

# Smart business challenge

March 13, 2025

## Context

In today's fast-paced business world, owners and managers rely heavily on data-driven insights to make strategic decisions. From analyzing sales trends and managing inventory efficiently, to predicting profitability and optimizing marketing spend, actionable information is crucial.

Imagine you are part of a tech startup that aims to empower small-to-medium business owners with clear, insightful, and highly interactive dashboards. Your product's primary objective is to enable business owners to swiftly grasp the performance of their products, customer engagement, revenue streams, inventory management, and future business opportunities.

Your team is tasked with building a sophisticated and visually appealing interactive Shiny dashboard. The dashboard should allow users to explore data intuitively and provide actionable insights such as profitability forecasts, sales performance, inventory predictions, customer segmentation, and strategic recommendations based on real-time user input.

Your challenge as a team of 4 data analysts is to build this advanced business insights dashboard within a timeframe of **3 weeks**.

## Your Task

### Technical Requirements:

- Develop a highly interactive and responsive Shiny application.
- Generate a sample dataset you'll use to test your application.
- Include dynamic data visualization features (charts, graphs, tables) for clear insights.
- Implement user-driven exploration: filtering and drill-down analysis on sales, products, and customers, etc.
- Implement probability density feature which state if the business owner will reach specific gross profit and sales number targets within user-defined periods. The user can reach if *probability* > 75%
- Allow users to dynamically segment customers and products based on performance indicators.
- Provide inventory management insights including stock-level alert and optimal reorder suggestions.
- Enable users to assess the impact of hypothetical changes (e.g., price adjustments, marketing spend variations) on future profits.
- Allow simulation of the impact of pricing changes, marketing expenditures, and promotional campaigns on future profitability.
- Integrate customer satisfaction and product rating analysis to highlight strengths and weaknesses.

## Database Variables

Each business owner using your solution will have in his database the following 25 variables:

1. ProductID
2. ProductName
3. Category
4. Subcategory
5. SalesQuantity
6. UnitPrice
7. CostPrice
8. GrossProfit
9. Revenue
10. InventoryLevel
11. ReorderLevel
12. SupplierID
13. SupplierLeadTime
14. CustomerID
15. CustomerAge
16. CustomerLocation
17. PurchaseDate
18. OrderStatus
19. MarketingSpend
20. MarketingChannel
21. DiscountRate
22. ReturnRate
23. SalesRepID
24. PaymentMethod
25. CustomerRating

## Documentation and Resources

To build this dashboard, the following resources are available:

- **Shiny Documentation:** (Shiny Documentation)
- **Visualization Libraries:** ggplot2 (ggplot2 Documentation), plotly (Plotly for R Documentation)
- **Data Manipulation Libraries:** dplyr (dplyr Documentation), tidyr (tidyr Documentation)
- **Predictive Modelling Libraries:** caret (caret Documentation), forecast (forecast Documentation)
- **Deployment Options:** Shinyapps.io (Shinyapps.io Documentation), RStudio Connect (RStudio Connect Documentation)

## Project Rules

- **Collaboration:** All team members must collaborate using GitHub with consistent commits at every stage.
- **Mentors Access:** Mentors must be added as collaborators to the GitHub repository.

## Milestones and Deadlines

Respect the following structured milestones:

1. **Milestone 1 (End of Week 1):** Dashboard UI mockup completed and initial data preparation finalized.
2. **Milestone 2 (Mid of Week 2):** Interactive data visualization components fully operational.
3. **Milestone 3 (End of Week 2):** Predictive analytics module and probability forecasting feature implemented.
4. **Milestone 4 (Mid of Week 3):** Final integration, user interactivity features, and hypothetical scenario assessments complete.
5. **Milestone 5 (End of Week 3):** Rigorous testing, debugging, final deployment, and project demonstration.

## Tips and Advice

- Clearly assign team roles (Data Analyst, Frontend Developer, Predictive Analyst, Project Manager).
- Begin early with thorough exploratory data analysis to understand business insights deeply.
- Prioritize the predictive module, as it's technically challenging and highly valuable to the users.
- Test dashboard interactivity frequently to ensure optimal user experience.
- Maintain organized, commented, and reproducible code.
- Engage in regular communication within your team and with mentors.

Good luck, and enjoy creating your powerful business insights dashboard!