

# A Study on Transportation Cost Validation & Optimal Vehicle Capacity Utilization for FTL Consignments at Hygienic Research Institute Pvt. Ltd.

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## Abstract

*This study focuses on validating transportation costs and optimizing vehicle capacity utilization for full truck load (FTL) consignments at Hygienic Research Institute Pvt. Ltd. (HRIPL). The objective of the study was to evaluate existing primary and secondary freight rates, compare them with current market rates, and identify opportunities for cost reduction across plants, regional distribution centers (RDCs), and carrying and forwarding (C&F) locations. The methodology involved understanding the company's supply chain and freight structure, collecting and validating data from internal records, warehouses, and industry sources, and conducting a comparative analysis of existing transporter rates. A capacity utilization model was developed to assess vehicle selection and reduce empty running costs. The findings indicate that the existing transporter MATA is cost-effective for 15 MT and 18 MT closed body trucks, Om Logistics is the most suitable for 7.5 MT open body trucks, and Rhenus performs best for 9 MT closed body trucks. The study highlights the importance of optimal vehicle selection and data-driven freight validation in improving logistics efficiency, reducing transportation costs, and strengthening overall supply chain performance at HRIPL.*

**Keywords:** *Transportation Cost Validation, Primary Freight, Secondary Freight, Vehicle Capacity Utilization, Logistics Optimization, Supply Chain Efficiency, Freight Rate Analysis*

## Introduction

Hygienic Research Institute Private Limited (HRIPL) is a leading Indian beauty and personal care company founded by Mr. S. S. Nischat in 1953, specializing in beauty, haircare, skincare, and professional products. The company's portfolio includes well-known hair care and hair colour brands such as Vasmol and Streak, and it has also entered the skincare segment with its new brand, Florozone.

With over five decades of research, the use of proven natural ingredients, and technology tie-ups with leading global cosmetic and research companies, HRIPL has consistently delivered quality products. The company is ISO 9001:2015 certified, and its products comply with Indian BIS quality standards as well as global FDA standards. Starting with a single manufacturing unit in Mumbai in the 1950s, HRIPL now operates six production facilities across Mumbai, Himachal Pradesh, and Guwahati. It employs over 700 staff

in the retail segment and more than 260 employees in the professional segment to meet growing market demand. HRIPL has also expanded into the e-commerce market, increasing its reach among Indian consumers. Additionally, the company has partnered with Carin Cosmetics, Belgium, and Lisap, Italy, for sourcing bulk cosmetics and finished imported personal care products, and currently collaborates with 40,000–45,000 salons across India.

HRIPL products are highly popular in the Middle East, SAARC, and Far Eastern countries. Its flagship brand, Vasmol, holds a 96% market share in the Kesh Kala segment of the hair coloring category, and Vasmol powder hair colors are market leaders in six Indian states. From a single manufacturing unit in Mumbai in the 1950s, HRIPL has grown to operate six functional production locations to meet the increasing demand for its products.

The core values of HRIPL include delivering and accepting high quality, ensuring customer delight, continuously innovating processes, products, services, and management practices, growing together with stakeholders, and maintaining integrity in business. The company's vision is to be a preferred organization offering excellent products and services, growing with stakeholders, and spreading happiness across the globe with passion. HRIPL's product mix comprises 40% hair color, 48% hair care, and 12% hair texture products, and the company has also received the "Best Place to Work" award for the period 2023–2025.

The company has an experience of nearly five decades in manufacturing and trading of hair care products such as hair dyes, oils and serums. It's well-established product portfolio consist of brands like as Super Vasmol 33 Kesh Kala, Streak Hair Colour, and Streak Professional range products, Vasmol Kali Mehandi, Vasmol Aamla Shakti,

Jasmine Hair Oil, Yogiraj Thanda Tel, and Brahmol Hair Oil. Being amongst the top five companies in the organized hair care segment, HRIPL has a network of more than 5,000 distributors across India and it continues to add new products under the Streak and Vasmol brands. Company's reliance on Vasmol 33 Kesh Kala has gradually reduced with steady increase in sales of Streak Hair Colour and Professional range products.

**Market analysis & Future plan:** Volume wise streak hair serum is the best seller in Indian industry, while color tube and straightening category ranks 2nd volume wise. HRIPL plans to become no.2 player in value proposition (already 2nd volume wise). Currently HRIPL has 18% market share by value and expects to capture 36% in next 5 years.

**SWOT Analysis:** HRIPL's key strengths include a strong brand portfolio with over 350 SKUs, geographically diversified operations across India as well as markets in the Middle East and neighboring countries such as Nepal, Sri Lanka, and Bangladesh, and a diverse product mix across hair care, color, and texture segments. However, the company faces certain weaknesses, including high dependence on retailers for performance and brand image, and rising raw material costs that reduce margins and may lead to price increases.

The company has several growth opportunities, such as strategic acquisitions and partnerships to expand operations and strengthen its supply chain; for example, HRIPL has partnered with Carin Cosmetics (Belgium) and Lisap (Italy) for sourcing bulk cosmetics and finished products. It also plans to become a cloud-only enterprise by migrating data to Azure within the next two years and has scope to innovate in sustainable products as environmental awareness grows. At the same time, HRIPL faces threats from intense competition in the consumer goods market from players like HUL,

Procter & Gamble, and L'Oréal, changing consumer preferences toward organic products, and potential supply chain disruptions that can affect raw material availability and costs.

**Industry Analysis:** The hair care industry in India is a growing sector with a market size of around USD 2.4 billion in 2020. It encompasses products like shampoos, conditioners, hair oils, and styling products. Hair care products are distributed through retail stores, e-commerce platforms, and salons. Salons also provide various services like haircuts, styling, and treatments. Indian consumers have diverse preferences influenced by factors like hair texture, climate, and regional practices. There is a growing awareness of hair care, hygiene, and grooming among consumers. Natural and herbal products are gaining popularity. The industry is highly competitive, with both domestic and international brands vying for market share. Rising beauty consciousness and growing emphasis on personal grooming are driving the demand for hair care products. Consumers are increasingly investing in hair care products to maintain and enhance the health, appearance, and style of their hair. Consumer preferences in hair care are continuously evolving. There is a growing demand for natural and organic hair care products, as well as products that cater to specific hair concerns, such as hair loss, dandruff, dryness, and damage. FMCG companies that align their product offerings with these changing preferences can experience growth. Continuous product innovation, research, and development are crucial drivers for the growth. FMCG companies that invest in developing advanced formulations, incorporating new ingredients, and introducing innovative hair care products tend to capture consumer attention and gain market share. Celebrities often set hair styling and beauty trends, which significantly impact consumer preferences in hair care. Popular hairstyles, hair colors, and treatments endorsed by celebrities drive the demand for corresponding hair

care products, leading to industry growth. Increasing disposable income levels enable consumers to spend more on personal care products, including hair care. As income levels rise, consumers are willing to invest in higher-quality hair care products and salon services, contributing to the growth of the industry. The growth of e-commerce platforms and online sales has revolutionized the hair care industry. Consumers can easily access a wide range of hair care products online, compare prices, read reviews, and make convenient purchases. E-commerce offers FMCG hair care brands an opportunity to reach a broader customer base and drive sales growth.

Major players in hair care market are HUL, Loreal, Nivea, MamaEarth, PnG. With Loreal & HUL leading the industry in country. HUL and Loreal are well established multinational brands in India. Having presence in all parts of the country. Strengths includes vast network and strong financial backing and robust warehousing helps both of them to stay competitive. Weakness includes changing consumer preferences leads to excess inventory and change in raw material prices affects production. Service Offering of Loreal includes their own salons pan India which makes them stand out in the industry. Competitive Advantages that set HRIPL apart from its competitors is their product reliability and availability at the right time.

Based on the analysis, potential actions that HRIPL can take are expand into more offerings through their Florozone section. This could involve focusing on specific niche areas of premium products directly competing with Nivea.

**Objective:** The objective of this study is to review and validate the existing primary freight costs and identify opportunities for cost reduction at the RDC and plant level. It also aims to validate the secondary freight rates from the CNF point and

optimize transport vehicle capacity utilization by selecting the right vehicle type for full truck loads (FTL), thereby reducing empty vehicle running costs.

**Methodology:** The methodology began with understanding the company's supply chain process, including the concepts of primary and secondary freight and the different types of vehicles used. After gaining this understanding, existing data was collected and further validated using data from warehouses and industry sources. A comparative analysis was then carried out to assess whether the current values were optimal. Based on this analysis, a model was developed to evaluate truck capacity utilization, and finally, the findings were compiled and presented in a structured manner.

**Analysis and Findings:** The study focuses on validating transportation costs for both primary and secondary freight. In the company's context, primary freight refers to the transportation cost incurred for moving goods from the factory, where products are manufactured, to the warehouse and then to the carrying and forwarding (C&F) agents, who store materials until they are dispatched further. Secondary freight refers to the transportation cost for moving goods from the C&F agents to retailers or end customers. The company works with a fixed set of transporters, and the objective of this study was to verify whether the existing freight rates were in line with current market rates.

The existing transporters engaged by the company for primary freight operations from Zirakpur include Mahalaxmi Transport Services, Naudhya Transport, Ruftaar Transport, Vasu Logistics, Garv Logistics, Deep Transport Company, Scorpion Group, New India Logistics, Balaji Transport Company, Krishna Logistics, RTL Logistics, Shree Shyam TransLogistics, and Om Logistics.

The existing transporters engaged by the company for secondary freight operations from Howrah

include JMD Group Packers Movers and Logistics Services, Om Goods Carriers, Mahakal Cargo Logistics, P S Logistics, Anjali Transport Service, Maruti Fast Express, Res Trans-Logis, National Logistics, Trans Cargo Services, NPR Logistics Private Limited, Smart Movers, Union Roadways Limited, Sri Srinivasa Roadlines, Zee Logistics, and CTI Group.

The existing transporters engaged by the company for secondary freight operations from Cuttack include Prakash Transport Corporation, Raj Laxmi Logistic & Trailers, Om Sai Packers & Movers, Agarwal Packers and Movers Ltd., Jaipur Golden, Vikas Packers and Movers, Jatadhari Packers and Movers, Domestic Cargo Movers, Nitco D2D Express, JB Express Packers and Movers, Girnar Cargo Escort, Verma Logistics, Shree Ganesh Transport, Mahaveer Transport, Smart Movers, Union Roadways Limited, and Pasaro Transolution.

There are several types of transportation trucks used for different purposes based on the nature of goods being carried. Open body trucks are available in various sizes and are commonly used to transport chemicals, food grains, raw materials, and other heavy goods, with tarpaulins used for covering. Closed body trucks are fully enclosed vehicles with fixed sides and a roof, offering better safety and protection. Semi-trailer trucks, also known as 18-wheelers, are used for long-distance transportation and can carry a wide range of cargo. Box trucks have an enclosed box-shaped cargo area and are mainly used for local deliveries. Flatbed trucks are suitable for oversized or irregular goods such as machinery and construction materials, while dump trucks are designed to carry loose materials like sand or gravel. Refrigerated trucks are used for temperature-sensitive goods such as food and medicines. Tanker trucks transport liquids and gases, tow trucks are used to move damaged vehicles, car carriers transport multiple cars,

cement mixers carry and mix concrete, and garbage trucks are used for waste collection and disposal.

Om Logistics was the new transporter who has quoted for both primary and secondary freight and Maruti Express Logistics Services for secondary locations. Following is the comparative analysis of primary and secondary freight of new transporters with the existing transporters for various types of vehicles.

### Primary Freight comparative analysis:

**For 15 MT (32 Ft) CBT**

Destination	MATA	Om Logistics	Rhenus	United Safe
Agartala	<b>165000</b>	209000		182750
Aslali	<b>35000</b>	44000	35650	44300
Bangalore	<b>103000</b>	106700	116000	
Barniyhat (Megalaya)	160000	<b>126500</b>		
Behrampur	<b>100000</b>	104500		
Bhiwandi	<b>55000</b>	57200	55200	
Chennai	<b>105000</b>	106700	118000	117200
Coochbihar	<b>90000</b>	123200	112700	
Cuttack	<b>95000</b>	101200	108000	117200
Dehradun		19800	20700	<b>4500</b>
Delhi		<b>19800</b>	20700	27900
Ernakulam	<b>130000</b>	137500	140000	159500
Ghaziabad	<b>19000</b>	19800	23000	25200
Goa		<b>110000</b>	115000	
Guwahati	<b>115000</b>	123200	128800	135200
Hyderabad	<b>85000</b>	88000	97750	99500

Indore	<b>45000</b>	52800	48300	64300
Jaipur	<b>24000</b>	30800	24150	30600
Jammu		44000	<b>31050</b>	36700
Kathihar	<b>85000</b>	99000	103500	
Kathmandu	120000	<b>104500</b>	138000	
Kolkata	<b>85000</b>	93500	94300	101500
Lucknow	<b>40000</b>	46200	49450	50500
Nagpur	<b>55000</b>	63500	63250	65100
Patna	<b>75000</b>	82500	81650	101100
Raipur	<b>70000</b>	74800	73600	96500
Ranchi	<b>80000</b>	93500	83950	101100
Siliguri	<b>90000</b>	104500	109250	111700
Varanasi	<b>60000</b>	68200	63250	75800
Vijaywada	<b>95000</b>	104500	108100	108800

**For 18 MT (32 Ft) CBT**

Destination	MATA	Om Logistics	Rhenus	United Safe
Agartala	<b>180000</b>	225500		195750
Aslali	<b>40000</b>	49500	39100	50000
Bangalore	<b>110000</b>	118800	125000	
Barniyhat (Megalaya)	170000	<b>137500</b>		
Behrampur	<b>110000</b>	115500		
Bhiwandi	<b>60000</b>	66000	62100	59800
Chennai	<b>115000</b>	118800	126500	132500
Coochbihar	<b>98000</b>	132000	121900	
Cuttack	<b>105000</b>	110000	117000	130200

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Dehradun			23000	<b>6000</b>
Delhi		<b>23650</b>	23000	32200
Ernakulam	<b>140000</b>	148500	150000	176250
Ghaziabad	<b>22000</b>	23650	25300	29000
Goa		<b>121000</b>	126500	
Guwahati	<b>120000</b>	132000	135000	145600
Hyderabad	<b>95000</b>	99000	105800	119250
Indore	<b>50000</b>	60500	54050	72700
Jaipur	<b>27000</b>	35200	26450	35900
Jammu		49500	<b>35650</b>	42800
Kathihar	<b>90000</b>	110000	109250	
Kathmandu	135000	<b>115500</b>	155250	
Kolkata	<b>90000</b>	104500	101200	114300
Lucknow	<b>45000</b>	52800	54050	56600
Nagpur	<b>60000</b>	71500	66700	72700
Patna	<b>80000</b>	91300	87400	107200
Raipur	<b>75000</b>	82500	78200	104900
Ranchi	<b>85000</b>	104500	89700	107200
Siliguri	<b>98000</b>	115500	118450	121000
Varanasi	<b>65000</b>	77000	72450	83050
Vijaywada	<b>105000</b>	115500	117300	124300

Bangalore	76200	<b>71500</b>	78390
Barniyhat (Meghalaya)		<b>93500</b>	
Behrampur		79200	
Bhiwandi	44200	41800	40950
Chennai	81800	<b>71500</b>	87750
Coochbihar	73000	93500	87750
Cuttack	77800	71500	76050
Dehradun		<b>10000</b>	14040
Delhi	15300	11000	<b>10530</b>
Ernakulam	115400	<b>93500</b>	105300
Ghaziabad	15300	12100	<b>11115</b>
Goa		<b>85800</b>	99450
Guwahati	80250	90200	87750
Hyderabad	70600	<b>63800</b>	64350
Indore	33000	36300	<b>32760</b>
Jaipur	20680	16500	<b>16380</b>
Jammu		<b>16500</b>	23400
Kathihar	61000	74800	81900
Kathmandu	77800	<b>66000</b>	105300
Kolkata	68500	63800	70200
Lucknow	33000	33000	30420
Nagpur	<b>44200</b>	48400	46800
Patna	58760	52800	56160
Raipur	61000	59400	52650
Ranchi	61000	63800	60840
Siliguri	65000	71500	87750

**For 7.5 MT (19 Ft) OBT**

Destination	MATA	Om Logistics	Rhenus
Agartala	134500	137500	
Aslali	33000	30800	<b>28080</b>

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Varanasi	52000	<b>41800</b>	42120
Vijaywada	76200	<b>71500</b>	87750

**For 9 MT (22 Ft) CBT**

Destination	MATA	Om Logistics	Rhenus
Agartala		<b>192500</b>	
Aslali	39600	38500	<b>32200</b>
Bangalore	<b>96240</b>	96800	97750
Barniyhat (Meghalaya)		<b>115500</b>	
Behrampur		<b>99000</b>	
Bhiwandi	50800	52800	<b>48300</b>
Chennai	99600	<b>96800</b>	100050
Coochbihar		115500	<b>103500</b>
Cuttack		<b>93500</b>	97750
Dehradun		16500	<b>16100</b>
Delhi	17200	16500	19550
Ernakulam	127600	<b>121000</b>	132250
Ghaziabad	17200	16500	17250
Goa		99000	<b>97750</b>
Guwahati		115500	<b>109250</b>
Hyderabad	90640	<b>77000</b>	86250

Indore	45200	49500	<b>39100</b>
Jaipur	27280	26400	<b>21850</b>
Jammu		38500	<b>27600</b>
Kathihar		91300	<b>89700</b>
Kathmandu		<b>99000</b>	126500
Kolkata		88000	<b>86250</b>
Lucknow	<b>38480</b>	44000	40250
Nagpur	<b>50800</b>	57200	51750
Patna		79200	<b>73600</b>
Raipur	73200	71500	<b>66700</b>
Ranchi		88000	<b>78200</b>
Siliguri		<b>96800</b>	101200
Varanasi	53040	60500	<b>51750</b>
Vijaywada	101840	<b>93500</b>	96600

**Findings:**

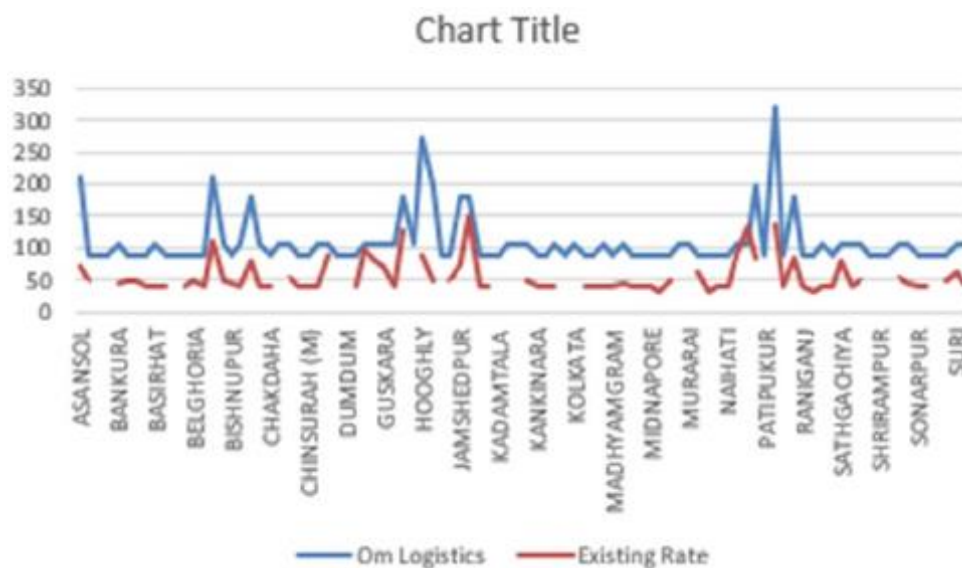
Based on the validated data, it was found that the existing transporter MATA is the most suitable and cost-effective option for 15 MT (32 ft) CBT and 18 MT (32 ft) CBT vehicles. For 7.5 MT (19 ft) OBT vehicles, Om Logistics emerged as the best fit, while for 9 MT (22 ft) CBT vehicles, the existing transporter Rhenus was found to be the most effective.

## Secondary freight comparative analysis:

For Cuttack location:



For Howrah location:



From the data upon validation, it is evident that current transporters provide the most optimum freight from Howrah and Cuttack location. But new transporter can be hired for locations where existing transporters do not deliver.

## Vehicle Capacity Optimal Utilization for FTL consignments

Optimizing vehicle capacity for full truckload (FTL) consignments involves accurate load planning, shipment consolidation, route optimization, dynamic load adjustments, and efficient loading and unloading processes. Proper weight distribution, collaboration with transport

partners, use of technology, regular fleet maintenance, and continuous data analysis further help in maximizing space utilization. By adopting these practices, businesses can reduce transportation costs, improve operational efficiency, and enhance the overall effectiveness of FTL transportation.

Solver algorithms provide a systematic approach to identifying the best possible solutions by considering multiple constraints and objectives. These tools support accurate load planning, route optimization, and dynamic load adjustments, leading to optimal vehicle capacity utilization. By using solver technology, companies can manage complex logistics challenges, minimize empty running, reduce costs, and improve overall efficiency. Solver tools enable data-driven decision-making, better resource allocation, higher customer satisfaction, and improved profitability, making them essential in today's logistics environment.

For this study, data related to the top 10 selling SKUs was collected from the company's Bhiwandi warehouse. The cubic feet dimensions of each case were considered for analysis. In addition, vehicle dimensions of different container types were taken as constraints for the study. The vehicle specifications included 7.5 MT (19 ft) open body trucks with dimensions of 19 L × 7 W × 7 H, 7.5 MT (32 ft) closed body trucks with dimensions of 32 L × 8 W × 8 H, 9 MT (22 ft) open body trucks with dimensions of 22 L × 7.5 W × 7 H, 9 MT (22 ft) closed body trucks with the same dimensions, 15 MT (22 ft) open body trucks with dimensions of 22 L × 7.2 W × 7 H, and 15 MT (32 ft) closed body trucks with dimensions of 32 L × 8 W × 8 H.

To complete the process, each product was assigned a label from P1 to P10, and the weight of each individual case was considered. The objective function was set to maximize the sum product of the decision variables and the products. These

decision variables were designated as the values that would change based on the solver's output. Two specific constraints were applied: first, the total weight had to remain within the vehicle's capacity, and second, each product quantity had to be greater than or equal to zero. Once solved, the final results were displayed within the decision variable cells.

The constraints considered for the model included ensuring that the objective value did not exceed the vehicle capacity for the 9 MT truck and that all decision variables (P1, P2, ..., P10) were non-negative. Solving the model under these constraints produced results that enabled maximum utilization of the vehicle capacity.

**Findings:** Each product, exact number of cases were derived using solver solution for optimum utilization for 9 MT vehicle. Total cases that could fit into truck based on solver model without exceeding the weight constraint were 931 and on average 850 cases usually are transported in actual via 9 MT vehicles.

## **Conclusion and Recommendations:**

Freight transportation plays a crucial role in the global economy and is essential for the functioning of businesses and societies. Therefore, it is important to select the right type of vehicle for location to utilize the capacity of truck as well as attaining low cost objective.

In conclusion, freight transportation is fundamental for the functioning of modern economies and societies. Its efficiency, reliability, and capacity to move goods across vast distances make it a vital component of our interconnected world. Without a well-functioning freight transportation system, the global economy would suffer, hindering trade, industry growth, and overall development.

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