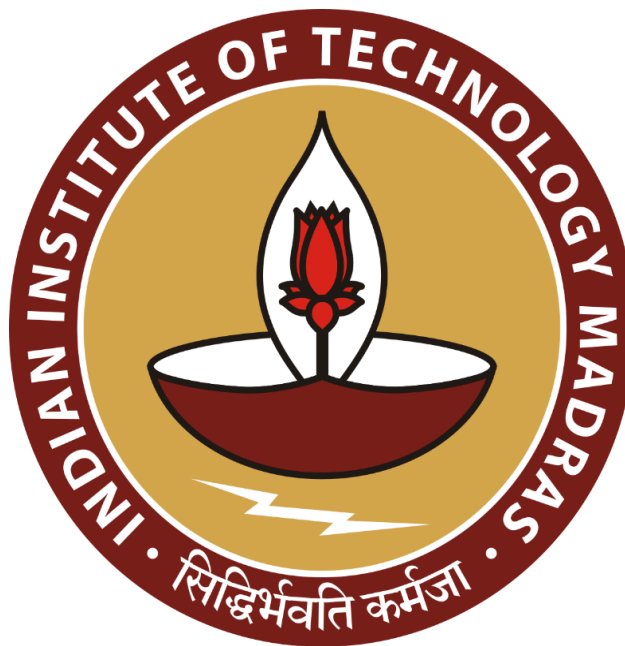# Logistics Optimization: Loading Trends, Operational Hotspots and Performance Analysis

A Proposal Report for the Business Data Management Capstone Project

Submitted by

Name: Shramana Sinha

BS in Data Science and Applications,

Indian Institute of Technology, Madras, Chennai

Tamil Nadu, India, 60003

Contents

Executive Summary

The project focuses on a small logistics & transportation firm located in Bankura, West Bengal. The business is B2B and primarily deals with cement transportation.

The business is grappling with operational challenges such as difficulty in arranging third-party trucks during periods of peak demand, effective coordination of backhaul trips, and maintaining a high driver retention rate.These issues are impacting the business's productivity and leading to potential business losses.

To address these challenges, the 5W1H method has been employed to identify and understand the problems, and to devise potential solutions. This method has guided the data collection process, ensuring that relevant and useful information is gathered.

This project is going to help the organization to better understand the loading and trip trends, identify operational hotspots for backhaul trips, and recognize high-performing drivers and trucks. This data-driven approach will facilitate informed decision-making, improve route optimization, and set performance benchmarks, ultimately leading to increased operational efficiency and profitability.

Organization Background

Aakash Logistics, a transport and logistics firm based in Bankura, West Bengal, was established in 2017 by Adrish Kanti Sinha. He has been in the transportation business since 1997, initially focused on transporting broilers. However, recognizing the need for more stability in his business, he shifted his focus to cement transportation in 2017. This strategic move led to the founding of Aakash Logistics which became a transport partner of OCL-Dalmia, Medinipur, West Bengal.

As a transport partner, Aakash Logistics is responsible for delivering cement to the dealers as per OCL's demand. In 2023, the company diversified its operations by beginning to transport rods, bricks, and other materials on backhaul trips, thereby increasing its profitability. This initiative was taken independently without the establishment of any formal transport partnerships with the respective companies.

Aakash Logistics operates mainly within Bankura, Medinipur, and Paschmi Burdwan with a fleet of twelve owner-operated trucks, including eight 6-wheelers and four 10-wheelers. To meet additional demand and serve areas outside its usual operation zones, the company occasionally employs third-party trucks.

Problem Statements

1. To develop a strategy to ensure timely arrangement of third-party trucks during high demand periods.
2. To improve the efficiency of backhaul trips coordination, aiming to increase the proportion of roundtrip hauls.
3. To devise a plan that increases the driver retention rate, with the intention to reduce the number of idle trucks.

Background of the Problems

1. The cement industry is affected by seasonality; demand is generally low during the monsoon season and peaks during the festival period and end of financial year (March-April) as government expenditure rises.[source] In addition, the cement manufacturer's demand for transportation also varies during the month.

   But the firm lacks a robust system to accurately forecast high demand periods and plan for adequate resources. This can result in last-minute scrambles to secure third-party trucks during these periods which can be challenging due to increased competition and higher rates, thus impacting productivity. Consequently, the firm can fulfill only 75-80% of demand during peak periods.

2. The firm is currently only able to make about 68% of all trips as roundtrip hauls. It also faces challenges in securing return freights in the vicinity of the unloading locations. This is primarily attributed to several complexities, including the identification of backhaul freight beyond the scope of established shipper partnerships, issues related to route planning, timing and scheduling.

On average, backhaul trips earn 10-30% less than front hauls.[source] However when trips involve empty miles, they do not contribute to revenue generation but still incur operating costs such as fuel consumption and driver wages. This leads to the underutilization of resources.

3. The firm has a driver retention rate of 50%, significantly lower than the industry standard of 86.3%.[source] Retaining drivers is challenging due to several factors, including more competitive salaries offered by competitors and high work pressure. This situation is further exacerbated by drivers taking uninformed leaves and day-offs.

   As a result, trucks often sit idle, incurring fixed costs such as EMI and maintenance, while the firm struggles to hire new or substitute drivers. This leads to a loss of revenue.

Problem Solving Approach

Following our discussion, the business owner shared several challenges his business is currently facing and provided comprehensive data on all headhaul trips from January 1st to November 20th. This data includes the date, destination, truck details, driver name, loading quantity, type of haul, profit, and other relevant information.

To understand these issues in depth, I utilized Excel for cleaning, pre-processing, analysis, and visualization of the provided data. This allowed me to determine key performance indicators such as the driver retention rate and the number of roundtrip hauls. Additionally, I applied the 5W1H method (refer to Table 1), which facilitated a comprehensive exploration of each problem, leading to a clear definition of the issues and the development of effective, tailored solutions.

What is the problem?	Why is it a Problem?	Where is the Problem Occurring?	How to solve the problem?	Who will Implement?	When will the Solution be Implemented?
Inability to arrange third-party trucks in a timely manner during high demand periods	Increased cost of securing third-party trucks	Across all locations where the firm operates	Conduct time series analysis, forecast demand, and plan resources accordingly.	Business owner	During peak demand periods
Inefficient coordination of backhaul trips	Operating cost for empty miles is nearly the same as roundtrip hauls, but they are non-profit generating.	Locations with high operational activities	Map operational hotspots, examine key activity areas, assess backhaul coordination, and expand shipper partnerships	Business owner	After the analysis
Low driver retention rate	Increases the number of idle trucks and hiring costs	Across all locations where the firm operates	Compare performance, analyze idle periods, analyze retention rates, recognize high-performing drivers, manage schedules, and grant leave during low demand periods.	Business owner	On a daily basis

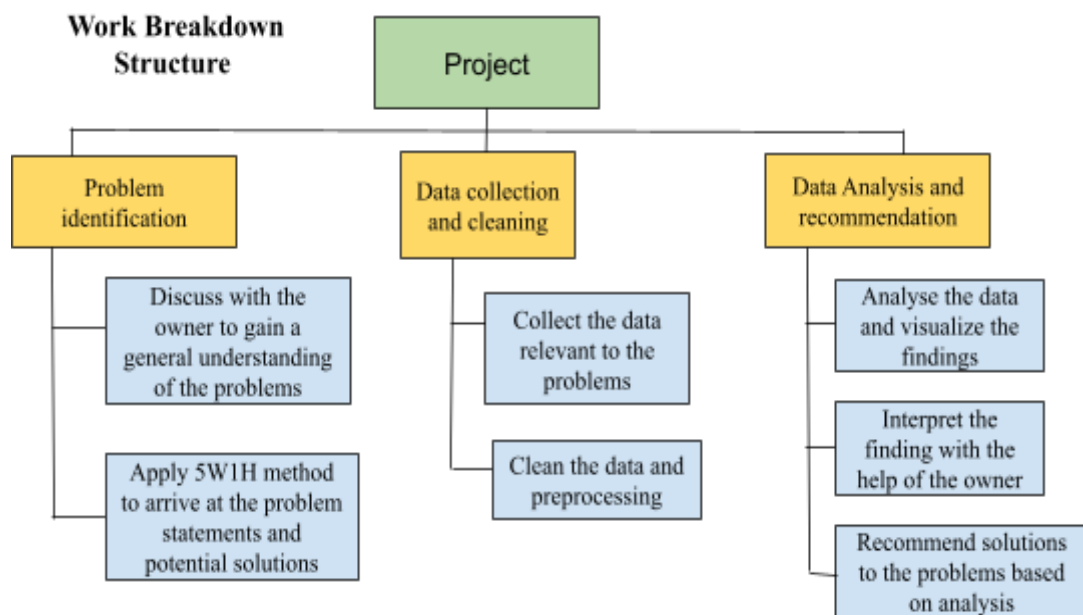*Table 1: 5W1H Problem-Solution Framework*

Expected Timeline

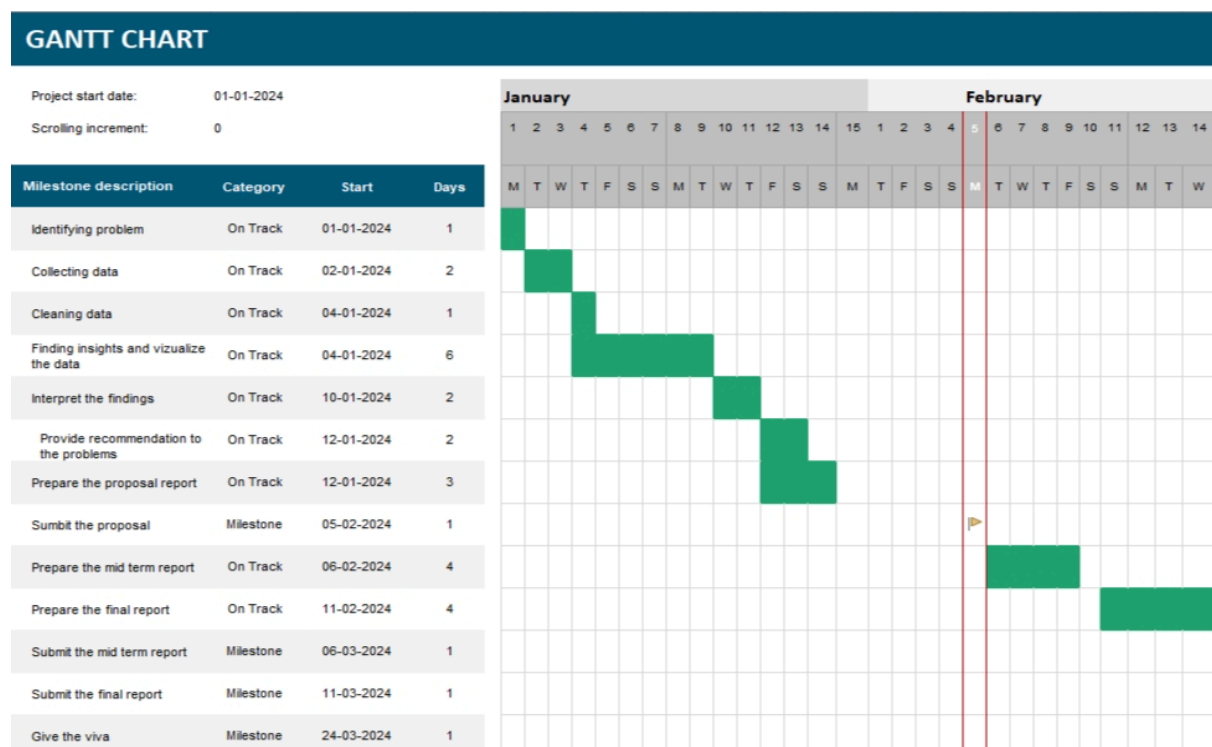*Figure 1 : Expected work breakdown for the project.*

Figure 2 : Expected timeline for completion of project.

Expected Outcomes

1. A comprehensive understanding of the daily, weekly, and monthly trends associated with loading and trips.
2. Pinpointing the operational hotspots that necessitate special attention to guarantee the successful coordination of backhaul trips.
3. Recognizing the high-performing drivers and trucks within the fleet.