Business Analytics Solution for Investigating Third-Party Motor Insurance Claims: A Case Study of a Private Investigation Firm

Midterm report for the BDM capstone Project

Submitted by

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Declaration Statement

I am working on a Project Title " Business Analytics Solution for Investigating Third-Party Motor Insurance Claims: A Case Study of a Private Investigation Firm". I extend my appreciation to Right View Investigators Company, 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.

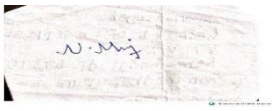
Additionally, I affirm that all procedures employed for the purpose of data collection and analysis have been duly explained in this report. The outcomes and inferences derived from the data are an accurate depiction of the findings acquired through thorough analytical procedures.

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:MUNEESHWARI N

Date:06.07.2025

1.Executive Summary and Title

This midterm report presents the progress of a business analytics capstone project undertaken for Right View Investigators, a private investigation firm specializing in third-party motor insurance claim verifications. The firm currently uses Excel-based systems to record claim numbers, assigned dates, submitted dates (final investigation completion), dispatch dates, fee receipts, and status updates.

The primary aim of this project is **not to provide technical solutions,** but to use data analysis to generate actionable business insights that support decision-making. By examining historical claim records, the project identifies operational inefficiencies, delayed fee collections, and investigator performance trends that can inform strategic decisions for improved workflow management.

Preliminary exploratory data analysis (EDA) revealed that while the majority of cases are marked as "Submitted," indicating investigation completion and report submission to insurers, fee receipts remain unrecorded for most claims. Additionally, Submission dates are missing in many entries, impacting turnaround time (TAT) calculations and performance evaluation.

Accurate and timely claim investigations are critical for insurance companies to ensure fair claim settlements and detect fraudulent cases. Therefore, providing insights into operational bottlenecks and financial follow-up gaps will help Right View Investigators streamline their processes and prioritize workload more effectively.

The work completed so far includes data cleaning, metadata documentation, and descriptive analysis. The next phase will involve developing business dashboards that visualize claim status, fee collections, and investigator turnaround times, followed by strategic recommendations based on these insights for final submission.

2. Proof of Originality of Data

Details:

Name: Right View Investigators

Founders/Owners: Mr. Rajesh Pandian.

Address: 11 ,Lourdhu Nagar,4th Street ,K.Pudur,Madurai -625 007

Mobile:99441-59936

About:

Right View Investigators (RVI) is a private investigation firm based in Madurai, Tamil Nadu, specialising in third-party motor claim investigations for leading general insurance companies across India. Established in 2017, RVI has built a strong reputation for its efficient, unbiased, and comprehensive investigation services that aid insurers in assessing the legitimacy and liability aspects of claims.

The firm handles a wide range of investigation types, including:

- Third-Party (TP) Bodily Injury and Fatal Claims
- Own Damage (OD) Claims
- Motor Vehicle Accident Reconstructions
- Connected and MV Investigations

Website Link: https://rightviewinvestigators.com/about-us.html

Drive Link for Authorized letter from firm & Photograph of the Firm:

https://drive.google.com/drive/folders/1mxkzbB05YXCPyfIPdhYIMW_DMeC7ijNu?usp=sharing

3.Metadata & Data description

🔷Dataset Title: **"Combine RTI and Case Status Trial.xlsx"**

RTI: Refers to *Right to Information*. It is a formal letter submitted to obtain necessary information from government departments relevant to claim investigations. In this project, RTIs are mainly filed to collect information from: Police Stations,RTO (Regional Transport Office),Hospitals…

Case Status: Represents the current stage of each investigation case**,** such as:

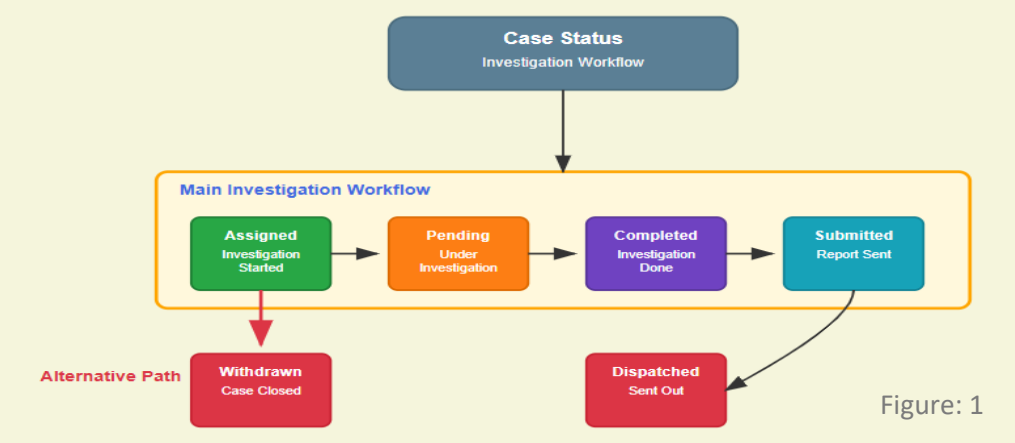


Figure: 1

Dataset Structure and Variables:

The primary dataset "Combine RTI and Case Status Trial.xlsx" contains 1079 records with the following key variables:

VARIABLE	TYPE	CATEGORY	DESCRIPTION	EXAMPLE VALUE	TAGS
Claim Number	CATEGORICAL	Identifier	Unique ID assigned to each claim	TP123456	*Claim ID, Key Identifier*
Company	CATEGORICAL	Client Tag	Insurance company that assigned the investigation	CHOLA	*Insurer, Client Name*
Assigned In	TEMPORAL	Timeline	Date when the firm received investigation assignment	2024-02-15	*Assignment Date, Start*
Submitted Date	TEMPORAL	Timeline	Date report was submitted to the insurer (final stage)	2024-03-12	*Report Submission, End*
Dispatch Date	TEMPORAL	Timeline	Date when the physical report was dispatched	2024-03-15	*Dispatch, Logistics*
Received Date	TEMPORAL	Financial	Date fee payment was recorded from insurer	2024-04-05	*Fee Receipt, Payment Date*
Status	CATEGORICAL	Case Status	Current stage of claim (Submitted = Completed)	Submitted	*Progress, Closure Status*
Fee Status	CATEGORICAL	Financial	Indicates whether fee has been received or is pending	Received / Pending	*Payment Status, Revenue*
TAT (Days)	NUMERIC	Performance Metric	Turnaround time in days (Submitted Date - Assigned In)	25	*Duration, Efficiency*

Figure:2

Core Operational Fields:

- **Assigned Date:** Date the investigation was assigned to the firm
- **Assigned In:** There is four ID's in which ID the case is assigned
- **Company:** Insurance company name assigning the investigation
- **Claim Number:** Unique alphanumeric identifier for each claim which was different for different company
- **Submitted Date:** Date investigation report was submitted via online website or Gmail(final completion)
- **Dispatch Date:** Date physical report(Hard copy) was dispatched
- **Amount:** Investigation fee charged
- **Received Date:** Date fee payment was recorded
- **Status:** Current stage of claim processing
- **TAT:** Turnaround Time (calculated or recorded)

Investigation-Specific Fields:

- **TYPE:** Category of investigation or claim type
- **POLICE STATION:** Relevant police station for the case where the case has been filed.
- **RTI DATE/FIR STATUS:** Right to Information requests and FIR status
- **CLAIMANT Location:** Location of the Person filing the claim

- **INSURED Location**: Location of the Policy holder
- **DRIVER Location:** Location of the Driver of the involved vehicles
- **Reporter Name:** Report Creator name who uses information collected by field investigators to create report

Administrative Fields:

- **Recipient Mail:** Email communication records
- **DRIVE LINK:** Document storage links
- **Mail Link:** Email reference links
- **Mail Sent Status:** Communication tracking
- **REMARKS:** Additional case notes

4.Descriptive Statistics:

Statistical Summary

Statistic	TAT	Amount
Mean	61.29128015	3191.919598
Median	44.5	3600
Mode	22	1800
Minimum	2	450
Maximum	589	6250
Standard Deviation	49.90496575	1328.738812

Figure:3

🔷Turn Around Time (TAT)

The mean Turn Around Time (TAT) is **61.3 days**, with a median of **44.5 days** and mode of **22 days**. This suggests that while the most frequent TAT recorded is 22 days, half of the claims are completed within 44.5 days. The mean is higher than the median, indicating a **right-skewed distribution** where a few cases have significantly higher TAT, thus pulling the average upwards. The minimum TAT is just **2 days**, while the maximum extends up to **589 days**, highlighting a wide range of claim processing durations. The **standard deviation of 49.9 days** indicates moderate variability, and operational interventions can target the delayed outlier cases to bring down the overall average and ensure faster claim settlement for clients.

🔷Fees Amount

The mean claim amount is **₹3192**, with a median of **₹3600** and a mode of **₹1800**. The median being higher than the mean indicates a **slightly left-skewed distribution**, meaning that most claims are around the ₹3600 mark, with some low-value claims pulling the average down slightly. The minimum claim amount recorded is **₹450**, and the maximum is **₹6250**, showing that payouts can vary significantly depending on claim nature and severity. The **standard deviation is ₹1328.7**, suggesting moderate variability in claim amounts. This insight is important for financial planning, reserve allocation, and risk assessment processes within the company.

5.Analysis Process / Method:

🔷Data Cleaning Process

The data cleaning process involved the following steps:

1. **Standardising Column Names**
   Column headers were cleaned to maintain consistent naming conventions (e.g., *Assigned In* renamed to *Assigned IN*, *CLAIMANT* renamed to *CLAIMANT Location*).
2. **Duplicate Removal**
   Duplicate rows were identified and removed to ensure each claim record is unique, resulting in a reduced row count from 1082 to 1079.
3. **Imputation of Missing Values**
   Missing dates in *Submitted Date* were imputed using available related date columns (*Dispatch Date*) to create new columns:
   - *Submitted Date Imputed*
   - *Submitted Date Final*
4. **Date Format Standardisation**
   All date columns were formatted uniformly to ensure accurate date difference calculations for TAT.

🔷Data Analysis Process

1. **Descriptive Statistics**
   Using Google Sheets built-in functions, summary statistics (mean, median, mode, minimum, maximum, and standard deviation) were calculated for:
   - Turn Around Time (TAT)
   - Claim Amount

2. **Visualisations**
   Created histograms and bar charts to analyse:
   - Distribution of TAT
   - Distribution of Claim Amounts
   - Company-wise case counts
   - Case status distribution etc…
3. **Data Interpretation**
   Each statistical output was interpreted to derive operational insights such as process delays, claim payout ranges, and workload distribution across companies.

🔷Tools Used 🛠️

📝**Google Sheets:** For data cleaning, formula-based imputation, descriptive statistics calculation, and visualisations.

🐍**Python (Pandas):** For dataset comparison and deeper validation of cleaning steps and column structures (during this documentation stage).

💻**Excel:** For local exploratory checks and pivot-based summaries.

📈 8. Results and Findings

1.Distribution of TAT for Claims:

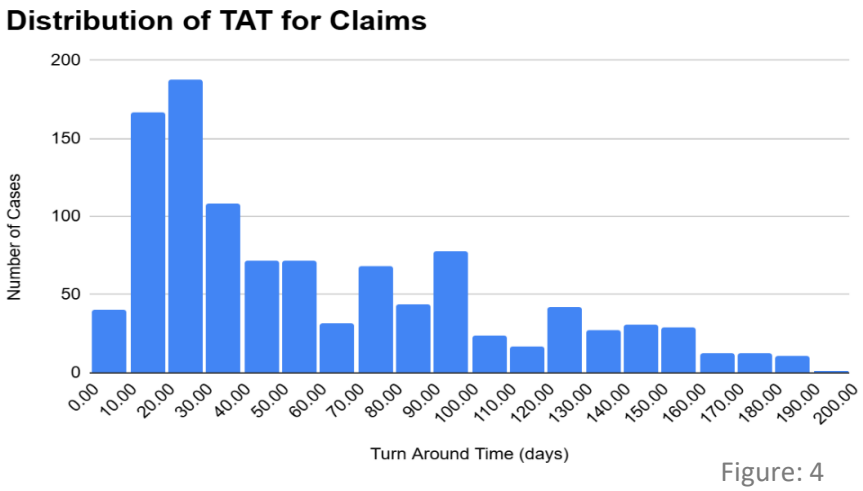


Figure: 4

Interpretation:
The histogram shows that most claims have a Turn Around Time (TAT) between 10 to 50 days, with frequency peaking around 20 days. A smaller number of cases extend beyond 100 days, with the longest TAT recorded as 196 days**.** This indicates that the process is

generally efficient, but focusing on delayed claims can help further reduce average turnaround time and improve service level commitments.

2.Distribution of Claim Amounts:

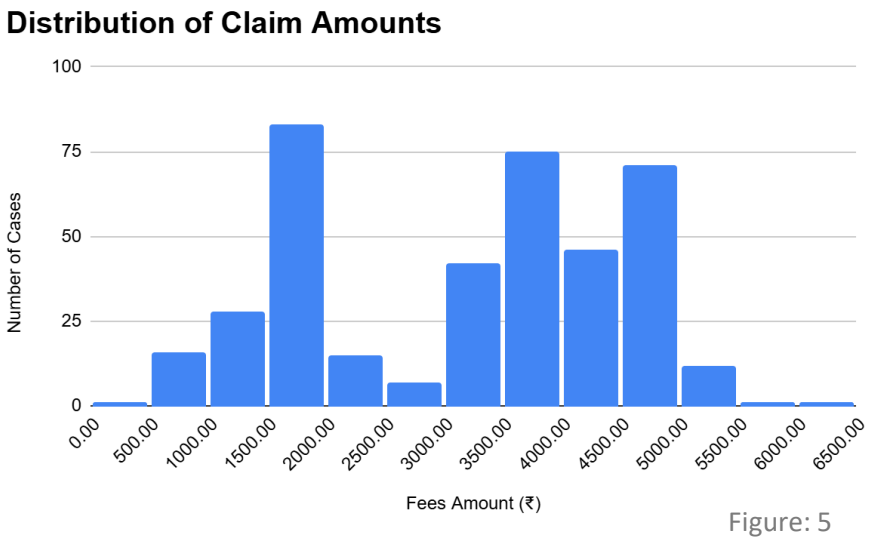


Figure: 5

Interpretation:

The histogram indicates that most claim amounts range between ₹1500 and ₹5000**,** with a peak concentration in the ₹2000–₹2500 bracket. Very few claims exceed ₹6000, suggesting that the majority of payouts fall within the low to mid payout range, making overall risk exposure moderate. This helps in planning financial reserves for typical claim settlements.

3.Number of Cases per Company:

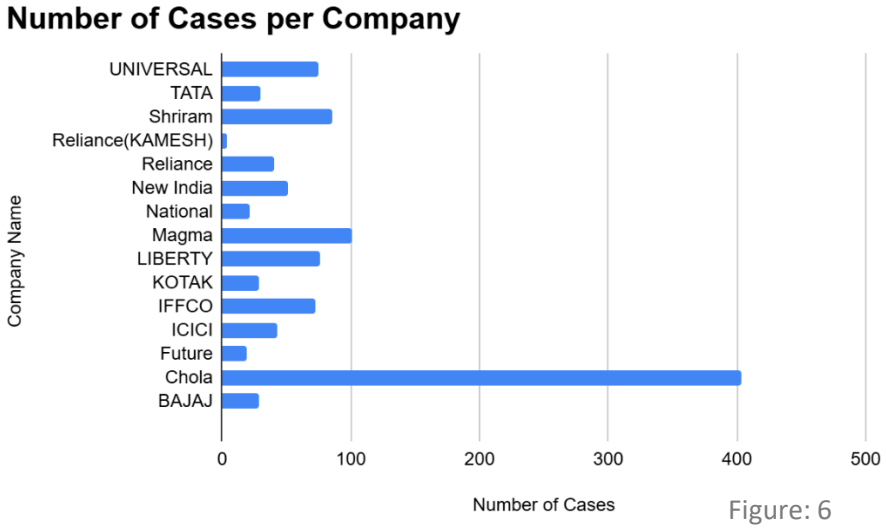


Figure: 6

Interpretation:

The bar chart shows that Chola and Magma are the top contributors to total case volume**,**

followed by companies such as Shriram and Liberty. This implies that operational resources and process improvements can be prioritised for these high-volume clients**,** ensuring service quality and efficient turnaround for major stakeholders.

4.Case Status Distribution:

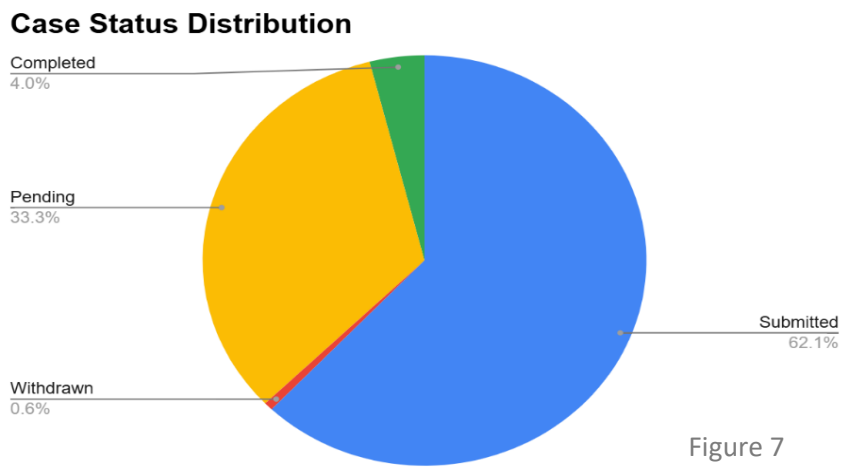


Figure 7

Interpretation:

The pie chart indicates that 62% of cases are Submitted, suggesting that the majority of investigations reach the final report submission stage. 33% remain Pending, highlighting a substantial proportion of ongoing cases, which can be targeted for process acceleration. 4% are marked Completed**,** and only 0.6% are Withdrawn, indicating a high completion and submission rate with minimal case dropouts. Overall, the chart demonstrates effective operational closure while pointing out areas for workflow optimisation to reduce pending backlogs.

🚀 12. Next Step

➡ **In the final report**, we will explain the findings in greater depth, along with advanced visualisations, recommendations for implementation, and overall outcome .