The University of Fiji

(An Entity of Arya Pratinidhi Sabha of Fiji)

School Of Computer Science and Mathematics

ITC 355 - BUSINESS INTELLIGENCE

Assignment:

LABBAYK RENTALS Company Analysis

Professor : Pankajeshwara Sharma

Student ID: 20230435

Name: HAFSA SIDDIQA

INTRODUCTION

This report presents a comprehensive analysis of a car rental company's dataset using **descriptive, predictive, and prescriptive analytics**. The aim is to support data-driven decision-making that enhances operational efficiency, minimizes risk, and drives revenue growth. By uncovering patterns in historical data, forecasting future trends, and recommending strategic actions, the company can make informed choices to ensure sustainable development.

The report is structured into three key sections:

- **Descriptive Analysis** – Provides a summary of past rental data to understand customer behavior and vehicle usage trends.
- **Predictive Analysis** – Uses machine learning techniques to forecast future rental demand and revenue patterns.
- **Prescriptive Analysis** – Offers actionable recommendations based on data insights to optimize operations and support business expansion.

About the Company

Labbayk Rentals is a small car rental business based in **Nadi, Fiji**. The company primarily serves **local Fijian customers** and currently operates in a **fully offline mode**, with bookings handled via phone calls. While its main customer base is local, Labbayk Rentals also occasionally attracts **international clients** through referrals from hotels and associated rental services.

Despite its modest scale, the company holds strong growth potential. Its **strategic location in Nadi**, offering **free pick-up and drop-off services** from the airport, hotels, and anywhere within Nadi, adds to its competitive advantage. Another unique feature is its **refundable bond system**, where customers pay a security deposit (ranging from **$200–$400**, depending on the vehicle), fully refundable upon safe vehicle return. This system encourages responsible use and customer trust.

The dataset used for this analysis includes **50 rental records** from **late 2022 to early 2023**, encompassing vehicle details, customer profiles, rental durations, pricing, and countries of origin, accident records, and booking modes.

Descriptive Analysis

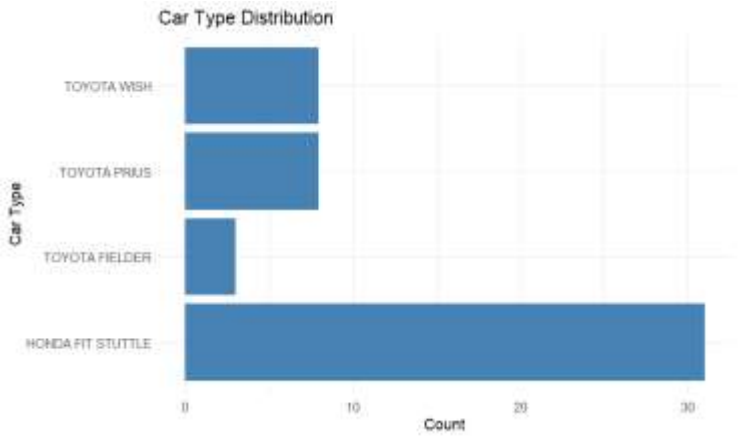
Purpose:
This section analyzes past rental data to uncover patterns and trends related to customer preferences, vehicle performance, and seasonal behavior. It aims to provide a solid foundation for understanding how the business has been performing so far. By summarizing key metrics like rental price distribution, car type popularity, rental durations, and accident occurrences, Labbayk Rentals can make sense of its historical performance and identify areas of strength or concern. These insights serve as a baseline for future forecasting and strategic planning.

Expected Outcomes:

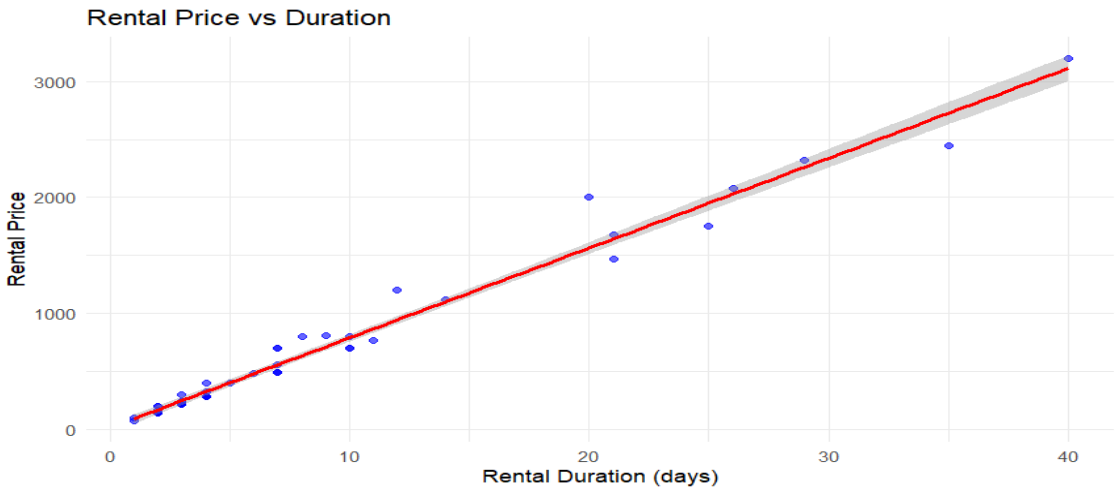
- Identify the most rented car types (e.g., Honda Fit Shuttle).
- Understand distribution of rental prices.
- Analyze rental duration trends and their relationship with price.
- Determine which countries most customers are from.
- Highlight peak rental months.
- Assess accident rates and which vehicles or customer groups are most involved.

This histogram displays the distribution of rental prices in the dataset. The majority of rentals fall within the lower price range (below $500), as indicated by the high frequency in the first bin. As the rental price increases, the frequency decreases significantly, showing a right-skewed distribution. This suggests that most customers opt for lower-cost rentals, while higher-priced rentals are less common.

Distribution of car types rented

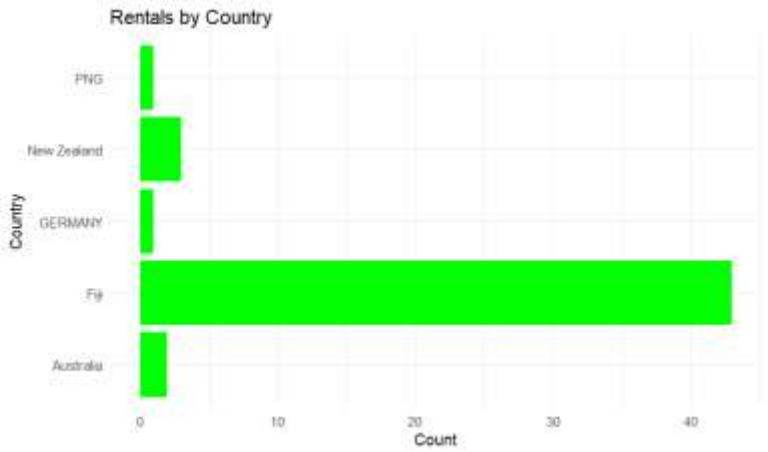


This bar chart illustrates the distribution of different car types rented. The **Honda Fit Shuttle** is the most rented vehicle, with around 30 rentals, significantly higher than the other models. **Toyota Wish** and **Toyota Prius** have moderate rental counts, while **Toyota Fielder** is the least rented. This suggests that customers prefer the Honda Fit Shuttle, possibly due to its affordability, fuel efficiency, or suitability for their needs.



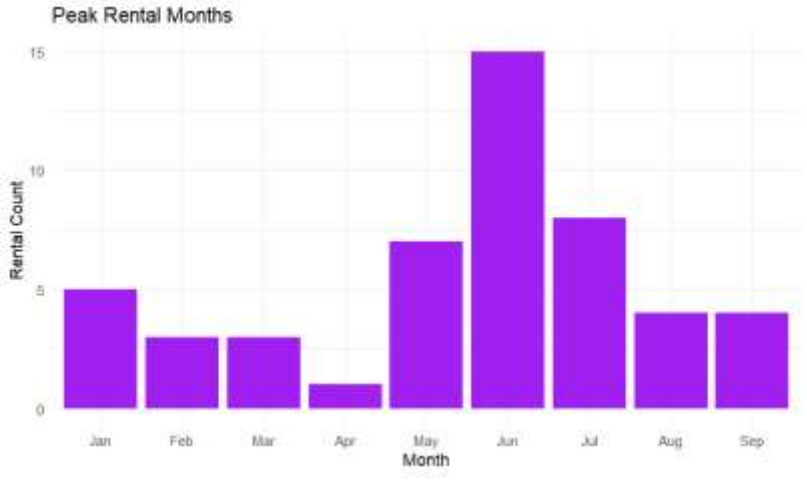
This scatter plot visualizes the relationship between rental price and rental duration (in days). The **blue dots** represent individual data points, showing the rental price for different durations. The **red line** is the fitted regression line, indicating a strong positive linear correlation between rental duration and rental price. The **gray shading** around the line represents the confidence interval. The trend suggests that longer rental durations consistently result in higher rental prices.

Rental frequency per country



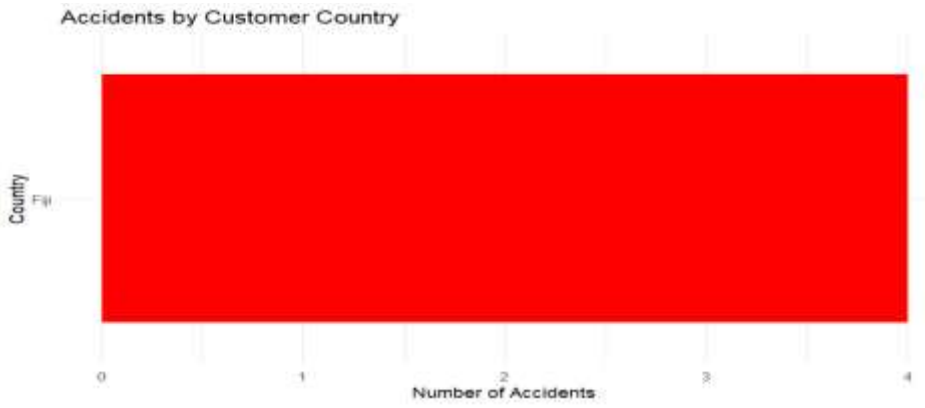
The "Rentals by Country" bar graph represents the number of rentals based on customers' nationalities. Fiji has the highest number of customers, exceeding 40, indicating that most renters are locals. New Zealand follows in second place, with rentals between 0 and 10, while Australia is slightly lower. Papua New Guinea (PNG) and Germany have the fewest rentals, suggesting that only a small number of customers come from these countries. This distribution highlights that the majority of the rental company's customers are Fijian residents, with a smaller international customer base.

Peak rental periods

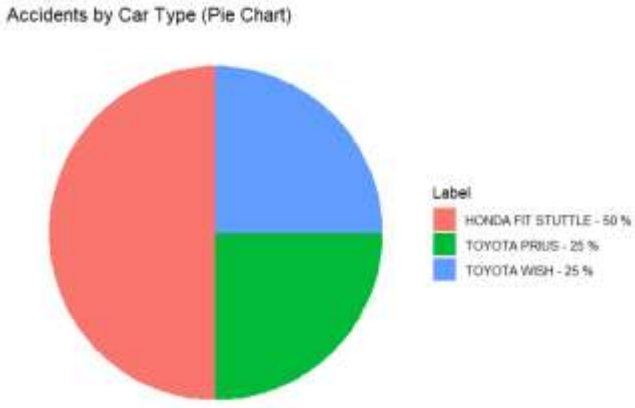


The "Peak Rental Months" bar graph displays the number of rentals across each month of the year. **June** has the highest rental activity, reaching up to 15 rentals, indicating it as the peak season. **July** follows as the second-highest, with rentals between 5 and 10. **May** ranks third, also falling in the mid-range. **January** shows moderate activity at around 5 rentals. **February**,

March, **August**, and **September** all have lower rental counts (under 5), while **April** has the least, suggesting it is the slowest month for rentals. This trend highlights that customer demand is strongest during mid-year, especially in June and July.



The **"Accidents by Customer Country"** chart shows that **all recorded accidents (4 in total)** were caused by customers from **Fiji**. Customers from **other countries (e.g., New Zealand, Australia, PNG, Germany)** had **no reported accidents** in the dataset. This suggests that, based on the available data, **local Fijian customers are more prone to accidents** compared to international customers. However, this could also reflect the fact that most rentals were by Fijian customers, so they naturally had more exposure and chances of incidents.



The pie graph illustrates the distribution of 4 accidents across three different car models. It reveals that the Honda Fit Shuttle was involved in the majority of the accidents, with 2 accidents accounting for 50% of the total. The remaining accidents were equally split between two other models: the Toyota Wish and the Toyota Prius, each of which was involved in 1 accident, making up 25% of the total accidents. This visual representation allows for an easy comparison of the frequency of accidents based on the car models, showing that the Honda Fit

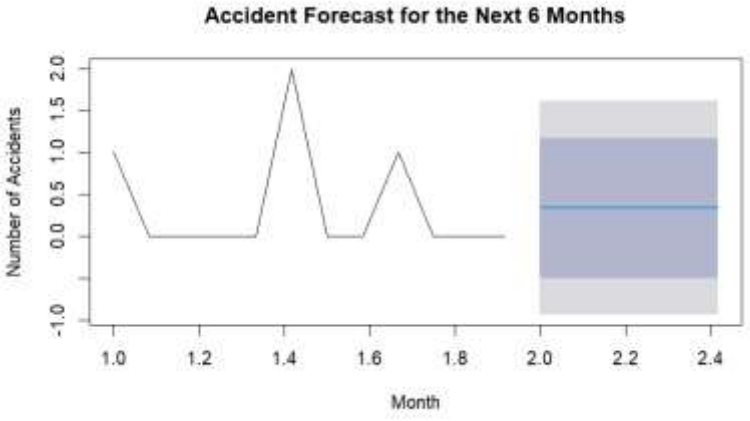
Shuttle had the highest involvement, while the Toyota Wish and Prius had an equal share of accidents.

Predictive Analysis

Purpose:
This section uses forecasting models and machine learning techniques to anticipate future outcomes based on historical data. It enables the company to estimate future customer demand, revenue, and accident risk. By training models on existing rental data, Labbayk Rentals can proactively plan for upcoming peak seasons, set pricing expectations, and prepare safety measures. This predictive insight ensures that business decisions are not reactive, but informed and forward-thinking.

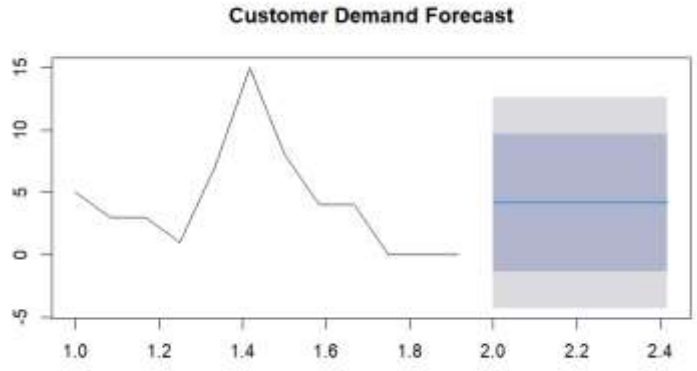
Expected Outcomes:

- Predict future rental prices based on car type, duration, and price per day.
- Estimate future demand by month using ARIMA forecast.
- Forecast upcoming revenue trends.
- Predict accident occurrences using decision tree modeling.
- Calculate model accuracy (e.g., RMSE for price prediction, confusion matrix for accident prediction).



As seen above the graph shows the **forecast for the number of accidents** over the next six months. The line on the left represents the **historical accident data**, indicating fluctuations with a notable peak around month 1.4. The shaded area on the right represents the **forecasted range** for accident occurrences, with the blue line showing the **average predicted number of**

accidents. The shaded area indicates the uncertainty around the prediction, suggesting that the actual number of accidents could fall within this range.



This graph displays the **customer demand forecast** for the next six months. The left side shows the **historical demand**, exhibiting significant volatility with a sharp peak around month 1.4. The shaded area on the right represents the **predicted range** for future customer demand, with the blue line indicating the **average forecasted demand**. The shaded area highlights the uncertainty in the forecast, suggesting that actual demand could vary within this range.

This graph illustrates the **revenue forecast** for the next six periods. The jagged line on the left represents the **historical revenue**, showing significant fluctuations and volatility over time. The shaded area on the right indicates the **predicted range** for future revenue, with the blue line marking the **average forecasted revenue**. This shaded area highlights the uncertainty in the forecast, suggesting that actual revenue could fluctuate within this range.

Prescriptive Analysis

Purpose:
This section translates insights from descriptive and predictive analytics into practical, data-driven strategies. It recommends actions that Labbayk Rentals can implement to enhance profitability, reduce risk, and support business growth. These include optimizing fleet allocation, adjusting pricing dynamically, targeting low-risk international customers, implementing accident mitigation policies, and justifying expansion through ROI analysis. The goal is to guide the company toward smarter decision-making and strategic transformation—especially as it prepares to go digital and expand its market reach.

Expected Outcomes:

- Identify the best-performing car types to optimize fleet allocation.
- Recommend dynamic pricing adjustments for peak seasons (e.g., June–July).
- Suggest discount strategies for longer rentals to increase average revenue.
- Recommend safety measures for high-risk renter groups (e.g., higher bond for local customers).
- Justify a dual-fleet system (segregating local and international customers).
- Support ROI calculation and payback period to validate the investment in online expansion.

---

1. Optimize Fleet Management

Prioritize Honda Fit Shuttle Availability
Maintain higher inventory of Honda Fit Shuttle during peak months (June–July), as it is the most rented model.
Rationale: Aligns with high customer preference and demand.

Reference: (see image 2) - Car Type Distribution

---

2. Enhance Revenue Streams

- **Introduce Long-Term Rental Discounts:**
  Offer a 10–15% discount for rentals longer than 7 days to boost average booking duration.

- **Dynamic Pricing:**
  Increase rates by 10–20% in June–July when demand peaks.
  Rationale: Drives higher revenue per rental during high-demand periods.
- **Reference:** See image 3 (rental price vs duration)

---

3. Target International Customers

- **Partner with Tourism Agencies:**
  Collaborate with hotels and travel agents to promote rentals among tourists from Australia, New Zealand, etc.
- **Launch Online Multilingual Booking System:**
  Enable international bookings via a user-friendly website with language options (e.g., English, German).
  Rationale: Appeals to tech-savvy travelers and improves accessibility.
- **Reference: see image 4 (rentals by country)**

---

4. Mitigate Accident Risks

- **Stricter Policies for High-Risk Groups:**
  Request a refundable $500 bond from Fijian customers renting Honda Fit Shuttles.
- **Mandatory Pre-Rental Briefings:**
  Introduce safety orientation sessions to reduce local accident rates.
  Rationale: Reduces liability and encourages safer driving behavior.
- **Reference:** see image 6 and 7

---

5. Boost Off-Peak Season Demand

"April Getaways" Promotion
Offer 20% discounts or free vehicle upgrades in April to boost low-season rentals.
Rationale: Fills demand gap and maintains steady revenue flow.

Reference: see image 5 (peak rental months)

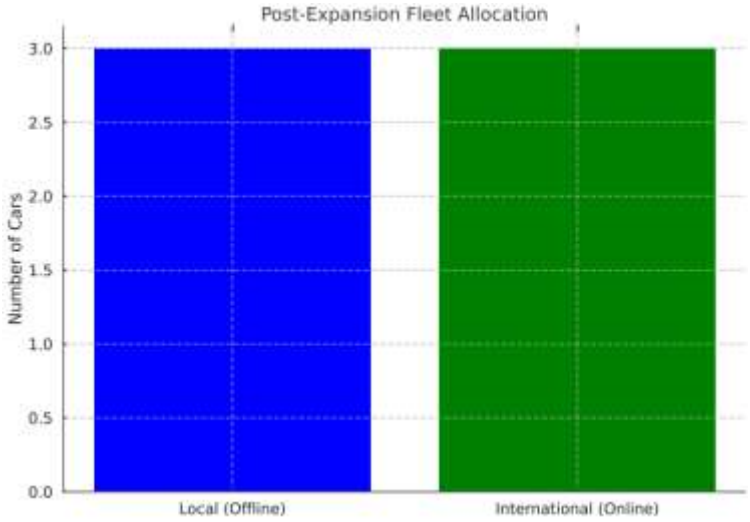
Strategy: Dual Fleet System + Online Booking

Fleet Allocation Roadmap

6. Implementation Plan

Fleet Allocation Strategy for Online Expansion

To minimize operational disruption while transitioning to an online booking system, Labbayk Rentals can implement a **dual fleet strategy**. This involves maintaining the current 3-vehicle fleet exclusively for **local Fijian customers**, continuing with the traditional **offline booking method**. Simultaneously, the company will **purchase 3 additional vehicles**, which will be dedicated solely to **international customers** booking through the **new online platform**. This separation ensures that the business retains its existing customer base without compromising service availability, while also tapping into a new, potentially more profitable segment—international tourists, who statistically pose lower accident risks. The dual system not only supports controlled growth but also reduces dependency on one customer group, offering both **revenue diversification** and **risk mitigation**. Over time, as international bookings increase, this setup allows for flexible reallocation of vehicles based on real-time demand trends**. This phased implementation balances growth with continuity, ensuring smoother adoption of the digital system while maintaining customer satisfaction.**



Post-expansion fleet allocation. The existing 3 cars will serve local customers via offline bookings, while 3 new cars will target international travelers through the online platform.

Phase 1 (Month 1–3):

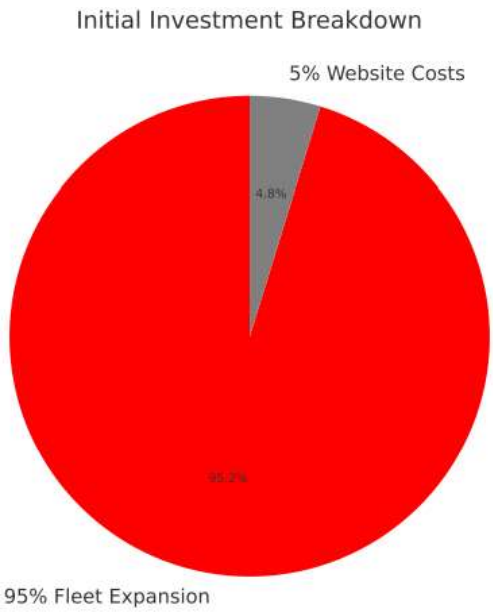
- Purchase 3 new vehicles
- Develop and test the multilingual website

Phase 2 (Month 4–6):

- Partner with hotels and tourism agencies
- Launch digital marketing campaigns

Phase 3 (Month 7–12):

- Monitor vehicle usage, bookings, and customer feedback
- Adjust pricing and availability accordingly



7. Initial Investment Breakdown

- *Initial investment breakdown. Majority of the budget is allocated to expanding the fleet, ensuring scalability.*

Visual: Pie Chart

- 3 New Cars: $60,000 (95%)
- Website Development: $3,000 (5%)

ROI Calculation:

- **Initial Investment**: $63,000
    - 3 New Cars: $60,000
- **Website Development**: $3,000
- **Annual Net Profit**: $20,000
- **Payback Period**: 3.15 years

ROI Analysis:

The ROI for Labbayk Rentals' online expansion project is approximately 31.75%, with a payback period of 3.15 years. This indicates that the project will recover its initial investment within just over three years, generating consistent annual profits of $20,000 thereafter. With a relatively high ROI and a reasonable payback period, this investment can be considered a sound decision for the company. The dual-fleet system also helps to mitigate risk by ensuring a steady flow of local and international bookings, making this project both a financially viable and strategically valuable initiative for Labbayk Rentals.

---

8. Digital Marketing & Online Presence Strategy

To complement the dual-fleet expansion and attract international customers, Labbayk Rentals must establish a foundational online presence. Below are actionable, low-cost strategies aligned with the company's goals:

1. Social Media Activation
Platforms: Launch profiles on Facebook and Instagram (ideal for visual storytelling).

Content Plan:

- Vehicle Spotlights: Post photos/videos of the Honda Fit Shuttle (most rented car) with captions like:
  "Explore Fiji's hidden gems with our fuel-efficient Honda Fit Shuttle! □ Free Nadi pickup and Drop-off included."

- Customer Testimonials: Share reviews from local Fijians to build trust (e.g., "Labbayk made my family trip hassle-free!").

- Safety Features: Highlight the refundable bond system and pre-rental safety checks.

- Hashtag Campaign: Encourage tourists to share photos with Labbayk cars using #ExploreFijiWithLabbayk

Rationale: Aligns with the preference for Honda Fit Shuttle (see Figure 2) and targets tech-savvy tourists.

2. Google My Business (GMB) Optimization
Actions:

- Create a GMB profile with accurate contact details, operating hours, and photos of vehicles.
- Encourage local customers to leave reviews (e.g., "Share your experience and get a 5% discount on your next rental!").
- SEO Keywords: Use terms like "affordable car rental Nadi Airport" or "best Fiji car hire" in the website and GMB description.
- Having an online booking system in the website.

Rationale: Improves visibility for tourists searching for rentals near Nadi Airport/hotels (reference: Figure 4).

3. Partnership-Driven Promotions

- Hotel Collaborations: Offer exclusive discounts (e.g., "10% off for guests of [Partner Hotel]").

- Travel Agencies: Partner with agencies catering to Australian/New Zealand tourists for referral commissions.

Rationale: Leverages existing hotel connections and targets low-risk international customers (see Figure 6).

4. Analytics & Adaptation

- Free Tools: Use Facebook Insights and Google Analytics to track engagement and website traffic.

- Adjustments: Shift focus to high-performing platforms (e.g., if Instagram drives 60% of inquiries, prioritize it).

Integration with Existing Strategies

- Dual-Fleet System: Promote online bookings for international customers via social media ads ("Book online for seamless pickup at Nadi Airport!").

- Risk Mitigation: Highlight the accident-free record of international renters (see Figure 6) in marketing materials to reassure tourists.

Cost Breakdown

Strategy	Cost
Social Media Management	$0
GMB Optimization	$0
Total	$0

Note: All strategies can be executed in-house using free tools.

By implementing these digital marketing strategies, Labbayk Rentals can attract international tourists, retain local customers, and amplify the ROI of its dual-fleet expansion. This approach aligns with the company's goal of sustainable growth while maintaining operational simplicity.

CONCLUSION

Labbayk Rentals stands at a pivotal juncture where data-driven strategies can transform its operations, revenue streams, and market reach. By leveraging insights from descriptive, predictive, and prescriptive analytics, the company can achieve sustainable growth while mitigating risks inherent to its current model.

The dual-fleet system—separating vehicles for local and international customers—ensures operational continuity while tapping into high-value, low-risk international tourists. This strategy is financially justified by a 3.15-year payback period and a 31.75% ROI, supported by scalable investments in fleet expansion and a cost-effective online booking platform.

Complementing this, the digital marketing plan bridges the gap between Labbayk's offline legacy and modern consumer expectations. By activating social media profiles, optimizing Google My Business, and forging partnerships with hotels and travel agencies, the company can attract tech-savvy tourists while retaining loyal local customers. Campaigns like *#ExploreFijiWithLabbayk* and seasonal promotions (e.g., "April Getaways") address demand fluctuations, ensuring steady revenue year-round.

Critical risk-mitigation measures—such as stricter bond policies for high-risk groups and mandatory safety briefings—directly respond to the higher accident rates among local Fijian customers, reducing liability and enhancing service reliability.

In summary, Labbayk Rentals' path to success lies in:

- Balancing growth and continuity through phased fleet expansion and online transition.
- Harnessing digital tools to amplify visibility and customer engagement.
- Data-informed decision-making to optimize pricing, inventory, and safety protocols.

By executing these strategies, the company will not only solidify its position in Fiji's competitive rental market but also emerge as a trusted choice for international travelers, driving long-term profitability and resilience.

R CODE

```
# Load necessary libraries
library(tidyverse)
library(lubridate)
library(caret)
library(randomForest)
library(forecast)
library(nnet)

# Load the dataset
data <- read.csv("Car Rental.csv", stringsAsFactors = FALSE)

# Inspect the structure of the dataset
str(data)
summary(data)

# Convert date columns to Date type
data$Rental.Start <- dmy(data$Rental.Start)
data$Rental.End <- dmy(data$Rental.End)

# Clean numeric columns by removing '$' and converting to numeric
data$Price.Per.day <- as.numeric(gsub("\$", "", data$Price.Per.day))
data$Rental.Price <- as.numeric(gsub("\$", "", gsub(",", "", data$Rental.Price)))
```

```
# Check for missing values
colSums(is.na(data))

# Univariate Analysis
hist(data$Rental.Price, main="Distribution of Rental Prices",
xlab="Rental Price", col="skyblue", breaks=10)

ggplot(data, aes(x = factor(Car.type))) +
  geom_bar(fill = "steelblue") +
  theme_minimal() +
  labs(title = "Car Type Distribution", x = "Car Type", y = "Count")
+
  coord_flip()

# Bivariate Analysis
data$Rental.Duration <- as.numeric(difftime(data$Rental.End,
data$Rental.Start, units="days"))
ggplot(data, aes(x = Rental.Duration, y = Rental.Price)) +
  geom_point(color="blue", alpha=0.6) +
  geom_smooth(method="lm", color="red") +
  theme_minimal() +
  labs(title = "Rental Price vs Duration", x = "Rental Duration
(days)", y = "Rental Price")

cor(data[, c("Price.Per.day", "Rental.Price", "Rental.Duration")],
use="complete.obs")

ggplot(data, aes(x = factor(Customer.Country))) +
  geom_bar(fill = "green") +
```

```
  theme_minimal() +
  labs(title = "Rentals by Country", x = "Country", y = "Count") +
  coord_flip()

accident_rate <- sum(data$Accident == 1) / nrow(data) * 100
print(paste("Accident Rate:", round(accident_rate, 2), "%"))

data$Rental.Month <- month(data$Rental.Start, label = TRUE)
ggplot(data, aes(x = Rental.Month)) +
  geom_bar(fill = "purple") +
  theme_minimal() +
  labs(title = "Peak Rental Months", x = "Month", y = "Rental
Count")

total_revenue <- sum(data$Rental.Price, na.rm = TRUE)
print(paste("Total Revenue:", total_revenue))

# Predictive Analysis
set.seed(123)
trainIndex <- createDataPartition(data$Rental.Price, p = 0.8, list
= FALSE)
trainData <- data[trainIndex, ]
testData <- data[-trainIndex, ]

model <- randomForest(Rental.Price ~ Rental.Duration +
Price.Per.day + Car.type, data = trainData, ntree = 100)
testData$Predicted.Price <- predict(model, testData)
rmse <- sqrt(mean((testData$Rental.Price -
testData$Predicted.Price)^2, na.rm = TRUE))
```

```
print(paste("RMSE for Rental Price Prediction:", round(rmse, 2)))

accident_model <- train(as.factor(Accident) ~ Rental.Duration + Car.type + Price.Per.day, data = trainData, method = "rpart")
pred_accident <- predict(accident_model, testData)
conf_matrix <- confusionMatrix(pred_accident, as.factor(testData$Accident))
print(conf_matrix)

time_series <- ts(table(data$Rental.Month), frequency = 12)
forecast_model <- auto.arima(time_series)
demand_forecast <- forecast(forecast_model, h=6)
plot(demand_forecast, main="Customer Demand Forecast")

rev_ts <- ts(data$Rental.Price, frequency = 12)
rev_model <- auto.arima(rev_ts)
rev_forecast <- forecast(rev_model, h=6)
plot(rev_forecast, main="Revenue Forecast")

# Prescriptive Analytics - Strategic Recommendations

cat("1. Popular Car Types (For Fleet Optimization):\n")
car_performance <- data %>%
  group_by(Car.type) %>%
  summarise(
    Total.Rentals = n(),
    Avg.Revenue = mean(Rental.Price, na.rm = TRUE),
    Accident.Count = sum(Accident, na.rm = TRUE)
```

```
  ) %>%
  arrange(desc(Total.Rentals))
print(car_performance)
print("Recommendation: Prioritize top rented cars like Honda Fit Shuttle for peak months.")

cat("\n2. Peak Demand Months (For Dynamic Pricing Strategy):\n")
monthly_rentals <- data %>%
  group_by(Rental.Month) %>%
  summarise(Count = n()) %>%
  arrange(desc(Count))
print(monthly_rentals)
print("Recommendation: Apply 10–20% price increase during June and July.")

cat("\n3. Long-Term Rental Discount Justification:\n")
long_term_model <- lm(Rental.Price ~ Rental.Duration, data = data)
summary(long_term_model)
print("Recommendation: Offer 10–15% discount for rentals longer than 7 days.")

cat("\n4. Risk Analysis by Customer Group and Car Type:\n")
accident_by_country <- data %>%
  filter(Accident == 1) %>%
  count(Customer.Country)
print(accident_by_country)
```

```
accident_by_car <- data %>%
  filter(Accident == 1) %>%
  count(Car.type)
print(accident_by_car)
print("Recommendation: Higher bond and mandatory briefings for high-risk groups (e.g., local renters using Honda Fit Shuttle).")

# ROI & Payback Period Calculation
initial_investment <- 60000 + 3000
annual_net_profit <- 20000
payback_period <- initial_investment / annual_net_profit
roi <- (annual_net_profit / initial_investment) * 100

cat("\nROI Calculation:\n")
cat("Initial Investment: $", initial_investment, "\n")
cat("Annual Net Profit: $", annual_net_profit, "\n")
cat("Payback Period: ", round(payback_period, 2), "years\n")
cat("ROI: ", round(roi, 2), "%\n")
```