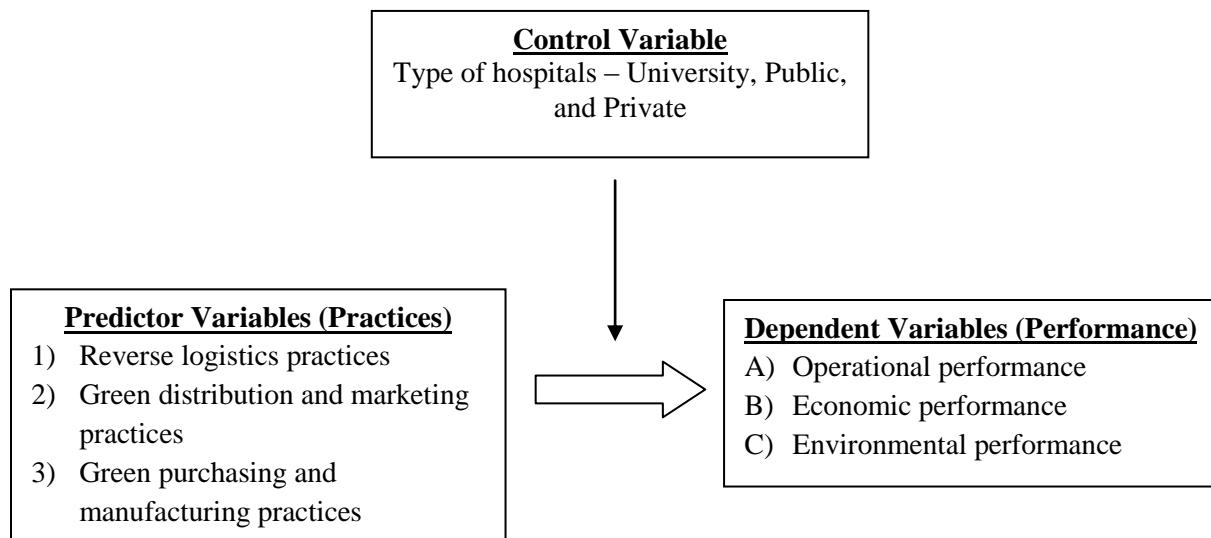


Figure 1 - Research framework

10 research hypotheses are formed by using the related literature. These are shown below.

- H1) Reverse logistics has a positive impact on operational performance
- H2) Reverse logistics has a positive impact on economic performance
- H3) Reverse logistics has a positive impact on environmental performance
- H4) Green distribution and marketing practices has a positive impact on organizational performance
- H5) Green distribution and marketing practices has a positive impact on economic performance
- H6) Green distribution and marketing practices has a positive impact on environmental performance

- H7) Green purchasing and manufacturing has a positive impact on operational performance
- H8) Green purchasing and manufacturing has a positive impact on economic performance
- H9) Green purchasing and manufacturing has a positive impact on environmental performance
- H10) Type of hospital moderates the relationship between green logistics practices and firm performance

## Research design

The survey instrument is constructed by using the related literature. At this point, the studies by Zhu et al. (2013), Ye et al. (2013), Lai and Wong (2012), Cao and Zhang (2011) are very useful resources for us.

In our survey instrument, 11 items are prepared to evaluate the level of implementation for green logistics practices. From them, 4 items are used for green purchasing and manufacturing, 3 items are used for green distribution and marketing, and 4 of them are used for reverse logistics practices. In addition, in order to understand the firm performance, 34 items are prepared. From these items, 10 items are used for operational performance, 9 items are used for environmental performance, and 15 items are used for evaluating economic performance.

This research is conducted with 240 hospital managers from 40 different hospitals located in Istanbul, Turkey. The sample respondents are expected to have knowledge or experience in green logistics practices. Therefore, the target respondents are the managers that are responsible from logistics operations.

## Analyses and results

Confirmatory factor analysis is conducted. The internal consistency of the constructs is verified by using Cronbach's alpha and the results indicate that all the values are above 0.7 and this confirms that our constructs are at acceptable levels.

*Table 1 – Standardized regression coefficients*

Green logistics practices	Operational Performance	Economic performance	Environmental performance
1) Reverse logistics practices	0,421	0,215	0,258
2) Green distribution and marketing practices	-	0,219	-
3) Green purchasing and manufacturing practices	0,366	0,393	0,354

In order to explore the relationship between green logistics practices and firm performance a regression analysis is performed for each performance indicator. Standardized regression coefficients obtained from regression analyses for the relationship between green logistics practices and firm performance are provided in Table 1.

Table 1 indicates reverse logistics practices are significantly influential on all performance indicators. A similar situation is also observed for green purchasing and manufacturing practices. These results indicate that our first six hypotheses (H1, H2, H3, H4, H5, and H6) are supported. However, for the green distribution and marketing practices, the results are substantially different. Namely, it is observed from Table 1 that the green distribution and marketing practices are influential only on the economic performance of hospitals. For the operational and environmental performances, on the other hand, there is no empirical evidence to support our hypotheses. This means that while H8 is supported from our empirical data, H7 and H9 are not supported.

In order to understand the impact of hospital type on the relationship between green logistics practices and firm performance, a nonparametric Kruskal Wallis test is performed for each performance indicator. These tests indicate that at 5 percent significance level, hospital type is an important factor for the relationship between green logistics practices and firm performance. This finding supports H10.

Later, a post hoc test is conducted for each performance indicator to understand which types of hospitals are separated from others. The results from post hoc tests provided in Table 2, Table 3, and Table 4.

*Table 2- Post Hoc test results for operational performance*

Hospital Type		Operational Performance				
		Differences in Means	Standard Error	p	95% Confidence Interval	
					Lowest	Highest
Public	University	-0,11429	0,14742	0,825	-0,4727	0,2442
	Private	-0,85762*	0,11267	0,0005	-1,129	-0,5862
University	Public	0,11429	0,14742	0,825	-0,2442	0,4727
	Private	-0,74333*	0,13861	0,0005	-1,0817	-0,405
Private	Public	0,85762*	0,11267	0,0005	0,5862	1,129
	University	0,74333*	0,13861	0,0005	0,405	1,0817

These tables indicate that at 5 percent significance level, performances of private hospitals are significantly different from the other hospital types. Namely, private hospitals outperform the university hospitals and public hospitals in terms of operational, economic, and environmental performance. However, it is also shown in Table 2, Table 3, and Table 4 that firm performance of university hospitals and public hospitals are not different in all three performance indicators.

*Table 3- Post Hoc test results for economic performance*

Hospital Type		Economic Performance				
		Differences in Means	Standard Error	p	95% Confidence Interval	
					Lowest	Highest
Public	University	0,00317	0,17283	1	-0,4166	0,4229
	Private	-0,71442*	0,13598	0,0005	-1,042	-0,3868
University	Public	-0,00317	0,17283	1	-0,4229	0,4166
	Private	-0,71759*	0,15937	0,0005	-1,1064	-0,3287
Private	Public	0,71442*	0,13598	0,0005	0,3868	1,042
	University	0,71759*	0,15937	0,0005	0,3287	1,1064

*Table 4- Post Hoc test results for environmental performance*

Hospital Type		Environmental Performance				
		Differences in Means	Standard Error	p	95% Confidence Interval	
					Lowest	Highest
Public	University	0,0575	0,1486	0,973	-0,3059	0,4209
	Private	-0,49806*	0,08799	0,0005	-0,7101	-0,286
University	Public	-0,0575	0,1486	0,973	-0,4209	0,3059
	Private	-0,55556*	0,14068	0,001	-0,9014	-0,2098
Private	Public	0,49806*	0,08799	0,0005	0,286	0,7101
	University	0,55556*	0,14068	0,001	0,2098	0,9014

## Conclusion

This research aims to investigate the relationship between green logistics practices and firm performance in healthcare organizations. For this purpose, empirical data from 240 hospital managers is obtained from hospitals operating in Turkey. While obtaining the data, green logistics practices are categorized into three groups as (1) reverse logistics, (2) green distribution and marketing, (3) green purchasing and manufacturing practices. In addition, firm performance is measured with three indicators. These are operational, economic, and environmental performances.

Analyses of empirical data indicate that two of green logistics practices positively support firm performance in all three performance indicators for hospitals in Turkey. These green logistics practices are (1) reverse logistics and (2) green purchasing and manufacturing. For the green distribution and marketing, on the other hand, only economic performances of hospitals are positively supported from our empirical data. In addition, statistical analyses of

data also indicate that performance improvements via green logistics practices are greater for private hospitals than university hospitals and public hospitals in Turkey.

## Bibliography

Cao, M., & Zhang, Q. (2011). Supply chain collaboration: Impact on collaborative advantage and firm performance. *Journal of Operations Management*, 29(3), 163-180.

Dekker, R., Bloemhof, J., & Mallidis, I. (2012). Operations Research for green logistics—An overview of aspects, issues, contributions and challenges. *European Journal of Operational Research*, 219(3), 671-679.

Lai, K. H., & Wong, C. W. (2012). Green logistics management and performance: Some empirical evidence from Chinese manufacturing exporters. *Omega*, 40(3), 267-282.

Laosirihongthong, T., Adebanjo, D., & Choon Tan, K. (2013). Green supply chain management practices and performance. *Industrial Management & Data Systems*, 113(8), 1088-1109.

Murphy, P. R., & Poist, R. F. (2000). Green logistics strategies: An analysis of usage patterns. *Transportation Journal*, 5-16.

Rao, P., & Holt, D. (2005). Do green supply chains lead to competitiveness and economic performance?. *International Journal of Operations & Production Management*, 25(9), 898-916.

Simchi-Levi, D., Kaminsky, P., and Simchi-Levi, E. (2008). *Designing and Managing the Supply Chain*. New York: McGraw-Hill/Irwin.

Ye, F., Zhao, X., Prahinski, C., & Li, Y. (2013). The impact of institutional pressures, top managers' posture and reverse logistics on performance—Evidence from China. *International Journal of Production Economics*, 143(1), 132-143.

Zhu, Q., Sarkis, J., & Lai, K. H. (2013). Institutional-based antecedents and performance outcomes of internal and external green supply chain management practices. *Journal of Purchasing and Supply Management*, 19(2), 106-117.