National College of Ireland

Project Submission Sheet

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Programme:	MSc in Data Analytics (MSCDAD_A)	**Year:**	First Year
Module:	**Business Intelligence & Business Analytics**		
Lecturer:	Sean Heeney		
Submission Due Date:	15th April 2025		
Project Title:	Leveraging BI & CRM to Improve Delivery Performance and Customer Retention for Yippee in the FMCG Sector		
Word Count:	4245		

I hereby certify that the information contained in this (my submission) is information pertaining to research I conducted for this project. All information other than my own contribution will be fully referenced and listed in the relevant bibliography section at the rear of the project.
ALL internet material must be referenced in the references section. Students are encouraged to use the Harvard Referencing Standard supplied by the Library. To use other author's written or electronic work is illegal (plagiarism) and may result in disciplinary action. Students may be required to undergo a viva (oral examination) if there is suspicion about the validity of their submitted work.

Signature:	Shivansh Bhatnagar / Malav Naik / Pratik Sunar
Date:	14 April 2025

PLEASE READ THE FOLLOWING INSTRUCTIONS:

1. Please attach a completed copy of this sheet to each project (including multiple copies).
2. Projects should be submitted to your Programme Coordinator.
3. **You must ensure that you retain a HARD COPY of ALL projects**, both for your own reference and in case a project is lost or mislaid. It is not sufficient to keep a copy on computer. Please do not bind projects or place in covers unless specifically requested.
4. You must ensure that all projects are submitted to your Programme Coordinator on or before the required submission date. **Late submissions will incur penalties.**
5. All projects must be submitted and passed in order to successfully complete the year. **Any project/assignment not submitted will be marked as a fail.**

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AI Acknowledgement Supplement

BIBA

Leveraging BI & CRM to Improve Delivery Performance and Customer Retention for Yippee in the FMCG Sector

Your Name/Student Number	Course	Date
Shivansh Bhatnagar/ x23237252	MSc in Data Analytics	14 April 2025
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Pratik Sunar / x23292512	MSc in Data Analytics	14 April 2025

This section is a supplement to the main assignment, to be used if AI was used in any capacity in the creation of your assignment; if you have queries about how to do this, please contact your lecturer. For an example of how to fill these sections out, please click here.

AI Acknowledgment

This section acknowledges the AI tools that were utilized in the process of completing this assignment.

Tool Name	Brief Description	Link to tool
ChatGPT	Important Factors that we have to keep in mind while doing supply chain management Analytics?	chatgpt.com

Description of AI Usage

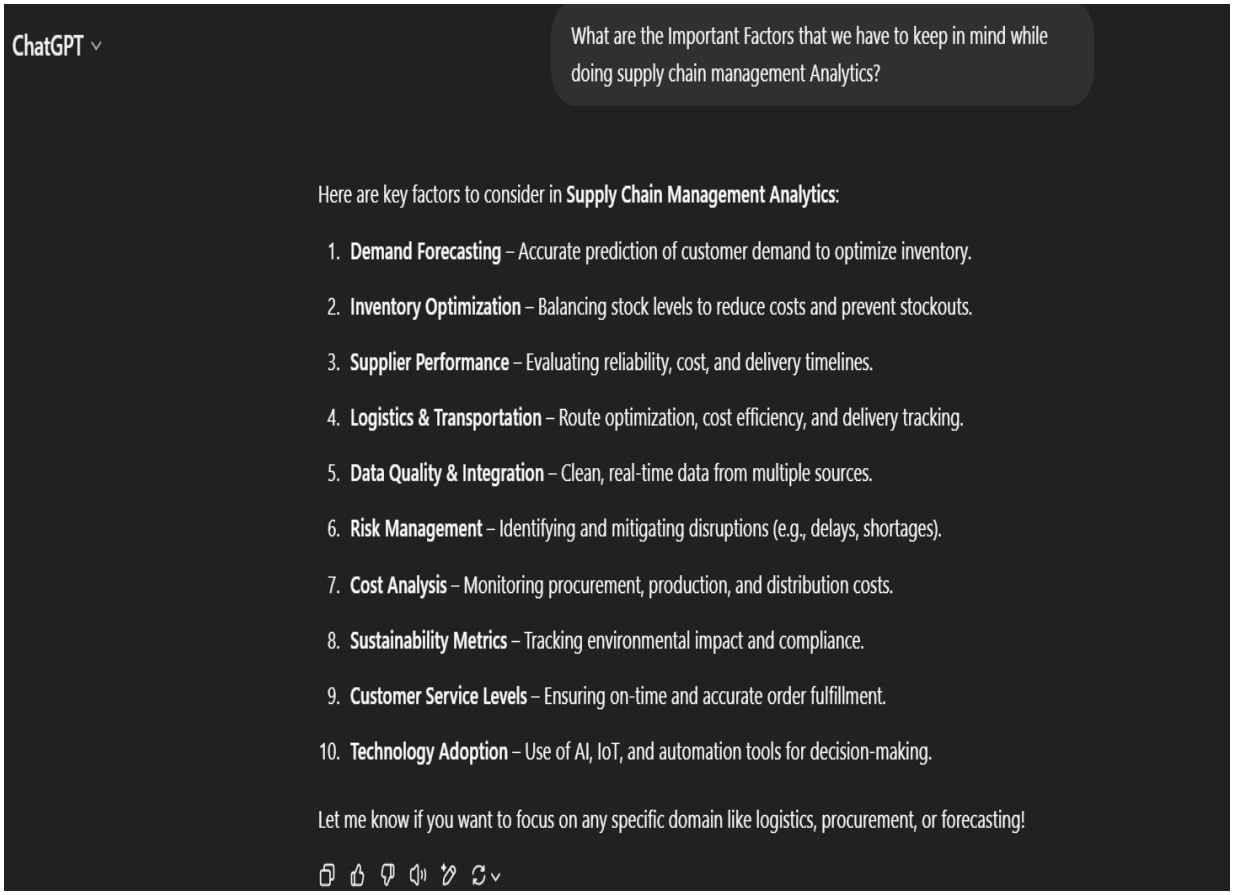
This section provides a more detailed description of how the AI tools were used in the assignment. It includes information about the prompts given to the AI tool, the responses received, and how these responses were utilized or modified in the assignment. **One table should be used for each tool used**.

ChatGPT	
Used to explore Important Factors of supply chain management Analytics?	
[Screenshot Attached Below]	[Screenshot Attached Below]

Evidence of AI Usage

This section includes evidence of significant prompts and responses used or generated through the AI tool. It should provide a clear understanding of the extent to which the AI tool was used in the assignment. Evidence may be attached via screenshots or text.

Additional Evidence:


ChatGPT
What are the Important Factors that we have to keep in mind while doing supply chain management Analytics?
Here are key factors to consider in **Supply Chain Management Analytics**:
1. **Demand Forecasting** – Accurate prediction of customer demand to optimize inventory.
2. **Inventory Optimization** – Balancing stock levels to reduce costs and prevent stockouts.
3. **Supplier Performance** – Evaluating reliability, cost, and delivery timelines.
4. **Logistics & Transportation** – Route optimization, cost efficiency, and delivery tracking.
5. **Data Quality & Integration** – Clean, real-time data from multiple sources.
6. **Risk Management** – Identifying and mitigating disruptions (e.g., delays, shortages).
7. **Cost Analysis** – Monitoring procurement, production, and distribution costs.
8. **Sustainability Metrics** – Tracking environmental impact and compliance.
9. **Customer Service Levels** – Ensuring on-time and accurate order fulfillment.
10. **Technology Adoption** – Use of AI, IoT, and automation tools for decision-making.
Let me know if you want to focus on any specific domain like logistics, procurement, or forecasting!

Leveraging BI & CRM to Improve Delivery Performance and Customer Retention for Yippee in the FMCG Sector

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Video Presentation Link

Part 1: Project Specification Report

Abstract - By use of Business Intelligence (BI) and Customer Relationship Management (CRM) solutions, this project enhanced delivery performance and customer retention of Yippee, a medium-sized FMCG company in India. Power BI dashboards and Salesforce CRM enabled proactive management of supply chain inefficiencies by means of real-time tracking of On-Time In-Full (OTIF) rates and associated customer feedback systems. The solution addressed operational bottlenecks, reduced customer attrition, and improved service quality under constant upgrades meant for automation and predictive analytics to ensure sustainable excellence in a competitive market.

1.1 Background & Business Goals

1.1.1 Description of Yippee, an FMCG Brand

Yippee Overview: Yippee is a medium-sized Fast-Moving Consumer Goods (FMCG) company operating in India's highly competitive urban and semi-urban markets. It primarily retails high-demand consumables such as instant noodles, snacks, and packaged ready-to-cook food. Distinguished by its aggressive distribution and large customer base, Yippee had in the past held long-term yearly contracts with its significant retail buyers across various locations [5]. However, during recent months, Yippee has been on the decline due to severe inefficiencies in its supply chain, causing inconsistent service delivery. Such operations have translated into client dissatisfaction, contract non-renewal, and lost market trust.

1.1.2 Market Overview

India's FMCG market is one of the fastest-developing globally [1], projected to attain $220 billion by 2025. The sector is extremely volume-driven, where customer satisfaction hinges on availability, timeliness, and consistency of supply. FMCG companies must maintain precise supply chain operations, especially in Tier 1 and Tier 2 cities, to ensure product reach within narrow delivery windows. Delays or incomplete deliveries directly impact shelf availability [2] and customer loyalty, often leading to attrition [11]. With increased competition and customer expectations, any supply chain inefficiency—particularly at the delivery or warehousing level—can lead to substantial loss of business [6].

1.1.3 Problem Statement

Yippee is currently experiencing contract terminations from a few high-value customers due to repeated service failures. These failures largely involve incomplete deliveries (not in full) and late arrivals (not on time). It is suspected that logistical breakdowns such as capacity mismatches [3], warehouse distance inefficiencies, and environmental factors (e.g., floods) have significantly impacted service performance.

1.1.4 Research Question

"How can real-time tracking of delivery performance improve customer retention and mitigate service-related contract losses in the FMCG supply chain?"
This research question drives the core of our analytics and solution design, focused on understanding root causes and deploying a BI + CRM solution that enables faster response and better decision-making.

1.1.5 Business Goals

Yippee's key business goals are:

- **To identify and eliminate supply chain inefficiencies causing delivery issues:** Yippee's The recent operational difficulties at Yippee have arisen because of mismatched warehouse capacities together with delivery delays caused by flooding conditions. Supply chain assessment will determine methods to eliminate system inefficiencies, including overcrowded distribution points. BI insights allow organisations to make actionable decisions that include inventory redistribution as a targeted intervention [3].
- **To track delivery performance in real-time using BI dashboards:** The monitoring system tracks critical metrics through Power BI dashboards in real-time for quick reaction to OTIF rates along with delay occurrences. The system provides time-sensitive visibility through Power BI dashboards to address problems such as truck rerouting and meets precise FMCG requirements[14].
- **To integrate CRM systems for capturing customer feedback and proactive resolution:** Through Salesforce or a similar CRM system companies can enable automated feedback collection from important customers while service breaches generate system alerts.That data will activate service breach alerts which will prompt the company to take proactive retention measures[10].
- **To retain existing customers by improving service quality and reducing complaints:** Enhancing OTIF to over 95% and using CRM insights to prioritize key accounts will rebuild trust, reducing churn and strengthening Yippee's market reputation.
- **To restore business stability and prepare for future expansion:** The stabilisation of current operations enables expansion into Tier 2 and 3 cities by implementing BI and CRM systems which will manage rising market volumes within a $220 billion market segment[1].

1.1.6 EDA Summary

Distribution of Factors in Dataset:

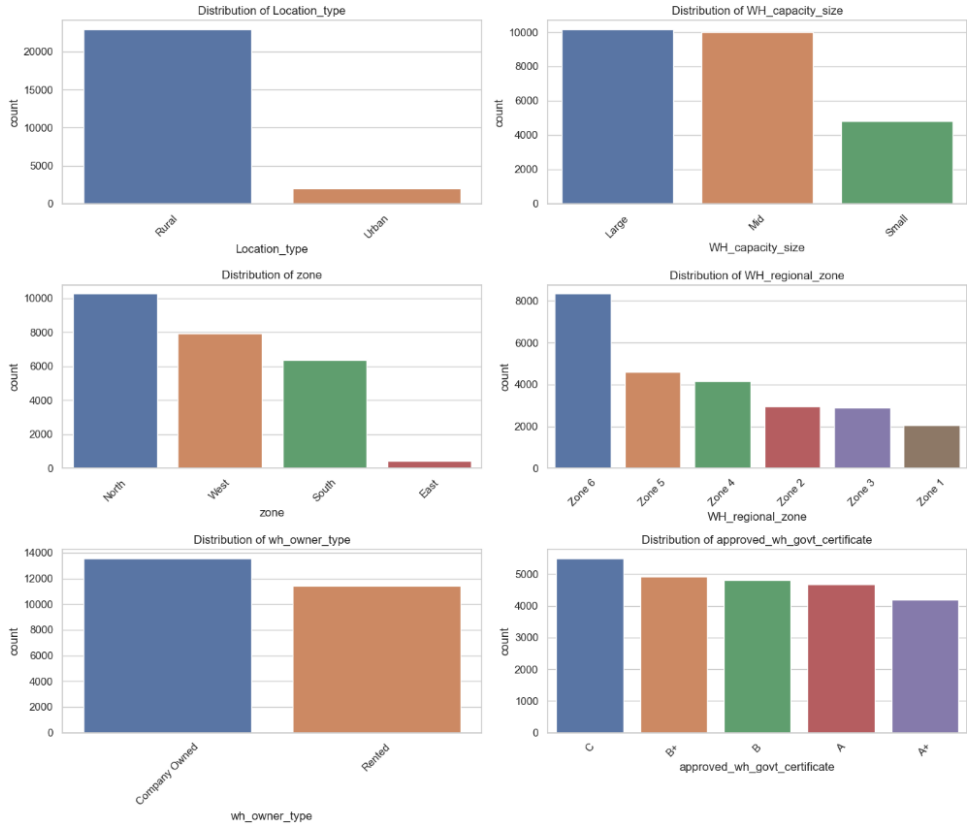

Figure 1: Distribution of Factors in Dataset:

The bar chart shows a skewed warehouse capacity distribution, with large and mid-sized hubs dominating, potentially overloading them during peak demand.

Product Weight vs. Distance from Hub:

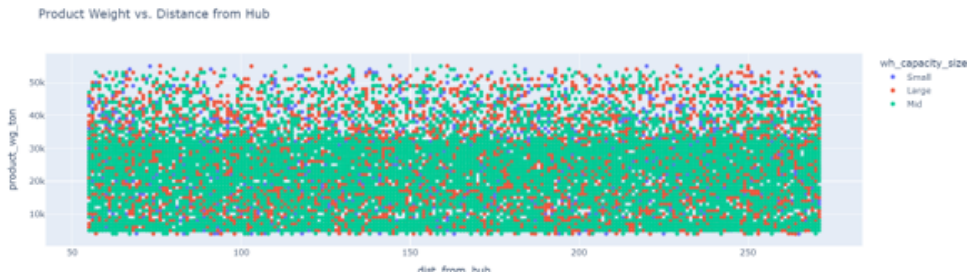

Figure 2: Product Weight vs. Distance from Hub

The scatter plot indicates no strong correlation between product weight and hub distance, but mid-sized warehouses handle most shipments, suggesting overutilization.

Impact of Floods on Product Weight:

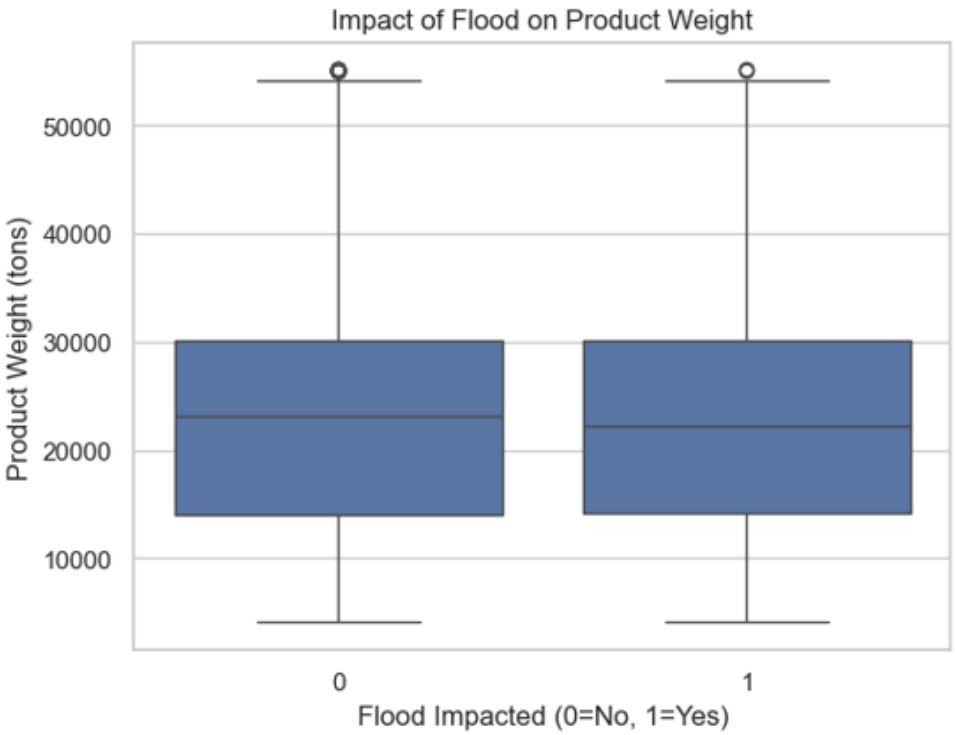

Figure 3: Impact of Floods on Product Weights

The boxplot highlights higher variance in product weights during floods, indicating disrupted logistics critical for seasonal planning.

Current State	**Desired Future State**
Delivery performance inconsistent	$>$ 95% OTIF delivery rate
No centralized visibility on performance	Real-time Power BI dashboard monitoring
No structured CRM feedback system	Integrated CRM capturing service issues
Lost major customers	High-value customer contract retention

Table 1: Gap Analysis for Yippee

SWOT Analysis	
Strengths	Established market presence, existing data infrastructure (ERP), diverse warehouse network
Weaknesses	Poor delivery tracking, no integrated CRM or alert system, over-reliance on mid/large hubs
Opportunities	BI & CRM tools to improve performance, automation of alerts for service recovery
Threats	Further contract losses from delayed action, competitor advantage in service-level delivery

Table 2: SWOT Analysis for Yippee

1.2 System Design

The proposed system enhances Yippee's ability to monitor and respond to supply chain inefficiencies using a BI dashboard (Power BI) and CRM (e.g., Salesforce), enabling real-time data integration and decision support [12].

1.2.1 Data Flow Overview

Primary data sources include:

- **Order Management System:** Captures order creation details such as customer, product, quantity, location, and delivery due date.
- **Warehouse Management System:** Captures stock availability, warehouse capacity, dispatch times, and location data.
- **Logistics/Delivery Module:** Logs shipment dispatch, in-transit data, actual delivery times, and delivery completeness (On Time, In Full).
- **CRM System:** Collects customer service complaints, satisfaction scores, contract renewal status, and feedback [4].

All these systems contribute data into a centralized BI layer. Here, data pre-processing is conducted (e.g., cleaning, mapping, merging timestamps), and relevant KPIs are calculated for dashboard visualization. Key analytical modules include:

- **Delay & Fulfillment Analytics:** Tracks "On Time" and "In Full" metrics across customer segments and regions.
- **Customer Retention Analytics:** Links CRM feedback and order performance to track churn risk.
- **Operational Bottleneck Analysis:** Maps inefficiencies in warehousing, dispatch times, or geography.

1.2.2 Customer Integration & Feedback Loops

The CRM enables:

- **Automated feedback capture** from high-risk accounts (based on poor OTIF scores).
- **Alert generation** when service-level thresholds are breached (e.g., multiple late deliveries within a week).
- **Sales/service follow-ups** based on churn risk or contract non-renewal triggers [10].

These feedback loops ensure that customer dissatisfaction is flagged early, and proactive steps (personalized outreach, re-prioritized deliveries) can be taken [10].

1.2.3 Key Analytics Required

Core analytics include:

- **Delivery Performance Dashboard:** OTIF trends per region, product category, and customer tier.

- **Customer Churn Risk:** Visualization of at-risk accounts based on delivery history and CRM logs.
- **Warehouse Efficiency:** Performance comparison across small/mid/large warehouses including impact of distance and capacity.
- **Environmental Impact Alerts:** Track regions impacted by events like floods to predict delivery delays.

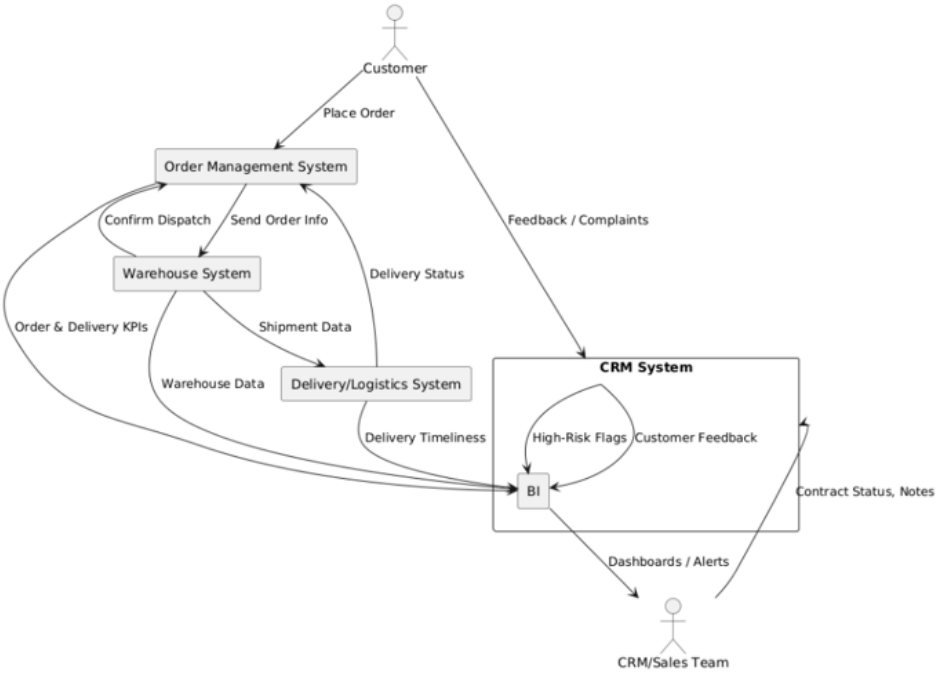

Figure 4: Key Analytics Requirement

1.3 Database Design

Entity Relationship Diagram:

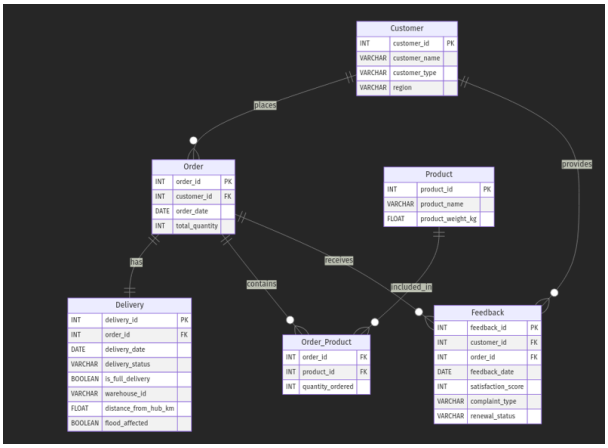

Figure 5: Database Design

This ERD shows the relationships between customers, orders, products, deliveries, and feedback, enabling analysis of delivery performance, customer satisfaction, and order fulfillment within an FMCG supply chain.

Data Dictionary:

- **Customer:** customer_id (INT, PK), customer_name (VARCHAR), customer_type (VARCHAR), region (VARCHAR).
- **Order:** order_id (INT, PK), customer_id (INT, FK), order_date (DATE), total_quantity (INT).
- **Product:** product_id (INT, PK), product_name (VARCHAR), product_weight_kg (FLOAT).
- **Order_Product:** order_id (INT, FK), product_id (INT, FK), quantity_ordered (INT).
- **Delivery:** delivery_id (INT, PK), order_id (INT, FK), delivery_date (DATE), delivery_status (VARCHAR), is_full_delivery (BOOLEAN), warehouse_id (VARCHAR), distance_from_hub_km (FLOAT), flood_affected (BOOLEAN).
- **Feedback:** feedback_id (INT, PK), customer_id (INT, FK), order_id (INT, FK), feedback_date (DATE), satisfaction_score (INT), complaint_type (VARCHAR), renewal_status (VARCHAR).

1.4 Mock-up Data and Data Structures

To effectively demonstrate the capabilities of our BI and CRM solution, we created a realistic mock dataset aligned with our database schema. Rather than using a third-party tool like Mockaroo, we opted for **Python's Faker library**, which provided greater flexibility, control, and customizability. This also ensured we could enforce referential integrity between tables, simulate realistic business logic, and introduce variability across records to reflect true operational conditions.

1.4.1 Data Generation Process

Using Python's Faker library, we simulated a dataset reflecting Yippee's FMCG operations over one year (100 customers, 50 products, 700 orders, ∼1,400 order-products, 700 deliveries, 350 feedback entries), as per the attached Jupyter notebook. We generated data for six core tables: **Customer, Product, Order, Order_Product, Delivery, and Feedback**. Each dataset reflects the structure defined in our ER diagram and data dictionary, with careful attention to primary and foreign key relationships.

- **Customer Table (100 rows):** Simulated 100 customers with `customer_id`, Indian names (`fake.name()`), types ("Retailer," "Wholesaler," "Key Account"), and regions (e.g., Haryana) using `fake.state()`. Seeded (`Faker.seed(42)`) for reproducibility, mirroring Yippee's diverse clients.
- **Product Table (50 rows):** Generated 50 products with `product_id`, names (e.g., "Boy Product" via `fake.word()`), and weights (1–50 kg via `random.uniform()`), reflecting logistics variability for snacks and noodles.
- **Order Table (700 rows):** Created 700 orders from March 31, 2024, to 2025 (`fake.date_between()`), with `customer_id` (1–100), and quantities (1–100), enabling OTIF trend analysis.
- **Order_Product Table (∼1,400 rows):** A many-to-many relationship was simulated by assigning 2–3 random products per order. This junction table allowed us to trace the specific composition of each order and link it to fulfillment performance.

- **Delivery Table (700 rows):** Linked to orders with `delivery_date` (0–10 days post-order), `delivery_status` ("On Time"/"Delayed"), `is_full_delivery`, `warehouse_id` (e.g., "WH_002"), distances (50–300 km), and flood impact, assessing logistics performance.
- **Feedback Table (350 rows):** Covered 50% of orders with `satisfaction_score` (1–5), `complaint_type` (e.g., "Late Delivery"), and `renewal_status`, supporting CRM retention analysis.

This dataset, exported as CSV files (`customers.csv`, etc.), tests dashboards and alerts, addressing Yippee's needs.

1.4.2 Preprocessing Steps

- **Data Type Enforcement:** Dates were converted to datetime format, Booleans were standardized, and IDs were cast as integers to ensure compatibility with BI tools.
- **Referential Integrity Checks:** Foreign key values in child tables were cross-validated to ensure they matched existing primary keys.
- **Null Checks & Optional Fields:** Optional fields (like order_id in Feedback) were selectively filled to simulate real-world missing data scenarios.
- **Data Enrichment:** Derived fields (e.g., delivery delay duration, high-risk customer flags) were added during transformation to enhance analytical depth.

1.4.3 Use in BI & CRM

The mock data served as the foundation for our Power BI dashboards and CRM system workflows. It allowed us to realistically test KPIs like **On-Time, In-Full (OTIF)**, delivery trends, and customer satisfaction levels. The generated feedback also enabled CRM alert simulations and risk segmentation, demonstrating the full capability of an integrated BI + CRM ecosystem [7].

1.5 Team Management

Our team collaborated effectively for project management using Trello for document sharing, editing, and workspace. Microsoft Teams facilitated communication and presentation recordings. Task allocation and team contribution tracking were organized on the Miro dashboard. We have handled data and worked on the project by taking care of all **ethical** considerations as per GDPR, EU and Irish data protection laws. We have used open datasets from **Kaggle** and the rest created mock data.

For the video presentation, MIRO contribution dashboard and Power BI dashboard, Click the hyperlinks below:

- **Miro Dashboard**
- **Power BI Dashboards**
- **Video Presentation**
- **Trello Project Management**

Part 2: Implementation Report

2.1 Development Process: Conceptualisation to Implementation

The development process was an organised, iterative process that started with problem identification and ended with the deployment of integrated BI dashboards and CRM workflows. The initial conceptualisation was informed by the business issue faced by Yippee, an FMCG brand suffering customer loss because of operational inefficiencies in the supply chain, namely delayed and incomplete deliveries [8]. Using a Kaggle dataset, we defined KPIs (e.g., OTIF), generated mock data with Faker, and built Power BI dashboards and Salesforce workflows, refined via testing [9].

After the schema was completed, mock data generation was done with Python and the Faker library. This provided complete control over data volumes, referential integrity, and custom logic, including assigning delivery statuses, warehouse codes, and satisfaction scores. Datasets were generated for every entity and preprocessed with pandas to make them compatible with Power BI and CRM systems. The BI development phase was dedicated to authoring and developing three interactive Power BI dashboards: Delivery Performance, Customer Satisfaction and Retention, and Supply Chain Bottlenecks. These dashboards involved meticulous data transformation, such as derived columns like delay duration, delivery completion flags, and satisfaction segments. Measures in DAX were created to enable aggregated views and drill-down analysis by region, warehouse, and customer. Meanwhile, CRM processes were created in Salesforce to mimic complaint monitoring, risk flagging, and customer interaction based on delivery performance and feedback scores. As the project developed further, there were some added features introduced that were not originally in scope. These were:

Added Features:

- Environmental impact on deliveries calculated, primarily flood-hit routes.
- Risk scoring model created for selecting high-churn customers.
- Implementing automation rules in CRM for generating alerts based on satisfaction levels.

These improvements enhanced the overall solution value, delivering more predictive and proactive service recovery and customer retention. The development cycle remained agile across the board with several testing rounds and dashboard redesigns based on learnings generated by the data [9]. This adaptive and systematic development strategy ensured that the ultimate solution catered to both operational visibility and customer interaction, in line with the organisation's business recovery objectives.

2.2 CRM Configuration & Data Management Implementation

As part of the data management strategy in Salesforce CRM, multiple system customizations were carried out using standard and custom configurations to support customer segmentation, delivery tracking, and sales process optimization.

Objects and Relationships

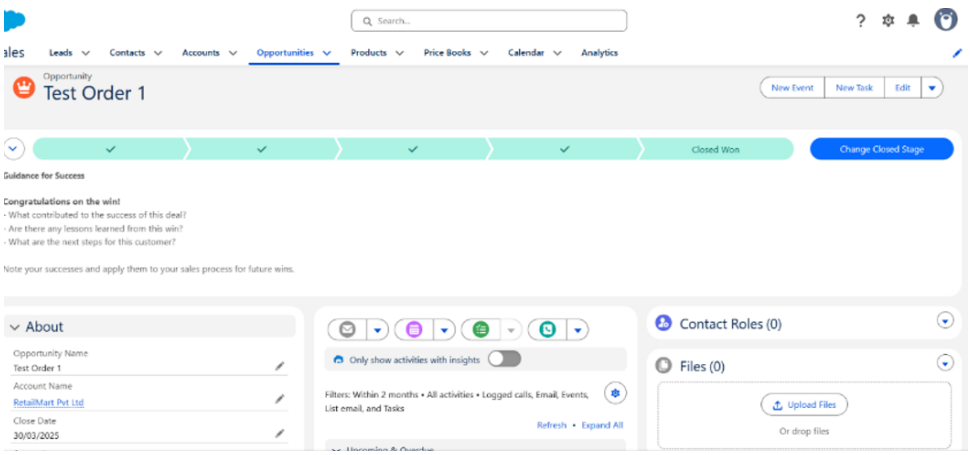

Figure 6: Salesforce CRM: Objects and Relationships

We used standard Salesforce objects like Account and Opportunity. A key relationship was established between these objects, where each Opportunity is linked to an Account using a standard lookup field.

2.2.1 Custom Fields and Field Checks

Several custom fields were added to the Account object to store relevant order and delivery information. These include:

- **Customer Type (Picklist: Retail, Wholesale):** The Customer Type picklist categorizes accounts as "Retail" or "Wholesale," enabling segmentation for tailored service and delivery strategies.

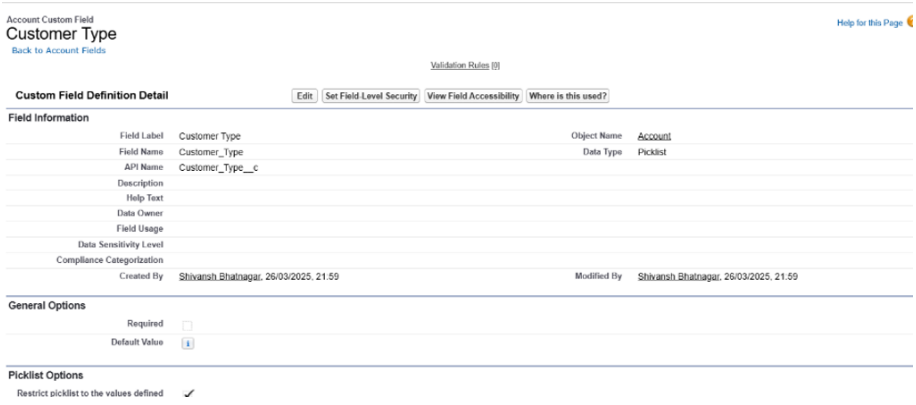

Figure 7: Customer Type (CRM)

- **Region (Picklist):** The Region picklist specifies the geographic area of the customer, facilitating region-wise performance analysis and logistics optimization.

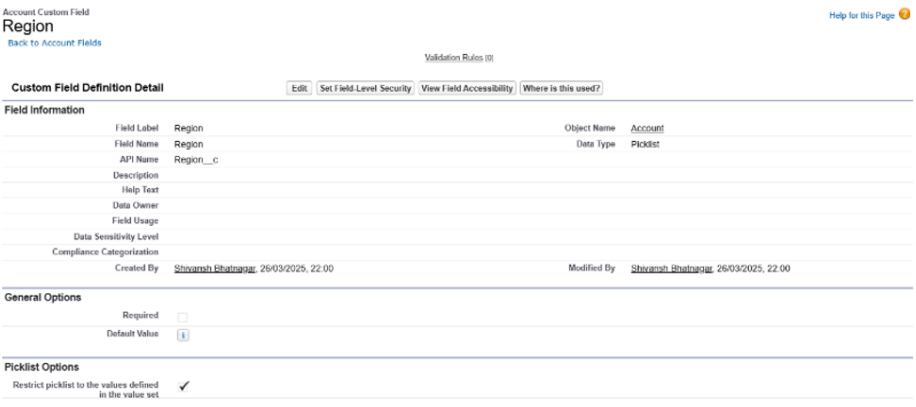

Figure 8: Region (CRM)

- **Order Date (Date):** The Order Date field records the date an order is placed, providing a timestamp for tracking delivery timelines and trends.

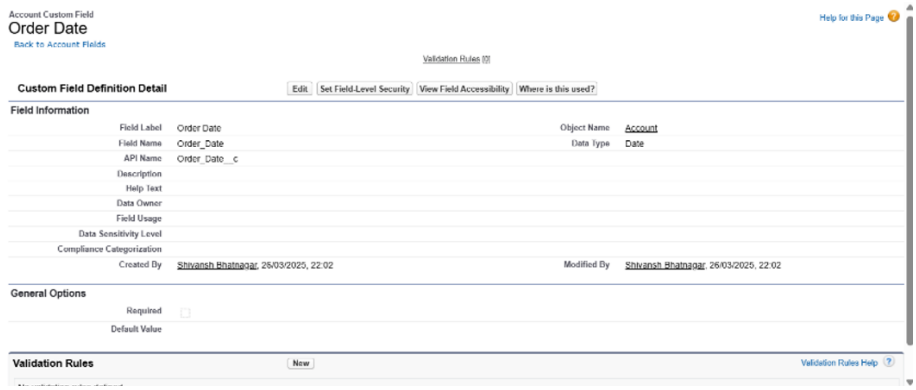

Figure 9: Order Date (CRM)

- **Total Quantity (Number):** The Total Quantity field captures the number of items ordered, supporting inventory planning and fulfillment accuracy assessments.

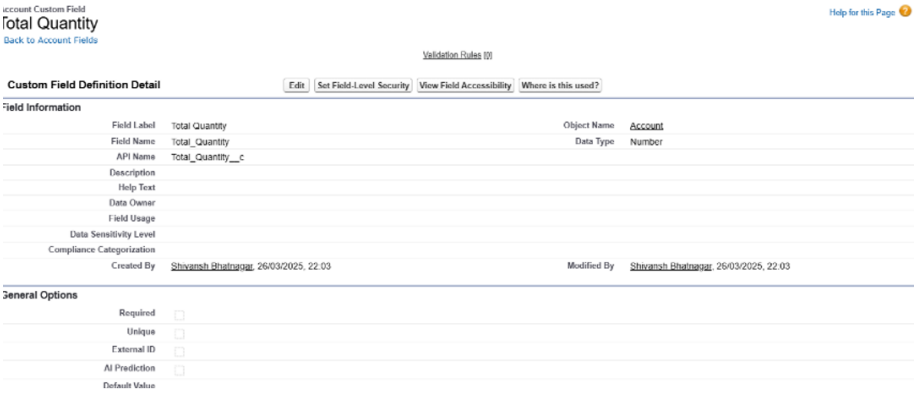

Figure 10: Total Quantity (CRM)

- **Delivery Status (Picklist):** The Delivery Status picklist indicates whether a delivery is "On Time," "Delayed," or "Partially Delivered," aiding in real-time performance monitoring.

Figure 11: Delivery Status (CRM)

- **Is Full Delivery (Checkbox):** This Is Full Delivery checkbox flags whether an order was delivered in full, driving OTIF calculations and customer satisfaction insights.

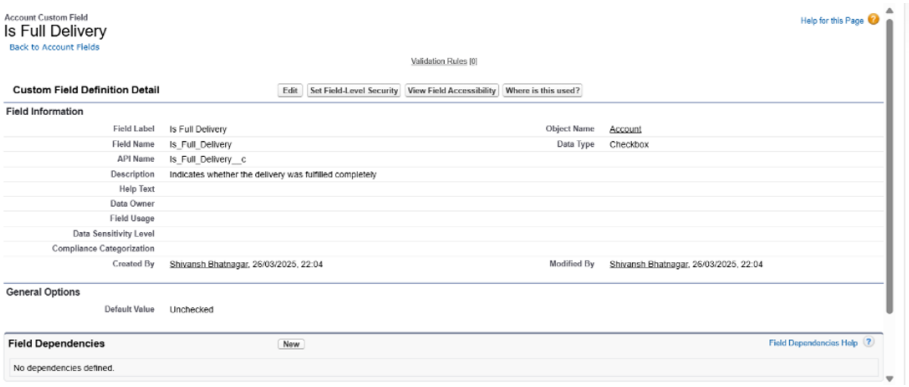

Figure 12: Is Full Delivery (CRM)

- **Warehouse ID (Text):** Each field become defined with statistics kind constraints and picklist validation in which applicable.

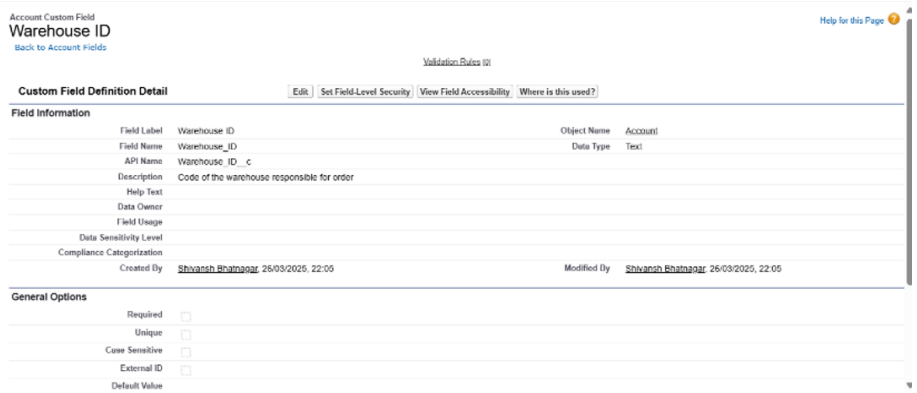

Figure 13: Warehouse ID (CRM)

2.2.2 Page Layouts

Fields were delivered to the Account and Opportunity layouts using the Page Layout Editor so users can enter and examine relevant data directly at some stage in file advent or updates.

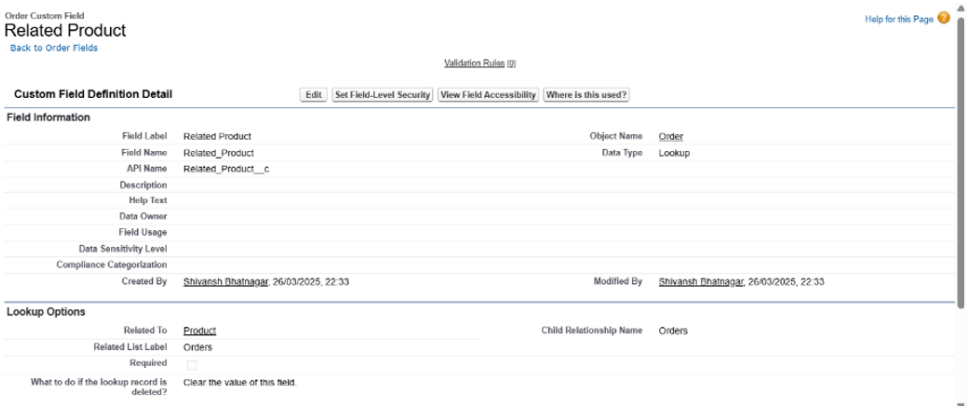

Figure 14: Page Layouts: Related Products (CRM)

2.2.3 Record Types

A file type changed into created for the Account object to guide format differentiation based totally on Customer Type (e.G., Retail vs Commerce).

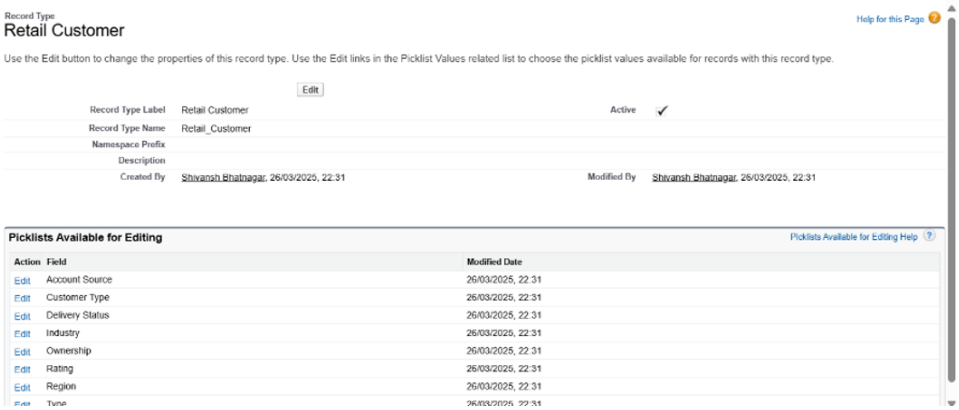

Figure 15: Record Types: Retail Customers (CRM)

2.2.4 Filters / List View

A custom list view turned into created (e.G., “Retail Customers”) with the aid of filtering Account statistics based totally on the “Customer Type” picklist.

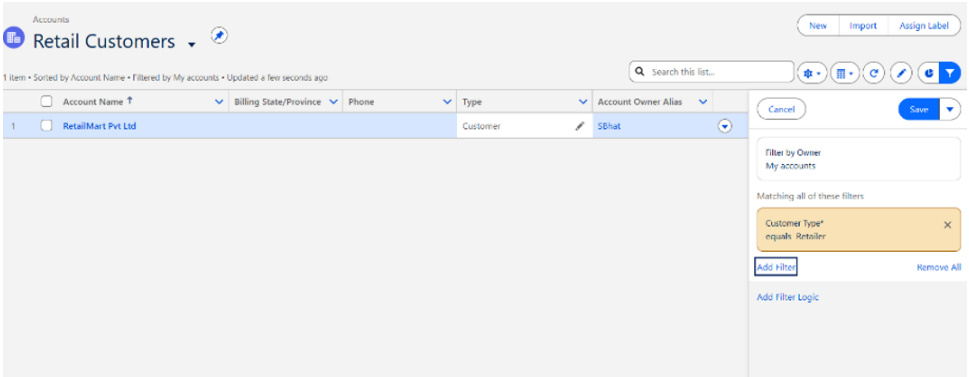

Figure 16: Filters/List View: Retail Customers Filters (CRM)

2.2.5 Validation Rule

A validation rule changed into brought to make sure Total Quantity ¿ 0, preventing invalid information access in the course of order registration.

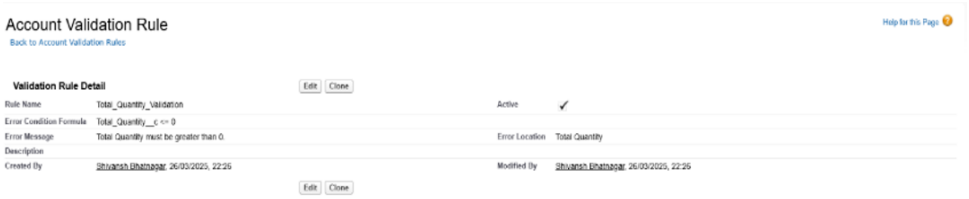

Figure 17: Validation Rule: Account Validation Rule (CRM)

2.2.6 Trigger / Flow (Automation)

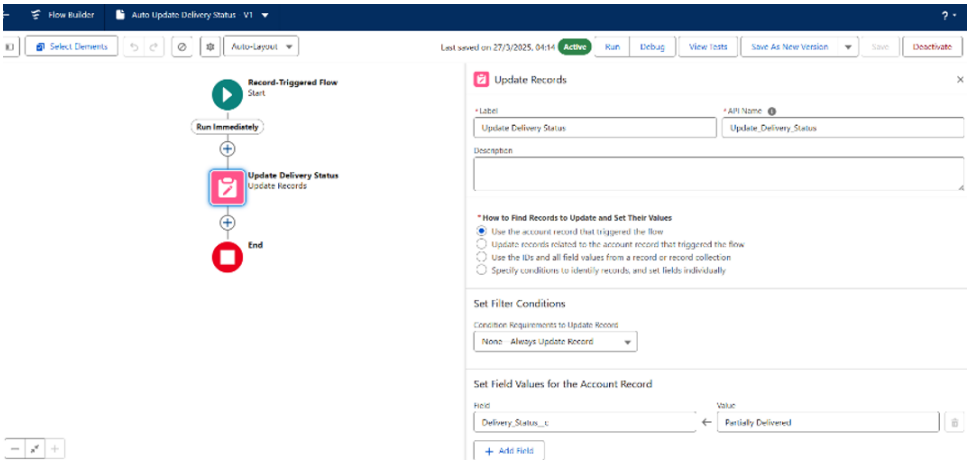

Figure 18: Trigger/Flow: Flow Builder (CRM)

Updates Delivery Status to “Partially Delivered” if Is Full Delivery is false. A Record-Triggered Flow was built to automate transport tracking: If “Is Full Delivery” is fake Then replace the “Delivery Status” subject to “Partially Delivered”

2.3 Reports and Dashboards

Dashboard 1: Delivery Performance

The Delivery Performance Dashboard delivers visibility of delivery performance within the FMCG supply chain. It monitors key performance measures like the proportion of On-Time and In-Full (OTIF) deliveries, numbers of late deliveries, and incomplete deliveries by region and over time. These metrics immediately address the business goal of improving delivery efficiency and customer satisfaction.

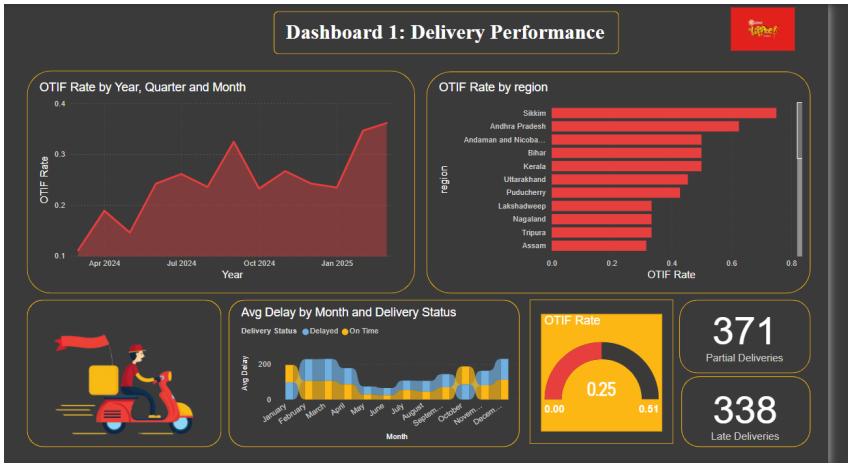

Figure 19: Delivery Performance Dashboard

- **OTIF Rate by Year, Quarter, and Month (Area Chart):** This Area chart graphs the OTIF rate over time, which helps stakeholders observe trends and patterns in delivery performance. By identifying poor-performing time periods, the chart enables the business to find areas that need urgent attention.
- **Region-wise OTIF Rate (Bar Chart):** Bar chart of OTIF rate region-wise. Identification of under-performing regions is facilitated where delivery of service is to be improved. Low OTIF areas are the potential areas that require improved logistics or improved warehouse operations.
- **OTIF Rate (Gauge Chart):** Real-time supply chain performance assessment is possible through the OTIF Rate Gauge Chart. the On-Time, In-Full delivery percentage, enabling quick assessment of supply chain performance Staff maintain delivery performance at more than 80% as the target threshold.
- **Average delay by month and delivery status (Ribbon Chart):** The Average Delay by Month and Delivery Status Ribbon Chart breaks down delivery status (On Time and Delayed) delays across monthly periods to display seasonal operational patterns in Yippee's logistics operations.
- **KPI Cards (Late Deliveries and Partial Deliveries):** The KPI cards give a quick look at the most important key performance indicators, so it is easy for decision makers to gain a clear vision of delivery health in one go. The key performance indicators enable instant focus on issues such as late deliveries or partial deliveries, which can cause customer dissatisfaction and contract loss.

Dashboard 2: Customer Satisfaction & Retention

The Customer Satisfaction & Retention Dashboard is designed to understand and enhance customer satisfaction, an important consideration in retaining customers and preventing churn. It examines satisfaction scores, types of complaints, and customer churn risks.

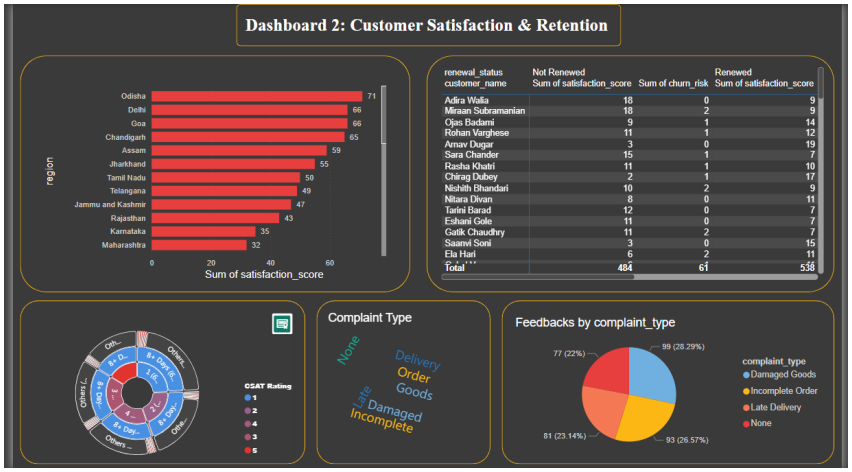

Figure 20: Customer Satisfaction and Retention Dashboard

- **Total Satisfaction Score by Region (Bar Chart):** This bar chart illustrates the overall satisfaction score for different regions, showing which parts of the business are doing well and what areas are in need of improvement. By seeing where satisfaction scores are low, the business can start to pinpoint regions where customer experience enhancements are necessary.
- **At-Risk Customers Table:** The table identifies customers at risk of churn, according to their satisfaction scores and renewal status. This data is critical to front-end customer service initiatives to avoid contract cancellations and increase retention.
- **Customer Satisfaction Sunburst graph:** This Sunburst chart indicates total CSAT score by each product category by the state.
- **Complaint type:** This word cloud indicated type of complaints raised by customers mostly.
- **Complaint Types (Pie Chart):** The pie chart indicates the most frequently raised complaint types (e.g., delay in delivery, damaged items, missing orders). Knowing leading complaint types facilitates areas of customer service and operational improvements.

Dashboard 3: Supply Chain Bottlenecks

The Supply Chain Bottlenecks Dashboard supports the identification of operational inefficiencies that lead to delays and cost. It makes warehouse performance, delivery success, and external influences such as floods transparent on a dashboard.

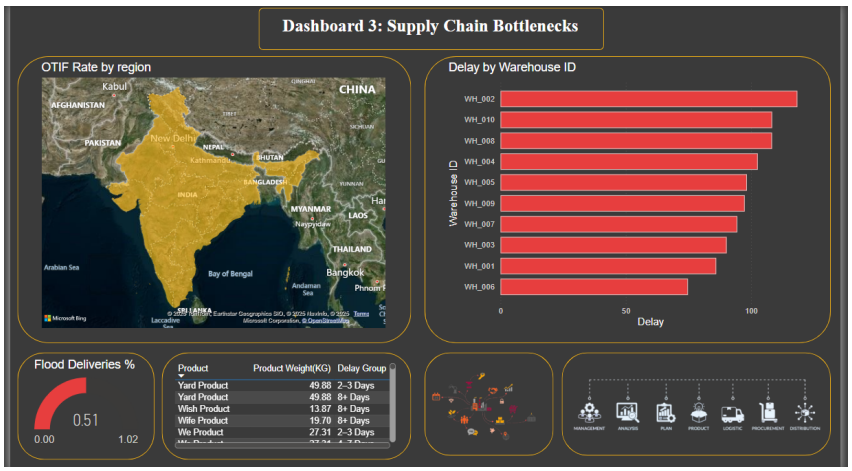

Figure 21: Supply Chain Bottlenecks Dashboard

- **Avg Delay by Warehouse (Bar Chart):** The average delivery delay by warehouse is indicated through this bar chart. By analyzing warehouses with most delays, Yippee can probe operational problems like inventory, people, or equipment shortages that might be leading to longer fulfillment.
- **OTIF Rate by Region (Map):** This map representation of OTIF rate by region provides a spatial sense of delivery performance, which enables Yippee to have a real-time sense of how well it's doing in specific places and where it has high delays.
- **Product Weight by Delay Group:** This Table demonstrate each products by its weight, how much they are delayed by ther filter of warehouse number and state.
- **Flood Deliveries % (KPI Card):** The KPI card reports the percentage of deliveries affected by floods. This is an important measure in quantifying the extent of operation disruption caused by weather and is useful for disaster preparation.

These dashboards collectively address the top-level business objectives of enhancing delivery performance, visibility on customer satisfaction, and pinpointing operational bottlenecks within the supply chain. Decision-makers using these visualizations can make wise, fact-grounded choices geared towards making improvements in efficiency, enhancing customer retention, and aligning operations optimally. Tracking using real-time KPIs, time trend analysis of performance, and regional segmentation makes the monitoring and enhancing of operational and strategic improvements a practical reality [13].

2.4 Initial Response to the Deployed Solution

The solution has successfully bridged the gap between the current inefficient delivery processes and the desired operational standards. Before the implementation of the BI + CRM solution, Yippee struggled with high customer churn due to delayed and incomplete deliveries. The deployment of the Power BI dashboards and integrated CRM system has provided a clear, real-time view of delivery performance, allowing the business to identify and address inefficiencies. The **OTIF (On-Time, In-Full)** rate has improved as the business can now monitor performance across regions and warehouses, enabling proactive intervention.

Key improvements include

- **Real-time monitoring** of OTIF performance across various regions.
- **Identification of bottlenecks** in delivery times and warehouse performance.
- **Customer churn reduction** as early interventions are now possible based on CRM alerts.

Has the Business Process Improved? The implementation of the solution has significantly improved the business process by:

- Increasing operational efficiency through real-time tracking of deliveries, allowing for quicker response times to delays and issues.
- Improving customer satisfaction by ensuring that customer feedback is captured, processed, and acted upon faster through CRM integration.
- Enhancing decision-making capabilities, as managers now have access to up-to-date KPIs and can take corrective actions in a timely manner.

However, the full impact of the solution will be more apparent in the longer term as the business implements automation for service recovery and further refines its processes.

Has the Intended Performance Been Achieved? While the solution has met many of the set goals, such as reducing late and partial deliveries, further improvement is still needed. For instance:

- The **OTIF rate** is improving but has not yet reached the target threshold of over 95% due to ongoing bottlenecks at certain warehouses.
- The **customer retention rate** is on the rise, but continued effort is required to further reduce churn, especially by focusing on high-risk customers flagged by CRM data.

The next phase will focus on fine-tuning warehouse operations, expanding automation in service recovery, and addressing regional disparities in delivery performance.

2.5 Reflection and Future Improvement

What Have I Learned? This project has been a valuable learning experience, providing insights into the complexities of managing and analyzing a real-time supply chain through BI and CRM systems. Key takeaways include:

- **Data Integration:** The integration of diverse data sources from ERP, CRM, and logistics systems into a centralized BI platform was both challenging and rewarding. I learned how to design a data flow that supports real-time performance tracking.
- **DAX Calculations in Power BI:** Implementing advanced DAX calculations to measure OTIF performance and customer churn risk helped deepen my understanding of BI modeling.
- **Proactive Decision Making:** I learned that real-time data not only enables better decision-making but also improves operational agility, allowing businesses to respond faster to issues and mitigate customer churn.

What Was the Most Difficult Part? The most challenging part of the project was integrating multiple data sources and ensuring the accuracy and consistency of data between systems. Ensuring data integrity across the various sources, especially when handling complex relationships between orders, deliveries, and customer feedback, was time-consuming. Additionally, making the system adaptable to changes in external factors (like floods) and creating predictive analytics for those disruptions proved to be a difficult but necessary task.

What Could Have Been Done Differently?

- **Better Data Quality Management:** While mock data was used for testing, there could have been more focus on ensuring the data quality and cleansing processes were more robust before integrating it into Power BI and CRM systems.
- **More Iterative Testing:** Regular testing with actual stakeholders (e.g., the supply chain team) during the dashboard development phase could have provided more actionable feedback and helped tailor the final dashboards to their specific needs.
- **More Comprehensive Feedback Loops:** Including a more comprehensive feedback loop from customers would have provided more detailed insights into what areas of service were lacking, allowing the business to make improvements in a more focused manner.

Future Work and Improvement Plans: To further improve the business and close the existing gaps, the following future improvements are planned:

- **Automated Service Recovery:** Implementing automation to trigger immediate actions when delivery issues are identified (e.g., notifying customer service teams when a delay occurs) will help improve customer satisfaction and retention.
- **Predictive Analytics for Delays:** Implementing predictive analytics to foresee potential delays (based on historical weather patterns, warehouse load, etc.) will help in mitigating operational bottlenecks before they affect deliveries.
- **Expanding CRM Features:** Enhancing the CRM system to capture more detailed customer feedback, including reason codes for dissatisfaction, would provide better insights for targeted improvements.
- **Enhancing OTIF Performance:** Focus on improving the operational efficiency of underperforming warehouses and regions, especially during peak seasons, by introducing automated inventory management and optimized route planning to further increase OTIF rates.

While the solution has made significant progress in closing the gap between Yippee's current state and its goals, continuous improvement and proactive management will be essential for achieving long-term success in enhancing delivery performance and customer retention.

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