Study of Green Logistics Practices: A Case of 3PL in the Automobile Industry

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ABSTRACT

Logistics plays a major role in polluting environment but it's an important part of supply chain management without which no business can run and our daily needs items cannot be fulfilled. With the increase in demand pollution level is also increasing which is threat to our coming generation. Transportation is main key indicator of logistics which creates pollution. This also emits the greenhouse gases which creates global warming. Certain rules have been made by Government of India to check on pollution. Similarly big industries are also taking green initiatives to minimize pollution level. various study claims that the small & medium companies has less focus due to lack of resources and have a fear to increase the cost. The present paper uses existing related research papers and journals with the objective to gain theoretical know-how on the significance of logistics & green logistics initiatives taken by automobile manufacturing companies in India. A case approach is used for empirical evidence in one of the leading automobile industry at Uttrakhand to understand their best practice to mitigate pollution. One of the initiative taken by them for reducing transportation need by introducing 3PL (Third party logistics provider) which has not only reduced their cost, they got other intangible benefits also. This initiative has resulted substantial reduction in pollution level.

Keywords *–Green Logistics, Supply Chain Management (SCM), Environment, Pollution, 3PL (Third Party Logistics).*

INTRODUCTION

The world economy is growing very fast with this change in demand of products. Simultaneously need of logistics is also increasing. Logistics has majorly three elements transportation, warehousing & packaging. Transportation is one of the major source in creating pollution in air. Vehicles are exhausting greenhouse gases which is resulting thinning of ozone layer which ultimately causing global warming. So with the increase in demand pollution is also increasing as transport load is increasing. Evangelista, P., Santoro, L., & Thomas, A. (2018) says in logistics segment is more prominent due to increase in demand & is the second largest creator of greenhouse gases after power generation, demand is growing. In recent years, Green Supply Chain Management (GSCM) and sustainability issues have been attracting rising attention among researchers and practitioners, basically due to increased environmental concerns

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and to an ever-competitive environment. As remarked by Min and Kim (2012), this growing interest sparked a series of new lines of research dealing with various supply chain activities that have important environmental implications, ranging from manufacturing to logistics and transportation.

There is a need that organizations should focus on environment sustainability alongwith business growth. It is important to take suppliers, dealers & customers all together for balancing of environment. To deal with pollution due to logistics a concept has emerged called green logistics. Under green logistics all factors i.e. transportation, warehousing, Packaging to be account for to improve environment.

Green Transportation- Under this initiatives options are explored to minimize the need of transportation, use of alternative transport which creates less pollution, designing of vehicles which exhausts less pollution, proper maintenance of vehicles, reverse logistics and use of milk run concept.

Green Warehousing- Under this initiative, warehouse are designed in such a way they get natural light and usage of low consumption electrical equipment. The material handling equipment's doesn't exhaust pollution, Usage of vertical height for space optimization. Inventories are kept to optimize space and transportation.

Green Packaging- Under this initiative usage of ecofriendly, reusable and recyclable materials packaging is used to minimize the wastages whose disposal creates pollution. This initiatives also saves lot of tree cutting also because use of wood, corrugated box and paper are made from wood.

Government's regulations- Government of India has made stringent rules from design till implantation i.e. upgradation from the BS Standard BS-III to BS-IV Norms on 1st April-17. Similarly the next upgradation of BS standard BS-VI being implemented from 2020, as per BSES, Bharat Stage Emission Standard. Government has also come up with the regulation for regular checking & issuing pollution certificate for all vehicles running on road. The life cycle for all diesel vehicles have been fixed under which these vehicles will be permitted to run for 10 years in Delhi-NCR. Rule is also being formed to scrap all vehicles after 15 years (The Times of India, February 2018). The National Highway Authority of India has developed to national highways in the recent past in the outskirt of Delhi (Eastern Peripheral and Western Peripheral) i.e. KMP (Kundli ,Manesar, Palwal), eastern peripheral road which goes from Uttar Pradesh to Haryana without entering in to Delhi. It is expected to decongest Delhi by offloading movement of 50000 trucks (approax) per day out of Delhi Delhi and thus reducing the pollution level by reducing 27 percent (Chaudhry, 2018).

However, despite the initiative and efforts by the Government, checks are not found to be robust and compliances in stricter forms. The small industries have not shown to prompt in implementing it because of fear of cost impact & lack of resources and finding the shortcut route to bypass.

PROBLEM STATEMENT

Pollution is the biggest threat to environment. Logistics is one of the major source of pollution in supply chain especially through transportation. The needs of transportation is increasing with the increase in demand and it's the automobile industry which is responsible for production of vehicles for transportation. Therefore it must be studied to see how transportation is contributing in vehicular emission and what kind of practices (especially green practices) being taken by industries help in minimizing pollution level. While studying the impact of logistics on environment and green initiatives it is important to study simultaneously the challenges faced by small & medium organizations in implementation green initiatives, best practices adopted by big organizations & the cost impact of green logistics on their economy.

OBJECTIVE OF THE STUDY

Main objectives are described as under-

- To study the impact of pollution of logistics on environment.
- To study the green initiatives to minimize pollution level.
- To study the challenges in implementing green initiatives in automobile industries.
- To study the cost impact of green initiatives in logistics in automobile industries.

RESEARCH METHODOLOGY

The present study is descriptive in nature supported by empirical evidence using case study approach. For the purpose of present study, various research articles on logistics & green initiatives

on logistics have been reviewed from research journals couple with the case study approach in an automobile organization. A leading automobile company based in Uttrakhand was selected for conducting case study to explore current practices on green logistics, their methodology, outcome of the initiative & motivation as well as challenges faced by them for implementing the initiative. The has been done by interviewing management team of logistics including supply chain, warehousing, security & safety who are directly or indirectly responsible for handling logistics in the plant.

LITERATURE REVIEW

Logistics plays very important role in today's world with the increase in consumption and demand. But simultaneously it is delivering pollution which is impacting on environment. To overcome this problem green initiatives are required. The Council of Supply Chain Management Professionals (2007) describes logistics management "the part of Supply Chain Management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements." Reviews has been made from related journals to get the knowledge of study made so far in this regard.

Logistics & its Importance- Logistics is an integral part of Supply chain and it is one of the main element. Logistics takes care of material handling from end to end i.e. from suppliers end till dealers end. This also includes holding of material & finish goods in warehouse & designing of packaging material to take care of no transit damage with cost competitiveness. Martin Christopher (2016) says " logistics is the process of strategically managing the procurement, movement and storage of materials, parts and finished inventory (and the related information flows) through the organization and its marketing channels in such a way that current and future profitability are maximized through the cost-effective fulfilment of orders." As per EU, road freight carriage is most popular & utilizing approx. 49% share in Europe because of flexibility nature and have lesser cost impact. As per Stank et al., (2005) logistics is an integral and most important part of supply chain management.

Srivastava (2006) explored the Indian scenario of logistics and its integration with supply chain and supply chain partners. As per him managers know very well how to integrate information flow from SCM of main manufacturer to supplier, material flow from supplier to manufacturer and the facility required to perform well. He also said there is extensive pressure globally on supply chain and logistics team to improve to manage environment but it is not implemented as expected due to various internal and external reasons.

Impact on Environment- Logistics has a larger impact on environment because transport vehicles emits greenhouse gases which contains CO2, CO, NOx, Hydrocarbon & smoke which are harmful and resulting air pollution as well as thinning the ozone layer causing global warming (Abukhader & Jönson,, 2004). Vehicles running on road for material handling emits CO2 which creates pollution, having road accidents and noise pollution as well (Sheu et al, 2005). Besides the logistics performance relates with organization image in terms of its delivery commitments with best price and safe transportation so that no any damage of product during transit. As per the study done by Green Jr, K. W. et.al (2008), the logistics performance is positively impacted by supply chain management strategy and that both logistics performance and supply chain management strategy positively impact marketing performance, which in turn positively impacts financial performance. Neither supply chain management strategy nor logistics performance was found to directly impact financial performance."

Green Logistics Practices - Logistics has basically three elements i.e. transportation, warehousing & packaging. Transportation comes on priority as it emits Greenhouse gases which are creating air pollution and global warming. 3PL is one of the initiatives to optimize transportation needs. Hertz and Alfredsson (2003) define a 3PL as "an external provider who manages, controls, and delivers logistics activities on behalf of a shipper". They take care of all transportation management from pick up material from supplier till reverse logistics after delivery of materials to plant. Similarly they take care of delivery of finish products till dealers end. As observed by Pagell *et al.* (2004), the Supply Chain has a pressure to ensure cost effectiveness as well as environmental balancing. To reduce the work load pressure on road transport it is important to use mix transport arrangement i.e use of railways and waterways alongwith roadways which will reduce the road overcrowding as well as it will be cost effective also. This will reduce environment imbalancing & will improve safety (Sheu *et al.,* 2005). As per

Karagülle (2012), the strengthening of intermodal transportation through green transport strategies may be an effective approach to eco friendly and safer freight transport. Janic (2007) describes in his study that logistics team has to maintain close loop contact with all supply chain team which includes 3PL service provider and customer & supplier for better performance. Min and Kim, (2012) mentioned in their study that green logistics was important to take care of environmental issues related to hazardous material movement & storage, packaging design to suit environment, inventory management and warehousing & to have sustainable transportation system so that pollution generation is reduced to bare minimum. Cagno et al.(2008) has studied for various green practices being followed presently and what given suggestions for further improvements which reduces pollution 7 takes care environment. Lee and Dong, (2009) has designed logistics networking system to improve green environment.

Reverse Logistics – Reversed logistics is important to optimize use of transportation by utilizing similar truck bringing the material for transportation of empties or other materials. This saves the cost as well as reduction in pollution level. Fleischmann, M. et.al (2001) focused on reverse logistics in their study. They compared the modified logistics system w.r.t. traditional method which is generally being used. They suggested holistic methods for reshaping logistics system. Reverse logistics is also used for recycling of waste & non usable products.

Motivation & Challenges – Whenever the process is challenged and new systems are made some pressure is build up in system. Simultaneously some motivation factors also comes in picture which moves the process ahead. It is always mixture of motivation & pressures which work concurrently. Similarly in implementing the green logistics various internal & external pressures are buildup. Xu et al. (2013), has classified this into five main categories i.e. having compliance to regulations set by government, to keep the existence in competitive world, the financial backbone which is most important to run an organization, have identified different pressures and classified them into five government policies and regulations, marketability of the product and competitiveness, external factors in the supply chain, financial factors, production and operational factors) based on their similarities. Sarkis (2003) & Lieb and Lieb (2010) also defined external pressures as mentioned above as well as the gap in coordination and harmony between all supply chain team members which includes supply chain team, logistics team, suppliers and customers. Similarly there is internal pressure within organizations. Sarkis (2003) , Lieb and Lieb (2010), and Zailani et al. (2010) describes internal pressures as company's commitment towards environment, top management focus towards achievements, giving parallel focus to environment alongwith cost reduction and efficiency up. Besides there is lack of skill, no training facility to improve knowledge, investment restrictions i.e. releasing less fund against requirement and unwillingness to change the process. Govindan et al. (2013) have identified five main categories which are effecting as barriers which are " outsourcing (e.g., lack of government support to adopt environmental friendly policies, complexity of measuring/ monitoring suppliers' environmental practices); technology (e.g., lack of technical expertise, lack of human resource, lack of effective environmental measures); knowledge (e.g., lack of environmental knowledge, perception of 'out-of-responsibility' zone, disbelief about environmental benefits); financial (e.g., financial constraints, non-availability of bank loans to encourage green products/ processes, high investments and less return-on-investments); and involvement and support (e.g., lack of customer awareness and pressure about GSCM, lack of Corporate social responsibility, lack of top management involvement in adopting green practices". These gives negative pressure in implementing green practices. But it gives motivation to team by involvement of top management, regular reviews & appreciations, good working environment as resultant of green practices, awards & recognitions from internal & external world.

THIRD PARTY LOGISTICS (3PL) CASE STUDY

The present case study is done for leading ISO 9001 & ISO 14000 certified company based in Uttarakhand. This is an automobile (vehicle manufacturing) company with 2000 (approx.) employees which are getting its parts and components supply from local ancillary units and well as other parts of India. It has got one of the largest market share in pan India its products segment. A study was conducted to observe the impact of green initiatives in transportation system by implementing the third party logistics (3PL). Transportation chosen because it is one of the major source which emits pollution & impacting global warming.

The company under present study has taken initiatives to made improvements in all area of logistics i.e. transportation, warehousing & packaging to improve environment. The case study is made in one of the initiatives of green transportation i.e. consolidation of transportation by introducing 3PL (3rd party logistics) service provider. This has resulted the reduction in overall trucks requirement which in turn had saving in transportation cost as well as reduction in pollution level. Following are the major observations.

Earlier Practice – Earlier suppliers from various locations were sending materials to that organization. Suppliers were having their own trucks and supplying the materials based on their economic truck load quantity. This concept was push type i.e. material was pushed by supplier based on their manufacturing outcome. This has resulted the over stocking at their end as well as lot of traffic congestion happened because approx. 300 trucks were entering/day to that organization.

Innovative Practice – The company introduced a 3PL service provider and started a milk run concept. This service provider is controlled by them. Under this practice, the service provider sends his trucks at supplier's location and make collection of material based on their requirement. 3PL service provider has grouped 4-6 suppliers in one cluster based on nearby locations & volume of material to be procured. So he deployed the trucks based on number of clusters made for collecting the material.

In this procedure their SCM team generates the time wise pickup requirement based on sequence of production and communicate this requirement to supplier & to 3PL service provider. The representative of 3PL give pick up schedule to his truck drivers who go to supplier end for pickup of material. In this contract 3PL service provider is responsible for timely bringing the material with quantity verification. The penalty clause are imposed in case of failures i.e. in case supplier fails timely supply at their end which causes production loss. Similarly in case there is any discrepancy observed in invoice quantity v/s physical stock at their end, 3PL will be responsible and will be penalized. It means 3PL is responsible to check material as per invoice quantity before leaving there factory. 3PL is also responsible in case some damages happen due to mishandling during transit. But in case supplier is not ready with the material at pickup time then 3PL is not held responsible. In this situation suppliers gets penalty to drop the material at their end at his own cost. Supplier is also being penalized in case there is production loss due to material shortage because of his preparation delay. With implementation of there was reduction of approx. 30% trips.

Benefit of this Practice- This practice has win-win situation. The new practice has reduced the requirement of trucks, therefore, the cost has gone down as well and at the same time pollution level has also reduced. The major impacts have been summarized in the following paragraphs.

i) **Inventory Reduction:** The concept of material procurement shifted from push to pull system i.e. earlier supplier used to send material its own as per their manufacturing capability but now picking of material from supplier's end by 3 PL as per consumption pattern resulted reduction in inventory. So earlier OEM used to keep high inventory which reduced to Hourly on JIT philosophy. There is a reduction of inventory approx. 50% for the parts procured by 3PL service provider.

ii) **Space Savings:** By the reduction in inventory and staking the parts vertically need of space is reduced drastically. Since space is one of the costlier affair now a days, lot of saving has happened.

iii) **Transportation Reduction:** There is a reduction in IBL (inbound logistics) trucks substantially because of consolidation of overall requirement. Earlier supplier's used their trucks for dispatching the materials which is done by OEM now through 3PL by picking up from their location. In some cases supplier brings full truck load with unwanted material resulting overstocking and sometime partially filled un-utilization of trucks capacity impacting inwarding of more number of trucks. After implementation of 3PL there was reduction in 30 % of trucks requirement which was approx. 100 trips /day. Average running per trip of a truck is approx. 50 kms so per day reduction in 5000 kms run of trucks. This has given direct savings in transportation cost.

iv) **Turnaround Time (TAT):** The implementation of 3PL has impacted the reduction in inwarding of trucks, which resulted de-congestion inside the plant and vehicle got free flow movement .Due to this there was faster unloading of vehicles which ultimately reduced in turnaround time of

trucks. So earlier average trip per truck was 2 per day which was improved to 3 trips/ day with the same truck.

v) **Safe Working:** Due reduction in congestion, it has improved the safety of employees as well. There was reduction in rate of accidents which earlier used to happen due to congestion inside the plant.

vii) **Smooth Flow of Production**: The new practices has lead to smooth production flow now, earlier there were some production stoppage due to shortage of material on account of transit delay by supplier's vehicle, which has been reduced. Earlier suppliers were using unprofessional transport providers which were having unstructured approach. But now 3PL service provider who are professional in nature maintaining their vehicle very well. This has reduced down time of vehicle not available. Besides the workload of supply chain engineers has also reduced which was being spent in chasing of vehicles. The control of supplier is shifted from suppliers to OEM because 3PL is implemented by OEM, which gives better results.

viii) **Reduction in Pollution:** By the reducing the needs for trucking operations (reducing the running of trucks (9 ton weight) by 5000 KM/day in 303 operating days per year). , there is reduction in CO2 by 2180 ton/annum approx. which ultimately reduces pollution. The calculation is made with the help of a formula given by Mr. Jason Mathers (Mathers, 2015) GHG emission (ton) = Distance run (KM)* Weight (ton)* Emission factor (161.8 gms /ton-km run)/10,000,00.

CONCLUSION

The study has been made to understand logistics, its need in current scenario & impact on environment. The study also done of the green logistics preferences by automobile industries and initiation taken by government to minimize the pollution level which impacts on environment. The literature review is done through earlier researches made & related journals to identify the areas of green logistics. A case study is also done in one of the leading automobile industry to identify the innovative practice followed, its tangible & intangible benefits, their motivation level and difficulty observed in implementation of green logistics practices. Similar practices can be made in different companies operating in the automobile industry. Further study also can be made to understand the linkage of green logistics with supply chain as well as overall performance of the organization.

REFERENCES

- Abukhader, S. M., & Jönson, G. (2004). Logistics and the environment: Is it an established subject?. *International Journal of Logistics Research and Applications*, *7*(2), 137-149.
- Cagno, E., Magalini F. and Trucco, P. (2008). Modelling and planning of product recovery Network: the case study of end-of-life refrigerators in Italy, *International Journal of Environment Technology and Manufacturing*, *8(4)*, pp.385–404.
- Chaudhry, C. (2019, November 19). Ring around Delhi: Final piece to fall in place as WPE opens today. *The Times of India*, p. 4
- Christopher, M. (2016). *Logistics & supply chain management*. Pearson UK.
- Competitiveness: an overview of Turkish logistics industry, *Procedia-Social and Behavioral Sciences, 4(1),* pp.456-460
- Council of Supply Chain Management Professionals (2007). *Supply chain management and logistics management definitions, available at: www.cscmp.org/ Website/ AboutCSCMP/Definitions/ Definitions.*
- Evangelista, P., Santoro, L., & Thomas, A. (2018). Environmental Sustainability in Third-Part Logistics Service Providers: A Systematic Literature Review from 2000–2016. *Sustainability*, *10*(5), 1627.
- Fleischmann, M., Beullens, P., BLOEMHOF RUWAARD, J. M., & Van Wassenhove, L. N. (2001). The impact of product recovery on logistics network design. *Production and operations management*, *10*(2), 156-173.
- Gonzalez-Benito, J. and Gonzalez-Benito, O. (2006). The role of stakeholder pressure and managerial values in the implementation of environmental logistics practices, *International Journal of Production Research*, *44(7)*, pp.1353–1373.
- Govindan, K., Kaliyan, M., Kannan, D. and Haq, A.N. (2013). Barriers analysis for green supplyChain management implementation in Indian industries using analytic hierarchy process, *International Journal of Production*

Economics [online] http://dx.doi.org/10.1016/j.ijpe.2013.08.018 (accessed 3 October 2013).

- Green Jr, K. W., Whitten, D., & Inman, R. A. (2008). The impact of logistics performance on organizational performance in a supply chain context. *Supply Chain Management: An International Journal*, *13*(4), 317-327.
- Hertz, S., & Alfredsson, M. (2003). Strategic development of third party logistics providers. *Industrial marketing management*, *32*(2), 139-149.
- Hervani, A. and Helms, M. (2005). Performance measurement for green supply chain Management', *Benchmarking: An International Journal*, *12(4)*, pp.330–353.
- Jumadi, H. and Zailani, S. (2010). Integrating green innovations in logistics services towards Logistics service sustainability: a conceptual paper', *Environmental Research Journal*, *4(4),* pp.261–271.
- Janic, M. (2007). Modeling the full costs of an intermodal and road freight transport network. *Transportation Research Part D: Transport and Environment, 12(1)*, pp. 33-44
- Jumadi, H. and Zailani, S. (2010). Integrating green innovations in logistics services towards Logistics service sustainability: a conceptual paper, *Environmental Research Journal*, *4(4)*, pp.261–271.
- Lee, D.H. and Dong, M. (2009). Dynamic network design for reverse logistics operations under Uncertainty, *Transportation Research Part E: Logistics and Transportation Review, 45(1)*, pp.61–71.
- Lieb, K.J. and Lieb, R.C. (2010). Environmental sustainability in the third-party logistics (3PL) Industry', *International Journal of Physical Distribution & Logistics Management*, *4(7)*, pp.524–533.
- Langella, I.M. and Zanoni, S. (2011). Eco-efficiency in logistics: a case study on distribution Network design, *International Journal of Sustainable Engineering*, *4(2)*, pp.115–126.
- Karagülle, A.O. (2012). Green business for sustainable development and Min, H. and Kim, I. (2012). Green supply chain research: past, present, and future, *Logistics Research*, *4(1-2)*, pp.39–47.
- Mathers, J.(2015, March 24). Green Fright Move: How to Calculate Emissions from a Truck Move. *EDF Business*. Retrieved from http://business.edf.org/blog/2015/03/24/green-freight-math-how-to-calculate-emissions-for-a-truck-move.
- Pagell, M., Yang, C. L., Krumwiede, D. W., & Sheu, C. (2004). Does the competitive environment influence the efficacy of investments in environmental management?. *Journal of Supply Chain Management*, *40*(2), 30-39.
- Rabinovich, E. and Knemeyer, A.M. (2006). Logistics service providers in Internet supply chains, *California Management Review, 48(4)*, pp. 84-108.
- Sheu, J.B., Chou, Y.H., Hu, C.C. (2005). An integrated logistics operational model for green-supply chain management, *Transportation Research Part E: Logistics and Transportation Review,41(4),* pp.287313
- Stank, T.P., Davis, B.R. and Fugate, B.S. (2005). A strategic framework for supply chain oriented logistics", *Journal of Business Logistics, 26(2),* pp. 27-45.
- Srivastava, S.K. (2006). Logistics and supply chain practices in India*, VISION – The Journal of Business Perspective, 10(3)*, pp. 69-79.
- Sarkis, J. (2003).A strategic decision framework for green supply chain management, *Journal of Cleaner Production*, *11(4)*, pp.397–409.
- Vachon, S. and Klassen, R.D. (2006). Extending green practices across the supply chain. The Impact of upstream and downstream integration, *International Journal of Operations & Production Management*, *26(7)*, pp.795–821.
- Xu, L., Mathiyazhagan, K., Govindan, K., Haq, A. N., Ramachandran, N. V., & Ashokkumar, A. (2013). Multiple comparative studies of green supply chain management: pressures analysis. *Resources, Conservation and Recycling*, *78*, 26-35.
- Zhu, Q. and Sarkis, J. (2007). The moderating effects of institutional pressures on emergent greensupply chain practices and performance, *International Journal of Production Research*, *45(18/19)*, pp.4333–4355.