

# Optimizing Sales Forecasting for Enhanced Supply Chain Efficiency: A Data-Driven Consulting Case Study

## Executive Summary

This business case presents a real-world scenario into a Quick Service Restaurant (QSR) that specializes in chicken sandwiches. It challenges participants to develop an end-to-end solution for enabling a restaurant called Chicken Coop in making macro-level decisioning and guide their long-term strategy.

The objective is to build a data driven solution that facilitates ongoing business actions and creates tangible value at both the store and national level. The solution will involve developing a by-store, by-day sales forecast model to support financial planning & analysis.

The key to success lies in helping the client convert their available data to actionable insights and backing your implementation with good justifications of the decisions you made.

## Background

Forecasting sales accurately for a quick-service restaurant (QSR) chain is paramount for efficient supply chain management and operational planning. QSRs operate in a dynamic environment influenced by numerous factors such as seasonality, local events, economic conditions, and changing consumer preferences. The ability to predict demand not only ensures that each store has adequate inventory to meet customer needs but also optimizes staffing, reduces waste, and enhances overall profitability.

Manually forecasting sales across multiple stores is inherently challenging due to the complex interplay of variables. Store-specific factors such as location demographics, competitive landscape, and local marketing initiatives can significantly impact sales patterns. Moreover, the rapid pace of transactions and the sheer volume of data generated daily pose hurdles to traditional forecasting methods.

For QSR chains like ours, accurately predicting sales involves analyzing a vast array of data points including historical sales trends, promotional activities among other external data sources that can also be leveraged. However, existing approaches often rely on simplistic models that may overlook nuanced factors contributing to sales variability.

To address these challenges and improve forecasting accuracy, our QSR chain aims to leverage advanced data analytics and machine learning techniques. By harnessing the power of data, we seek to develop predictive models that not only forecast sales with greater precision but also adapt in real-time to changing market conditions. This initiative will not only optimize inventory management and streamline operations across our stores but also enhance customer satisfaction by ensuring product availability.

Additionally, by implementing a standardized forecasting framework powered by data-driven insights, we aim to empower store managers and regional teams with actionable information. This approach not only supports strategic decision-making but also aligns with regulatory requirements and industry best practices.

In summary, our goal is to transform how we forecast sales across our QSR chain by embracing data-driven methodologies. By doing so, we can proactively meet customer demand, optimize resource allocation, and achieve sustainable growth in a competitive market landscape.

## Problem Statement

Participants will receive three datasets of sales, store level details and an external source of promotional data including column descriptions. The challenge is to build a machine learning model that predicts forecasted sales over a 3-month duration and tests its capability by looking at actual vs predicted sales. The scope is defined for only US-based stores that are currently in operation.

The participants also need to provide a framework to evaluate performance of the stores, the confidence in the predictions that are made, model deployment, utilization of the solution, and help with planning future operations for Chicken Coop.

**Note:** You must use the presentation template provided for building your deck.

## Objectives

1. *Develop a 3-month sales forecasting model and assess its effectiveness:* Evaluate performance of the developed model with a metric that is most relevant. Define next steps for maturing the model.
2. *Identify key areas for business improvement:* Identify areas through which business operations can be improved using the 3-month sales forecast.  
*Queue:* How will the client use your solution. Find areas where Chicken Coop can focus its efforts. Drive proactive measures and strategic decision-making
3. *Create an **elaborate plan** for pushing this solution to production:* Data science consultants don't pass model files to the client for them to run the solution.  
*Queue:* What platform/tool could you use, how would an end user interface with the solution? How can it be ensured that the solution stays accurate
4. *Devise an action plan for an 18-month forecast duration:* Leverage your learnings from the 3-month forecast model, and devise a plan for creating a **national** level 18-month forecast (not store-level)  
*Queue:* You do not have to develop a model but suggest ways to provide an 18-month forecast. What and how external/internal data sources can be leveraged? How would you change your feature engineering strategy?
5. **<Optional>** If there are two stores in proximity and one store starts eating the sales share of the other store, how does Chicken Coop decide where they should open a new store? Create an action plan to counter this problem

## Deliverables

- *A comprehensive report:* Detailing the approach, methodology, feature selection and findings (Use the attached slide-deck template for the final presentation)
- *Code scripts and documentation:* Showcasing the model development and evaluation process. Use good coding practices i.e. commenting, modularized code
- *Visualizations and interpretations:* of the data understanding and exploration process
- *Actionable Recommendations:* Provide clear and actionable recommendations supported by data analysis and rationale. This could include the use of data visualization techniques to communicate findings effectively.

## **Evaluation Criteria**

The submissions will be evaluated based on:

- Accuracy and effectiveness of the forecasting model. You should be able to explain why a particular model was chosen and why a particular validation metric was chosen.
- Demonstrated understanding of the feature selection process i.e. Temporal, geographical, store specific features that you create
- Creativity and feasibility of recommendations to make the forecasted data actionable
- Clarity, depth, and quality of the report, including visualizations and interpretations. Note that we are not looking for a paragraph description as solutions for objectives (2), (3) and (4) but rather an extensive plan backed by good research and reasoning. Something that can be implemented in real-world problem statements.
- Note that story and aesthetics matter for a good presentation

## **Conclusion**

This business case challenges participants to apply their data analysis and machine learning expertise as well as putting their consulting skills to the test. It emphasizes the role of a data science consultant who goes beyond the provided dataset, conducting industry research and leveraging all available resources to develop an enhanced solution.

## **Dataset**

Teams can download the problem dataset from the below mentioned link

[https://drive.google.com/drive/folders/12LGcMXzKmPWou7B7uuHNijUsUxrvH4wz?usp=drive\\_link](https://drive.google.com/drive/folders/12LGcMXzKmPWou7B7uuHNijUsUxrvH4wz?usp=drive_link)

In case you face any difficulty downloading dataset from the mentioned link, please drop an email to [pgdba.conclave@iimcal.ac.in](mailto:pgdba.conclave@iimcal.ac.in)