The Cost of Goods Transportation: Navigating through the Loss

Mid-Term report for the BDM capstone Project

Submitted by -

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Declaration Statement

I am working on a Project Title “The Cost of Goods Transportation: Navigating through the Loss ”. I extend my appreciation to Mr. Sujoy Sarkar, the owner of a small-scale businessman in the field of Transport Business, for providing the necessary resources that enabled me to conduct my project.

I hereby assert that the data presented and assessed in this project report is genuine and precise to the utmost extent of my knowledge and capabilities. The data has been gathered through primary sources and carefully analyzed to assure its reliability.

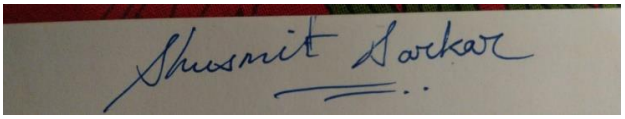
Additionally, I affirm that all procedures employed for the purpose of data collection and analysis have been duly explained in this report. The outcomes and inferences derived from the data are an accurate depiction of the findings acquired through thorough analytical procedures.

I am dedicated to adhering to the information of academic honesty and integrity, and I am receptive to any additional examination or validation of the data contained in this project report.

I understand that the execution of this project is intended for individual completion and is not to be undertaken collectively. I thus affirm that I am not engaged in any form of collaboration with other individuals, and that all the work undertaken has been solely conducted by me. In the event that plagiarism is detected in the report at any stage of the project's completion, I am fully aware and prepared to accept disciplinary measures imposed by the relevant authority.

I agree that all the recommendations are business-specific and limited to this project exclusively, and cannot be utilized for any other purpose with an IIT Madras tag. I understand that IIT Madras does not endorse this.

Signature of Candidate:



Name: Shusmit Sarkar

Date: 22nd July 2024

1. Executive Summary and Title:

Ganesh Transport, a small B2B transport company based in Kolkata and operated between Kolkata and Guwahati, faces significant operational challenges that are affecting its profitability. The company's fleet, consisting of a 6-wheeler and a 12-wheeler truck, has been plagued by issues such as goods damage during transit and delays in order fulfilment.

The root causes of these problems are linked to geographical areas prone to adverse weather conditions, leading to frequent goods damage, and operational inefficiencies contributing to transportation delays. To tackle these issues, the project will employ data analysis techniques, including data extraction, cleansing, and geographical analysis, to identify the most problematic routes and factors affecting timely deliveries.

To address these issues, the project will implement a comprehensive data collection and analysis plan. Data will be gathered over a 3-month period to capture information on weather patterns, transportation routes, delivery times, and instances of goods damage. The data collection process will involve manual logging by drivers and manager himself.

The collected data will be analysed using a variety of analytical tools and techniques, including geographical information system (GIS) mapping to identify high-risk routes, statistical analysis to determine the key factors contributing to delays, and predictive modelling to forecast transportation costs. Additionally, graphical techniques will be employed to establish optimal pricing strategies based on the insights gained.

By systematically addressing the root causes of operational inefficiencies, this project aims to enhance Ganesh Transport's profitability, reduce transportation costs, and improve overall service delivery, ultimately positioning the company as a more competitive player in the transport sector.

2. Proof Of Originality:

To substantiate my claims, I have included a visual documentation comprising images showcasing the establishment itself.
The link for folder containing proof of originality (video and images) –
https://drive.google.com/drive/folders/13pHCo6Wr-QM-HLNpLgoDaJR47ZkLkCQd?usp=sharing
Video link -
https://drive.google.com/file/d/1h24l6gyuRv-yfbYU8c7mcf2yOZoWr_eg/view?usp=drive_link
The link for dataset is –
https://docs.google.com/spreadsheets/d/1WnMl8rjChSZ9chIWMwJf9deeVbJ2mDCr/edit?usp=sharing&ouid=117958901382199749450&rtpof=true&sd=true


GOODS
CARRIER
GARIA
MALE
TATA


BLOW
HORN
TATA

3. Meta Data –

I have meticulously gathered an extensive 5-month dataset. Throughout this period, my data collection approach involved a combination of daily visits with the manager and strategically timed alternate-day visits, allowing me to compile a comprehensive set of cumulative data encompassing the entire time span. The entirety of the dataset was graciously provided by Mr. Sujoy Sarkar, the manager of Ganesh Transport.
It includes -

- Date – The date of start of travel
- cost_to_go – Expenses Incurred while going to Guwahati, Assam (in Rs.)
- cost_to_come – Expenses incurred while coming back to Kolkata, West Bengal
- damage_go - Number of goods/packages damaged on going
- damage_come – Number of goods/packages damaged while coming
- oil_price - Total amount spend for a round trip on oil (in Rs.)
- profit – Total profit for one round trip (in Rs.)
- time_go _ Time Taken to go (days)
- time_back – Time taken to come back (days)

Below given is a snippet of data –

S.no	Date	cost_to_go	cost_to_come	damage_go	damage_come	oil_price	profit	time_go	time_back	total_cost	total_damage	total_time
1	01-12-2022	17,258.09	14,116.78	18	24	8357.2	63381	8	8	31,374.87	42	16
2	26-12-2022	17,765.56	17,416.55	18	25	8234.4	87973	9	8	35,182.11	43	17
3	20-01-2023	12,777.94	19,015.95	10	21	8992.1	88192	7	7	31,793.89	31	14
4	14-02-2023	18,081.99	14,811.02	11	16	8804.8	93549	8	7	32,893.01	27	15
5	11-03-2023	15,116.94	15,405.46	18	25	8322.4	97710	9	8	30,522.40	43	17
6	05-04-2023	12,548.66	18,457.48	13	17	8088	75140	7	8	31,006.14	30	15
7	30-04-2023	16,906.89	17,545.32	13	25	8467.3	70803	10	8	34,452.21	38	18
8	25-05-2023	19,162.73	17,670.74	11	30	8433.4	97051	9	7	36,833.47	41	16
9	19-06-2023	13,472.63	19,208.08	17	21	8248.7	96796	8	8	32,680.71	38	16
10	14-07-2023	19,556.91	16,566.93	20	19	8263.7	90720	8	8	36,123.84	39	16
11	08-08-2023	19,051.36	16,682.26	17	25	8945.7	78707	8	8	35,733.62	42	16
12	02-09-2023	17,856.93	15,063.93	16	19	8576	99182	6	7	32,920.86	35	13
13	27-09-2023	17,338.78	18,197.67	19	28	8182.7	50507	8	8	35,536.45	47	16
14	22-10-2023	13,630.91	16,310.44	15	19	8420.2	62008	7	8	29,941.35	34	15
15	16-11-2023	12,408.57	14,726.51	17	26	8640.8	99692	9	8	27,135.08	43	17
16	11-12-2023	15,491.59	19,034.68	11	18	8356.4	59452	8	9	34,526.27	29	17
17	05-01-2024	14,566.85	17,034.32	15	29	8394.6	62616	10	9	31,601.17	44	19
18	30-01-2024	17,493.17	16,355.68	18	22	8067.6	72491	8	8	33,848.85	40	16
19	24-02-2024	14,970.60	17,606.00	10	20	8041.8	61148	10	8	32,576.60	30	18
20	20-03-2024	17,548.65	15,229.32	10	29	8322	78617	8	8	32,777.97	39	16
21	14-04-2024	17,337.53	15,476.18	19	19	8590.9	67731	8	7	32,813.71	38	15
22	09-05-2024	15,281.00	14,791.50	17	27	8913.2	72999	10	7	30,072.50	44	17
23	03-06-2024	16,924.67	18,074.61	16	17	8290.1	61994	8	7	34,999.28	33	15
24	28-06-2024	19,849.88	18,305.57	12	19	8632.8	75331	7	9	38,155.45	31	16
25	23-07-2024	17,188.65	15,614.31	11	26	80934	86729	6	7	32,802.96	37	13

4. Descriptive Statistics –

	Average	Median	Standard Deviation	Min	Max	Range	Skewness	Kurtosis
Total Cost	33,132.19	32813.7	2427.5971	27135.08	38155.45	11020.37	-0.1780	-0.2645
Total Damage	37.52	38	5.4707	27	47	20	-0.3137	-1.0225
Total Time	15.96	16	1.3994	13	19208.08	19195.08	-0.2039	-1.2619
Oil Price	11,340.83	8394.6	14208.040	8041.8	80934	72892.2	4.9972	24.9809
Profit	78,020.76	75331	14535.502	50507	99692	49185	0.0060	-1.2494

Descriptive statistics are brief informational coefficients that summarize a given data set, which can be either a representation of the entire population or a sample of a population. Descriptive statistics are broken down into measures of central tendency and measures of variability (spread). Measures of central tendency include the mean, median, and mode, while measures of variability include standard deviation, variance, minimum and maximum variables, kurtosis, and skewness. Descriptive statistics summarizes or describes the characteristics of a data set.

Descriptive statistics consists of three basic categories of measures:

- measures of central tendency,
- measures of variability (or spread), and
- frequency distribution.

Measures of central tendency describe the centre of the data set (mean, median).

Measures of variability describe the dispersion of the data set (variance, standard deviation).

Measures of frequency distribution describe the occurrence of data within the data set (count).

5. Detailed Explanation of Analysis Process/Method

1. Clustered Column Chart

The goal here is to compare how much damage to goods occurs in relation to the time taken for one round trip. The clustered column chart makes it easy to see this side-by-side comparison for each journey. This is helpful because we can quickly spot patterns—like whether longer trips tend to result in more damaged goods. By using this chart, we can visually identify problem areas that might be driving up costs, such as delays or frequent damage during transit.

Why it's the best choice: A clustered column chart is perfect when we need to compare two different things (like time and damage) without losing clarity. Other charts, like stacked bar charts or pie charts, would mix these two factors together, making it harder to see their relationship.

2. Line Graph for Date vs. Costs and Date vs. Profit

A line graph is great for tracking changes over time, which is exactly what we need when looking at how costs and profits fluctuate throughout the five-month period. It's easy to see trends—whether expenses are rising due to oil prices or if profits are going down at certain times. This gives us a clearer picture of the financial health of Ganesh Transport and helps spot potential problems early.

Why it's the best choice: Line graphs are ideal for showing ongoing changes. Other types of charts, like bar charts, wouldn't be able to show the flow of costs and profits over time as effectively. The line graph makes it easy to see the long-term trends and helps us understand the bigger picture.

3. Time Series Forecast for Date vs. Profit

With this method, we can go a step further and not just look at the past, but also predict the future. Time series forecasting uses the patterns we see in the data to estimate what might happen with profits in the coming months. This is really useful for planning because it helps us anticipate how changes in costs or other factors might impact future profits. By being proactive, Ganesh Transport can make adjustments ahead of time to avoid potential losses.

Why it's the best choice: Time series forecasting is designed for exactly this kind of task—predicting future trends based on past data. While regular trendlines or simple averages might show general patterns, forecasting allows us to see potential ups and downs in profits, making it more actionable for business planning.

Why These Methods Fit The Data –

Detailed and Consistent Data: Since we have gathered such thorough data over five months, these methods can give you the insights you need. The data collected from Mr. Sujoy Sarkar includes everything from daily expenses to trip durations, making it ideal for both visual analysis and forecasting.

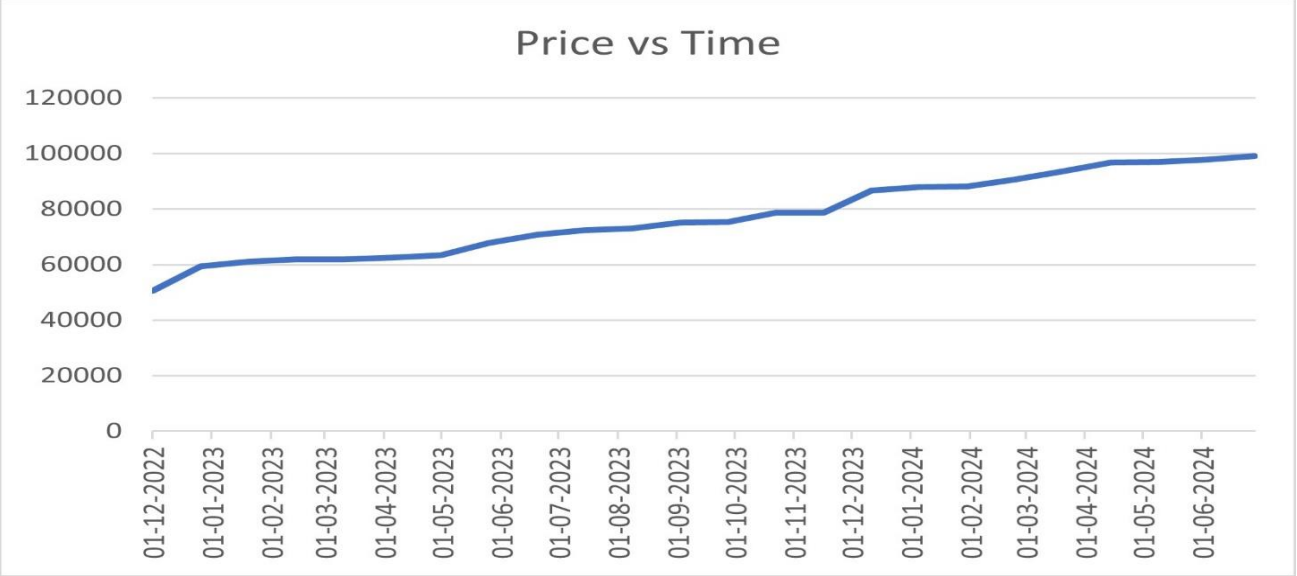
Understanding the Challenges: The methods were chosen because they align with the key challenges we are looking to solve—goods damage, rising costs, and fluctuating profits. By using these tools, we wll be able to visualize these issues and forecast future trends, helping us make informed decisions.

Turning Data into Action: Each method serves a different purpose—whether it's highlighting operational inefficiencies or forecasting profits—and together, they provide a full picture of the business's performance. This gives us actionable data to address inefficiencies and improve profitability for Ganesh Transport.

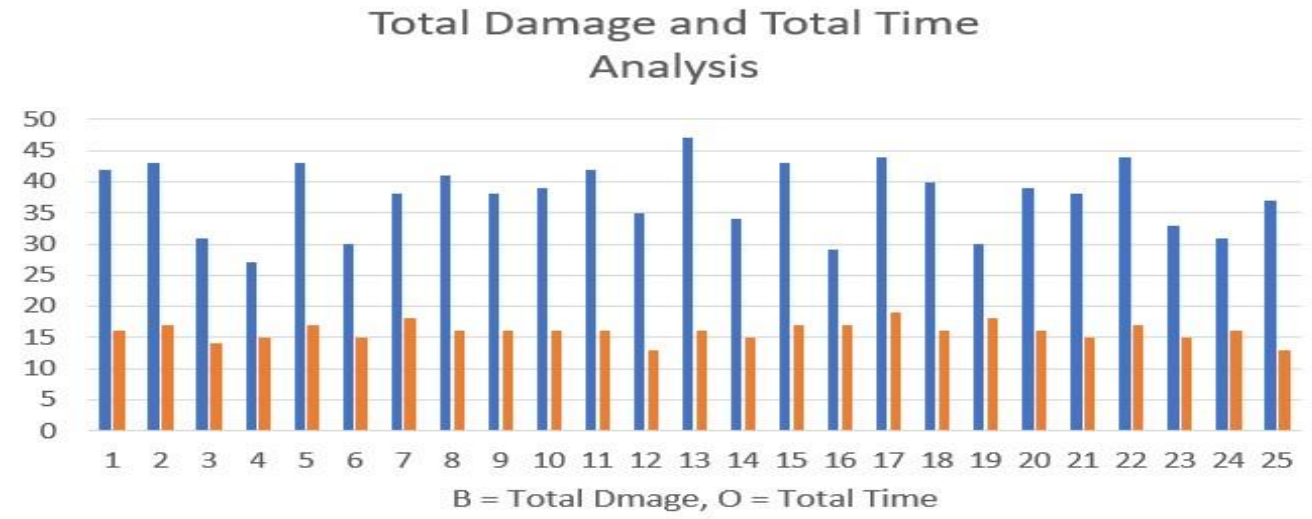
By using these methods, we are not just collecting data—but also turning it into useful insights that can directly improve the way Ganesh Transport operates, helping the business run more efficiently and profitably.

6. Results and Findings (Graphs and other Pictorial Representation) –

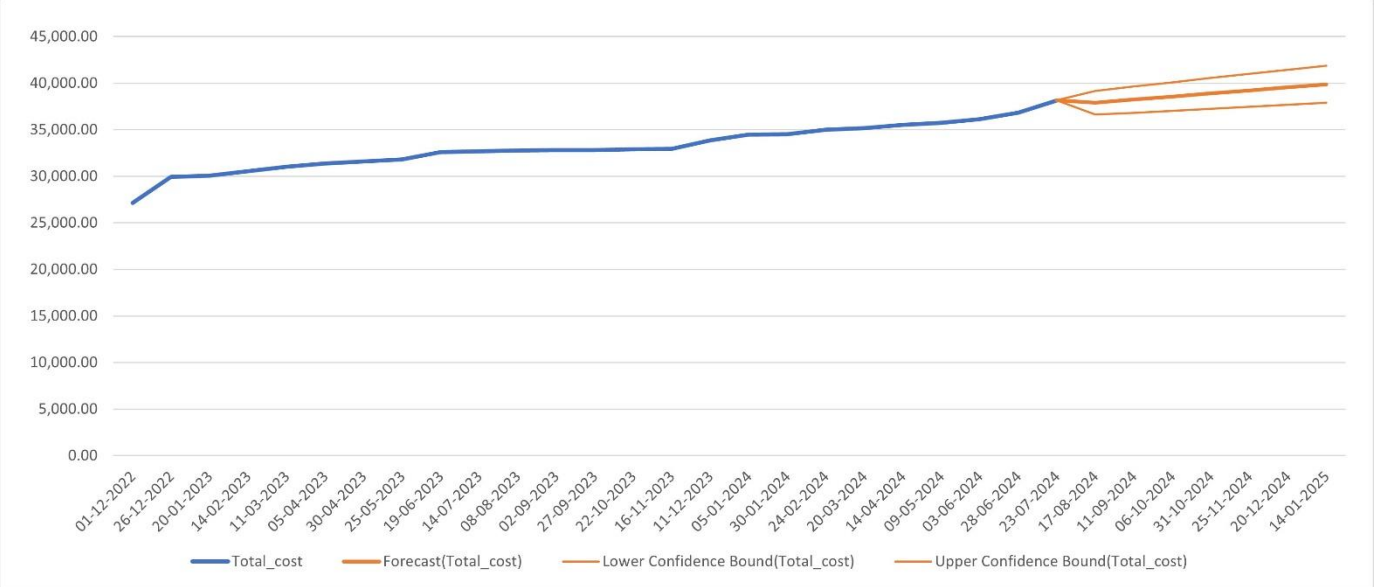
This graph tells us the trend with which the cost incurred in an entire round trip is varying. It's increasing as visible but at a slow pace.



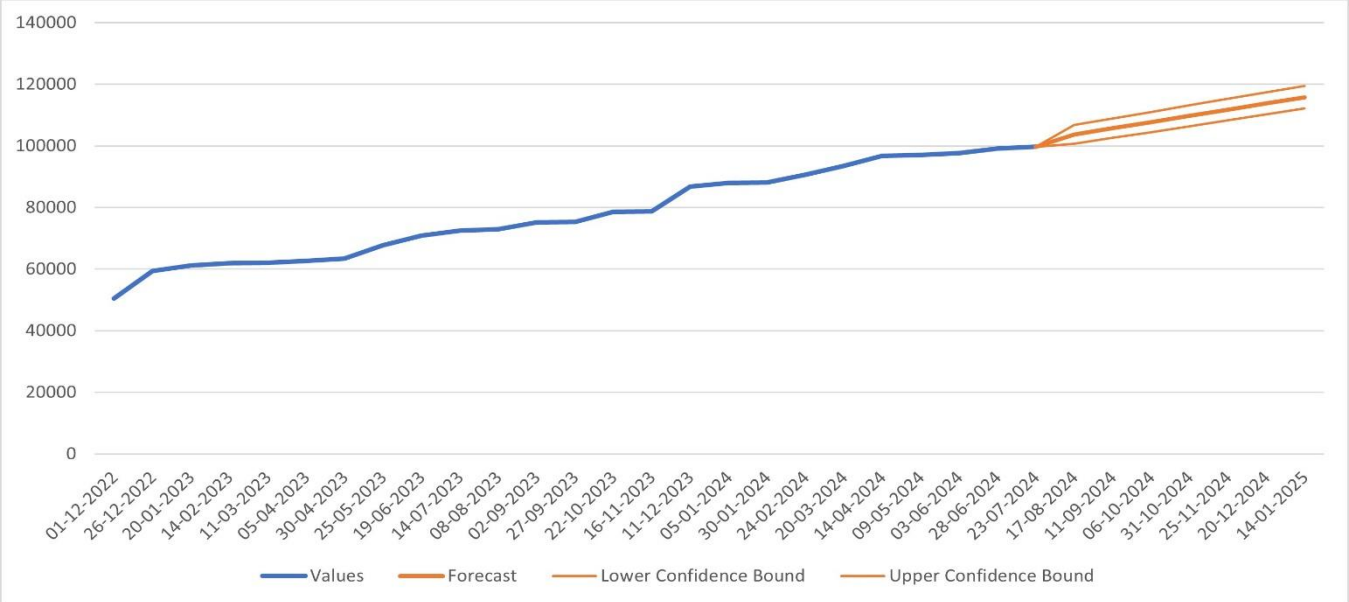
This graph tells us the trend with which the price or profit incurred in an entire round trip is varying. It's increasing but is having a tendency to get saturated or become constant. So the cost is increasing but profit increase is declining which is alarming.



The clustered column chart makes it easy to see side-by-side comparison for each journey. We can visually identify problem areas that might be driving up costs, such as delays or frequent damage during transit. The damage of goods have not been brought under control which is increasing the expenses. Also, the total time taken for each journey is high. Most of the time it does meet the deadline of 10 days + extra 2 days.



This time series graph helps us to predict the future or expected costs incurred it can make within an upper and lower bound. It is plotted between costs incurred and time interval of 15 days.



This time series graph help us to predict the future or expected profits it can make within an upper and lower bound. It is plotted between profit incurred and time interval of 15 days.

In the Final Report Submission, I will deeply analyze the data and will try to solve the problem Statement in a more efficient manner by adding more graphs and trends and analyzing them. It has been found from above analysis that profits aren't increasing at same rate with which the other expenses mainly the total costs, oil prices, etc are increasing. Also, there is an increase in goods increased over the period. There has also been an increase in delay or time taken to deliver the goods. All this add up to additional expenses. Like for every day delay, a fine of Rs.500 is imposed and a fine of Rs.200 for every good damaged.