

# A Study on Green Solutions with Reference to Third Party Logistics - An Indian Perspective

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*In today's world, environment issues pose a major challenge for all the industries and logistics is one of the key contributor to the environmental issue's faced globally by most of the industries across, and India in particular. For organizations in India, green logistics is becoming a challenge in terms of understanding and implementing the same. Organizations in India are challenged to reduce the environmental impact of their product supply chain and one major area where they would require outside help is logistics and especially from their Third Party Logistics (3PL)'s. Third Party Logistics (3PL)'s have been growing in India for the past 10 years by gaining the trust of the organizations and also bringing in the tools and technologies required to service their clients. Globally, Third Party Logistics (3PL)'s has a major say in any organization's Green logistics strategy formulation. In India, we are not sure as to the services offered by 3PL's from a green logistics perspective because this would surely help India organisations to reduce environmental impact to a larger extent in their entire supply chain. This research paper attempts to identify the top green logistics initiatives implemented / adopted by logistics companies, and also tries to identify the major drivers and barriers which they face while implementing the green logistic initiatives.*

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**Keywords:** Green Logistics, Third Party Logistics, Drivers in supply chain

## INTRODUCTION

Organisations today are facing serious challenges in terms of logistics and supply chain of their respective companies, and one of them is how they can incorporate green logistics solutions within their supply chain. However, research shows that managers in most of the companies generally lack the

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understanding of what kind of green logistics initiatives that can be implemented, and can be part of their overall greening of their supply chain and also, the major drivers and barriers, which forms the basis of implementing the green logistics initiatives (Berns et al., 2009). Since most of the organizations have outsourced their logistics to Third Party Logistics (3PL) 's, it is only fair for these companies to look out to their respective Third Party Logistics (3PL) 's to support their green logistics implementation. Most of the Third Party Logistics (3PL) 's in India talk about Green logistics solutions, but lacks understanding of an ideal solution that suits to their organisation..For example, A transport intensive logistics company is expected to focus more on trucking related green logistics solutions like vehicle modification, alternative fuel etc.

Most of the Third Party Logistics (3PL) 's in India, both local and global have started greening their operations with global companies having an edge with the required domain expertise and technological edge due to their global presence. Saying that, the number of green logistics initiatives on ground differs from what we can expect from these players.

## REVIEW OF LITERATURE

### Implementation of Green logistic solutions

In the last few decades, Logistics companies have shifted their service levels from normal transport related services to an integrated model based on offering a wider range of services (Ashenbaum et al., 2005). As a result of this process, Third Party Logistics (3PL) are in a position to adopt both green transport and non-transport related initiatives or a mix of both altogether in their respective organisations.

Although there have been many researches conducted on Green logistics, little research has been conducted on green environmental issues in the logistics service industry (Wolf and Seuring, 2010). Since the development of environmental sustainability research in the logistics service industry is still in the nascent stage, most of these works are empirical exploratory in nature.

Even though, there are researches that discuss on green environmental issues, it does not give an explicit definition of green initiatives in the specific context of Third Party Logistics (3PL) .(Lieb and Lieb2010) on the basis of the survey conducted on a sample of 28 CEO of large Logistics Service Providers (LSP)'s operating in the North American, European, and Asia-Pacific and Martinsen/ Huges-Brodin (2010,) on the basis of a review of general green logistics literature as well as a survey and company home pages scan grouped green initiatives into transport related measures (e.g. fuels, vehicle technology, mode choice, behavioral aspects, transport management), and beyond-transport

initiatives (e.g. logisticssystem design, choice of partners, environmental management system, emissions and energy data).This research suggests 10 Green logistics solutions in general, that can be used globally by Third Party Logistics (3PL) 's and also refers the current adoption of Third Party Logistics (3PL)'s Greenlogistics initiatives in India.

### **DRIVERS AND BARRIERS IN GREENING LOGISTICS**

Some of the researchers in Europe had analyzed various factors that affect the adoption of green logistics initiatives in logistics service industry. In relation to the main drivers, the research done by Ho et al (2009) analyses the major determinants influencing the implementation of green logistics initiatives in services industry. The authors studied the influence of technological, organizational and environmental drivers in implementing green innovations on Third Party Logistics (3PL)'s. The results indicate that support for innovation of top management, quality of human capital, organizational knowledge accumulation etc., have positive influence on the adoption of green innovative initiatives.

Similarly, there are a few studies identified on the barriers of implementing green logistics in logistics service industry. Isaksson and Huge-Brodin (2010) identified financial, technical, information, managerial and organizational as major barriers in the industry and the findings indicate that among major barriers, financial and informational barriers are most relevant while implementing green initiatives. Research of of Evangelista et al. (2011). Further highlights financial and market as major barriers to green initiatives implementation. This paper has pretty much the same sets of determinants, like customers, finance and organization.The authors give emphasis on the same set of determinants in this research, where it is the first of its kind in Indian context with reference to third party logistics service providers.

### **FIRM CHARACTERISTICS AND GREEN INITIATIVES**

The influence of firm characteristics on the adoption of green initiatives undertaken by Third Party Logistics (3PL)'s has been studied in recent literatures. It is expected that, employee size and turnover of the company are major influencing factors in the adoption of green logistics initiatives. Researches conducted by Lin and Ho (2008) and Ho et al. (2009) envisage that,, number of employee and capital size influence green logistics initiatives taken by Third Party Logistics (3PL) companies. In addition, differences between small and large Third Party Logistics (3PL)'s have been found by Evangelista et al. (2010) and Evangelista et al. (2011). For example, large Third Party Logistics (3PL) companies show a higher level of awareness of environmental sustainability

in comparison with smaller ones. With reference to the adoption of green initiatives, the results reveal that large Third Party Logistics (3PL) companies tend to adopt a set of coordinated sustainable initiatives which are strategic, costly and in both transport and beyond transport area. A different approach has been detected between small Third Party Logistics (3PL)'s which normally focus on reducing the environmental impact of transport activities only.

The relationship between firm characteristics (company size) and drivers and barriers of green initiatives in Third Party Logistics (3PL)'s has been investigated by Evangelista et al. (2011). This work shows that for large Third Party Logistics (3PL)'s the most influential drivers are customers and managerial support, while regulation is the most important driver for green measures in small LSPs. The work of Evangelista et al. (2011) does not indicate any relevant difference between large and small LSPs regarding the experienced barriers.

There exists a gap in terms of what is green logistics solutions available to global organisations and what is available for Indian organisations from a Third Party Logistics (3PL) perspective. Basis on the above literature research, we can come to a conclusion that no major research was done in identifying the green logistics initiatives implemented by Third Party Logistics (3PL)'s in India and also their major drivers / barriers from an Indian context. This research is important cause most of the organisations which wanted to implement green logistics thru outsourcing the same to Third Party Logistics (3PL)'s will get some clear ideas as to what has been implemented in India and what drives Third Party Logistics (3PL)'s to implement the same.

#### **THE MAJOR OBJECTIVES FOR THE STUDY ARE:**

1. To find out the important Green logistics and green supply chain solutions.
2. To find out the major drivers and barriers of green logistics initiatives.
3. To find out the significant difference in Green logistics solutions, stakeholders influence in Green Logistics initiatives, decision making factors to adopt Green Logistics initiatives and Barriers in Green Logistic Initiatives with respect to Annual turnover of the company.

#### **HYPOTHESIS**

- H1: There is no significant difference in Green logistics solutions with respect to annual turnover of the company.
- H2: There is no significant difference in stakeholder's influence in Green logistics initiatives with respect to annual turnover of the company.

- H3: There is no significant difference in decision making factors to adopt Green logistics with respect to annual turnover of the company.
- H4: There is no significant difference in barriers in Green Logistic Initiatives with respect to annual turnover of the company.

### **RESEARCH DESIGN**

A survey has been conducted among selected third party logistic service providers in India where there was no special emphasis given to type of company. As the survey was launched on early June, 2016, 40 respondents filled in the questionnaire till the survey ended in Aug, 2016. No specific type of Third Party Logistics (3PL) companies were targeted when the survey was done.

The survey investigates the Third Party Logistics (3PL) 's based in India on their adoption of Green logistics and their major drivers and barriers in implementing green logistic solutions.. The determinants used in the study has been derived from previous researches on Greenlogistics. In this study, the authors had tried to identify the top 10 green logistics initiatives adopted by Third Party Logistics (3PL) within the country, and also the influence of barriers and drivers in implementing green logistic solutions to an organisation.

### **FINDINGS**

The findings of the study are classified as given below.

### **PROFILE OF THE RESPONDENTS**

Respondents from both small and large companies (in terms of both number of employees and annual turnover) have participated in the survey. The most part of respondents are medium and high band revenue Third Party Logistics (3PL)'s, with a number of employees above 1000 in India. The annual turnover was evenly spread among the intervals ranging from Rs.51 crores to 500+ crores.



Source: Author research

**Figure 1: Number of employees and annual turnover in the sample firms**

Most of the surveyed companies were Multinational companies (70%) and almost 30% were Indian companies. This also shows that Third Party Logistics (3PL)'s has more MNC's and so their commitment to Green logistics would be more due to their overseas experience. Secondly, they also would have required tools to help organisations implement green logistics solutions in India market.

**GREEN INITIATIVES**

Here the respondents were asked to rate the Green Logistics Solutions in a five points rating scale. The mean value of importance assigned for each statement by the respondents are given in the following table along with the ranks assigned.

**Table 1. Green logistics Solutions**

Item	Mean	Std. Deviation	Rank
Alternative Fuel for Transport	2.54	1.12	2
Modification of vehicle specification	2.77	1.14	1
Eco-Driving	2.33	1.08	3
Switch to less energy intensive transport modes	2.31	0.98	4
Greater use of intermodal transport	1.95	0.86	6
Measures to improve vehicle loading	1.74	0.88	8
Measures to reduce empty running	1.56	0.68	9
Transport Planning (Route Optimization)	1.46	0.68	10
Logistics system changes (warehouse location change, size)	1.87	0.83	7
Emission data reporting	2.18	1.00	5

Source: Author research

While considering various factors on Green Logistics Solutions, the respondents are giving priority for “Modification of vehicle specification” with a mean value of 2.77 and subsequently “Alternative Fuel for Transport” compared to other variables selected for the study. The lowest mean was given to factors like reduce empty running and route optimization.

According to the researcher, here vehicle modification is referred to as movement of goods on vehicles whose volumetric capacity has been increased, change to lower resistance tyres, enhance aerodynamic designs to the truck to increase mileage, work with newer trucks with latest engine design etc. The high mean for this solution means, most of the Third Party Logistics (3PL) have adopted this solution, which is on an expensive side due to upfront investments, but would be a low hanging fruit for the MNC Third Party Logistics (3PL) companies based in India. This is purely a transport related green initiative and so their return on investment (ROI) would be delayed. The second important factor according to respondents is Alternative fuels and Alternative fuel vehicles, such as, battery operated and hybrid vehicles. Alternative fuel is battery powered as of now, but few years down the line, we may look at biofuels in India. Battery vehicle usage has been predominant in big warehouses in India and for dedicated small city movements.

The lowest mean was for Route optimization out of the given alternatives, which is rarely used by most of the Third Party Logistics (3PL) companies but the authors are hopeful that this will become a part of the top 5 solutions in few years.

#### **DRIVERS OF GREEN LOGISTICS INITIATIVES (STAKEHOLDERS INFLUENCE)**

There are various stakeholders in the supply chain who would normally drive the logistics companies to implement certain green logistics initiatives. Consultants received the highest mean in this study (2.33) and this shows that external consultants play a very important role in influencing / driving the green logistics initiatives. The second-high mean is trade bodies like CII logistics, which shows a significant influence among various drivers on green logistic initiatives...

Top management received the lowest mean which is quite interesting cause the global studies have ranked them higher and not in the bottom like in India. One of the reasons could be that in India, top management is yet to come in terms with green logistics investments, and that could be the reason why they have a low mean.

**Table 2. Drivers of Green Logistics Initiatives (Stakeholders influence)**

Item	Mean	Std. Deviation	Rank
Competitors	1.82	0.80	6
Customers	2.13	0.90	4
Management	1.74	0.64	7
Transport / Logistics Suppliers	2.23	0.93	3
Employees	2.23	0.81	3
Consultants	2.31	0.95	1
Trade Bodies	2.28	1.01	2
Government	1.97	0.96	5
Owners / Stakeholders	1.82	0.72	6

Source: Author research

Several factors were also identified supporting and driving the implementation of green initiatives (see table 2). Costs for suppliers (2.23)



had a significantly higher mean than most other reasons studied (not significantly higher than reducing the costs for customers and increasing market share). The highest\* means were identified for increase firm's competitiveness (2.1), improve customer relationship (2.08) improve firm's revenue (2.05), and improve customer service (2.13) and improve market share (2.21). This clearly indicates the important role of the customers in implementing green initiatives., since cost reduction would ultimately would be passed on to end customers.

**Table 3. Decision making factors to adopt green logistics**

Item	Mean	Std. Deviation	Rank
Cost reduction for customers	2.12	0.72	4
Cost reduction for Suppliers	2.23	0.90	1
Cost reduction within Company	1.95	0.96	9
Improve customer relationship	2.08	0.84	6
Improve Customer Service	2.13	0.86	3
Increase firm's competitiveness	2.10	0.75	5
Increase firm's revenue	2.05	0.79	7
Increase ROI	1.97	0.84	8
Increase market share	2.21	0.92	2
Improve Brand image	1.85	0.84	10

Source: Author research

### **BARRIERS TO GREEN LOGISTICS INITIATIVES**

Most of the barriers to implement green logistics have a higher mean than the drivers. While considering several factors that act as barriers in implementing Green Logistics initiatives, the respondents have considered "Lack of organization resources" and "Negative impact on customer supply chain" with mean values 2.62 and 2.56 respectively. (see table 4). The smallest means were identified for the external barriers negative impact on lack of economic incentives (2.26) and lack of clear regulation (2.23).

**Table 4. Barriers to Green Logistics Initiatives**

Item	Mean	Std. Deviation	Rank
Lack of financial resources	2.43	1.12	7
Lack of organization resources	2.62	1.09	1
Lack of knowledge / skills	2.33	1.06	8
Lack of ICT skills	2.44	1.00	5
Lack of Customer Support	2.51	1.17	3
Lack of customer interest	2.46	1.14	4
Negative impact on customer supply chain	2.56	1.00	2
Lack of Logistics suppliers interest	2.44	1.07	6
High investment cost	2.33	1.13	7
Lack of economic incentives	2.26	1.14	9
Lack of clear regulation	2.23	1.11	10

Source: Author research

To implement Green logistics, the first and foremost thing is resources in terms of finance and trained manpower, and this could be a huge barrier which most of the companies in India are facing the same. Customer service has been gaining tremendous focus from the Third Party Logistics (3PL)'s, and some customers do not want any increase in cost or greening of the Supply chain, because this may impact them negatively (cost). So this is one of the key barriers for Indian Third Party Logistics (3PL).

**Table 5. ANOVA for Green logistics solutions with respect to Annual turnover of the company**

	Sum of Squares	D	Mean	F	Sig
<b>Between Groups</b>	3.60	4	.90	2.64	.05
<b>Within Groups</b>	11.60	34	.34		
<b>Total</b>	15.20	38			

Source: Author research

This Anova table 5 analyses the significant difference in Green logistics with respect to Annual turnover of the company. From the table, it can be

observed that, there is a significant difference at 90% confidence level on values of Annual turnover of the companies selected for the study.

**Table 6. Mean Values for Green logistics solutions with respect to Annual turnover of the company**

Annual turnover of the company	N	Mean Value
51 Crore-250 Crore	12	1.95
251 Crore-500 Crore	7	1.99
More than 501 Crore	15	2.01
Less than 10 Crore	3	2.20
11 Crore-50 Crore	2	3.35

Source: Author research

Here it can be observed that, companies having annual turnover between 11-50 crore (medium sized companies) perform better compared to companies in other categories. Table 6 it is important to notice that, companies that has got higher annual turnover (lower mean) has given moderate preference for green logistic related solutions or companies with 1 to 50 crores (higher mean) are focussing more on green logistics solutions than the upscale logistics companies. These companies in the lower band of revenue (high mean) are serious in terms of environmental concerns when implementing changes in their company's logistics system compared to higher band revenue companies (low mean). And also these low band revenue companies (higher mean) are more inclined to adopt green logistics management initiatives more at an operational level like reduce empty running, improve vehicle loading, Greater use of intermodal transport etc. Also most of the low band revenue companies don't have any environmental department responsible for green initiatives in India, but are focussing more on operational level green logistics solutions, which makes a difference to end customers. This shows that low band companies (higher mean) are experimenting green logistics solutions at an operational level better than the higher band revenue companies (lower mean). (Table 7 and 8).

**Table 7. ANOVA for stakeholder's influence in adopting Green Logistics with respect to Annual turnover of the company**

	Sum of Squares	DF	Mean Square	F	Sig
<b>Between groups</b>	2.15	4	0.54	1.77	0.16
<b>Within Groups</b>	10.32	34	0.3		
<b>Total</b>	12.47	38			

Source: Author research

**Table 8. Mean Values for stakeholder's influence in adopting Green Logistics with respect to Annual turnover of the company**

Annual turnover of the company	N	Mean Value
Less than 10 Crore	3	1.85
51 Crore-250 Crore	12	1.93
More than 501 Crore	15	1.99
251 Crore-500 Crore	7	2.29
11 Crore-50 Crore	2	2.89

Source: Author research

Once again, the low and medium band revenue companies have a higher mean compared to high band review companies. For the higher mean companies, one of the major driver is owners / stakeholders because they would invest on green logistics initiatives on behalf of the company. For the low mean companies, the major drivers are government because these low mean companies will be looking at government support in terms of implementing green logistics initiatives. Customers are one of the key common drivers for the high mean and low mean companies, which is good from a Third Party Logistics (3PL)'s perspective. (Table 9&10).

**Table 9. ANOVA for decision making factors to adopt green logistics with respect to Annual turnover of the company**

	Sum of Squares	DF	Mean Square	F	Sig
<b>Between groups</b>	0.61	4	0.15	0.38	0.82
<b>Within Groups</b>	13.6	34	0.4		
<b>Total</b>	14.22	38			

Source: Author research

**Table 10. Mean Values for decision making factors to adopt green logistics with respect to Annual turnover of the company**

Annual turnover of the company	N	Mean Value
Less than 10 Crore	15	1.95
51 Crore-250 Crore	12	2.04
More than 501 Crore	3	2.11
251 Crore-500 Crore	7	2.25
11 Crore-50 Crore	2	2.33

Source: Author research

The higher mean companies are a mix of low and medium band revenue companies. The major decision making factors according to high mean companies are brand image, ROI, increase competitiveness and customer service. If we look at the low mean companies, their major factors are cost reduction, increase market share and ROI. It can be noted that, there is a remarkable difference between high mean and low mean companies in terms of their decision making factors, where in high mean companies gives preference to customer service, brand image, whereas low mean companies give more importance to cost and market share. ROI is a common factor between both the low and high mean companies, which is good from a Third Party Logistics (3PL)'s perspective. (Table 11 & 12).

**Table 11. ANOVA for barriers to green logistics Initiatives with respect to Annual turnover of the company**

	Sum of Squares	DF	Mean Square	F	Sig
Between groups	3.78	4	0.95	1.27	0.3
Within Groups	25.42	34	0.75		
Total	29.2	38			

Source: Author research

**Table 12. Mean Values for barriers to green logistics Initiatives with respect to Annual turnover of the company**

Annual turnover of the company	N	Mean Value
Less than 10 Crore	12	2.02
51 Crore-250 Crore	2	2.14
More than 501 Crore	3	2.33
251 Crore-500 Crore	15	2.54
11 Crore-50 Crore	7	2.89

Source: Author research

When barriers are concerned, high band revenue companies have a high mean and low band revenue companies have a lower mean. For high mean companies, the major barriers are lack of knowledge / skills, lack of customer interest, economic incentives and lack of standards. For the low mean companies, the major barriers were Negative impact on customer supply chain, Lack of Logistics suppliers interest, High investment cost, Lack of economic incentives and Lack of clear regulation. There is a clear difference between them because the high mean companies have the required appetite for investments and are looking for the next steps like knowledge in terms of process and employees etc. Whereas the low mean companies, tend to look at investment as a major barrier apart from regulation. Economic incentives or viability is common to both the high mean and low mean companies, which is good.

## DISCUSSION AND CONCLUSION

This paper helps us to understand the major green logistics initiatives which are adopted by Third Party Logistics (3PL)'s in India. This study has

shown that medium size companies give more preference to green logistics initiatives compared to others in this study.

The study provides a deeper understanding the implementation of green logistics services and what drives and inhibits that process. Cost, increase in market share and improve customer service clearly comes out as the major drivers that drive Third Party Logistics (3PL) 's to adopt Green logistics solutions. This clearly indicates that customers play an important role in driving the greening of Third Party Logistics (3PL)'s services. It is the customer demand, that translates into services from the Third Party Logistics (3PL)'s, so customers being a key driver is good for the Third Party Logistics (3PL) industry.

From a stakeholder perspective, Indian Third Party Logistics (3PL)'s have more confidence on consultants (external / internal) which also shows that they are interested in driving these new solutions, but don't have the required domain expertise within the company. But employees also pay an important role from a stakeholder's perspective in driving green logistics. One of the strongest reasons to implement green initiatives was cost reduction for suppliers and the suppliers as a stakeholder group driving the implementation of green initiatives received almost the same mean signifies the importance given by Third Party Logistics (3PL)'s is correct.

The survey findings also indicate that barriers as having a slightly bigger influence on the implementation of green initiatives as opposed to drivers. This shows that Third Party Logistics (3PL) 's in India has more barriers compared to drivers, which is a cause of concern, but this should change over a period of time with more exposure and the cost of implementation coming down. Further research could be done w.r.t what drivers drive Indian companies to adopt Green Logistics, and whether Barriers are linked to employee strength in the Third Party Logistics (3PL)'s.

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