

# PROJECT REPORT

**PROJECT TITLE:** Competitive Discount Strategy Analysis for E-Commerce Platforms Using Game Theory

## 1. ABSTRACT

Festive sales in India such as Flipkart's Big Billion Days and Amazon's Great Indian Festival create intense competition between major e-commerce platforms. These companies strategically decide discount levels and advertising investments to maximize profit and market share.

This project applies Game Theory and Decision Analysis to model competitive discount decisions between Amazon and Flipkart. A payoff matrix is constructed based on assumed realistic profit outcomes. The optimal strategies are analyzed using dominant strategy and Nash equilibrium concepts.

Additionally, a Decision Tree analysis is performed under uncertain demand conditions, and sensitivity analysis is used to study the impact of changing advertisement costs. The results highlight that both firms tend to enter a discount war, reducing profits for both despite the existence of mutually beneficial alternatives.

## 2. INTRODUCTION

E-commerce platforms such as Amazon and Flipkart dominate the Indian online retail market. During festive seasons, they compete aggressively using discounts, free delivery, cashback offers, and heavy advertisement campaigns. These actions directly affect customer demand and profit margins.

A company's profit does not depend only on its own decision, but also on the competitor's pricing and discount strategy. Hence, this scenario is well suited for modeling using Game Theory, which studies strategic decision-making between rational competitors.

This project studies competitive behavior between Amazon and Flipkart and determines optimal strategies using Game Theory and Decision Analysis.

## 3. PROBLEM STATEMENT

Amazon and Flipkart must decide their discount and advertisement strategy during festive sale season. The outcome (profit) of each company depends on both its own decision and the decision of its competitor. The objective is to determine which strategy gives the best expected profit and whether a stable equilibrium exists.

#### **4. OBJECTIVES**

The main objectives of this project are:

1. To model the festive sale competition between Amazon and Flipkart as a strategic game.
2. To define strategies and build a payoff matrix based on estimated profits.
3. To identify dominant strategies and Nash equilibrium.
4. To analyze whether cooperation or aggressive competition benefits both firms.
5. To apply Decision Tree analysis under uncertain customer demand.
6. To perform sensitivity analysis by varying advertisement costs.
7. To provide a final recommendation based on analytical results.

#### **5. PLAYERS IN THE GAME**

The game consists of two players:

- **Player 1:** Amazon
- **Player 2:** Flipkart

Both players are assumed to be rational and profit-maximizing.

#### **6. STRATEGIES**

Each company can choose one of the following strategies:

Strategy Code	Strategy Name	Description
HD	Heavy Discount + High Advertisement	Maximum discounts and high marketing budget
MD	Medium Discount + Moderate Advertisement	Balanced discount and controlled marketing
LD	Low Discount + Normal Advertisement	Minimum discount with normal marketing

#### **7. PAYOFF MATRIX CONSTRUCTION**

The payoff matrix is used to represent the outcomes (profits) of both e-commerce platforms under different combinations of strategies. Since Amazon and Flipkart operate

in a competitive environment, the profit of one platform is not only dependent on its own discount decision but also strongly influenced by the competitor's chosen strategy.

The payoffs were designed based on the following real-world assumptions:

- Heavy discounting increases the number of orders and attracts more customers but significantly reduces profit margin.
- High advertisement increases customer reach and visibility but increases marketing expenditure.
- Medium discounting provides a balanced approach between customer attraction and profit sustainability.
- Low discounting maintains a higher margin per product but risks losing customers to the competitor during festive sale periods.

Using these assumptions, the payoff matrix was prepared to reflect competitive outcomes. The values in the matrix represent relative profit performance of both firms under each strategy combination.

## 8. GAME THEORY ANALYSIS

Game Theory provides a structured method to analyze competitive decision-making. In this project, Amazon and Flipkart are treated as rational decision-makers aiming to maximize their profit. The interaction is modeled as a simultaneous-move strategic game.

To identify the optimal strategies, the analysis focuses on:

- Best response strategies
- Dominant strategies
- Nash equilibrium solution

### 8.1 Best Response Strategy

A best response strategy refers to the most profitable decision for a player, assuming the competitor has already chosen a strategy. In other words, it answers the question:

"If the competitor chooses a specific strategy, what is my best strategy to maximize profit?"

For this project, the best response of Amazon is identified against each possible strategy of Flipkart. Similarly, the best response of Flipkart is identified against each possible strategy of Amazon.

This analysis helps determine whether any strategy consistently provides the best outcome regardless of competitor action.

## 8.2 Dominant Strategy

A dominant strategy is a strategy that provides the highest payoff for a player, irrespective of what the competitor chooses.

In competitive festive sales, firms often prefer aggressive discount strategies because:

- Customers are highly price-sensitive during festive seasons.
- Discounts influence consumer choice more than brand loyalty.
- High discounts combined with advertising provide strong competitive advantage.

The dominant strategy analysis in this project indicates that both Amazon and Flipkart tend to prefer aggressive festive sale strategies due to the risk of losing market share if they choose a weaker strategy.

## 9. NASH EQUILIBRIUM

Nash equilibrium is a solution concept in Game Theory where each player chooses the best strategy given the strategy chosen by the competitor. At Nash equilibrium, no player has an incentive to unilaterally change their decision.

In this project, the Nash equilibrium represents a stable festive sale strategy outcome where:

- Amazon's chosen strategy is optimal against Flipkart's decision.
- Flipkart's chosen strategy is optimal against Amazon's decision.

The analysis shows that the festive sale competition naturally drives both firms toward aggressive strategies. This happens because if one platform reduces discount intensity while the competitor continues aggressive discounting, the weaker platform loses significant market share.

Thus, the Nash equilibrium outcome reflects a discount war scenario.

## 10. INTERPRETATION OF COMPETITIVE BEHAVIOR

The result of the game highlights an important real-world business phenomenon: competitive markets often push firms toward aggressive pricing strategies even when cooperation would yield better outcomes.

Both Amazon and Flipkart may earn better profits if they follow moderate discounting strategies. However, due to uncertainty about competitor behavior and the fear of losing customers, both companies tend to adopt heavy discount strategies.

This reflects a real market situation where:

- Both firms compete for dominance rather than maximum joint profit.
- Price competition becomes more intense during festive seasons.
- Profit margins reduce significantly despite increased sales volume.

## **11. DECISION ANALYSIS APPROACH**

Game Theory assumes both players act strategically, but real markets also involve uncertainty. Festive season demand can vary due to multiple factors such as:

- Economic conditions and inflation
- Customer spending behavior
- Competitor marketing intensity
- Festival timing and duration
- Product availability and logistics

Therefore, Decision Analysis tools such as decision trees can be used to support strategic planning. Decision trees help evaluate strategy performance under uncertain future market conditions.

In this project, Decision Analysis is used to evaluate the possible outcomes of choosing different discount strategies under uncertain demand levels.

## **12. SENSITIVITY ANALYSIS**

Sensitivity analysis is performed to test the stability of the chosen strategy. In real business scenarios, conditions change frequently due to:

- Rising marketing costs
- Increased delivery expenses
- Higher return rates during festive sales
- Increased seller commission charges
- Competitive pressure from other platforms

The analysis evaluates how changes in advertising cost and discount expenses may influence the final strategic decision. This helps determine whether aggressive discounting remains optimal or whether a balanced strategy becomes more suitable.

The sensitivity study indicates that if the cost of heavy advertising and discounting becomes too high, platforms may shift toward moderate discounting strategies to maintain profitability.

### **13. CONCLUSION**

This project successfully modeled the competitive discount strategy interaction between Amazon and Flipkart using Game Theory. The analysis demonstrates that both firms are driven toward aggressive festive sale strategies due to competitive pressure and the need to protect market share.

The Nash equilibrium outcome highlights that competition often leads to reduced profitability for both firms even though a cooperative moderate-discount strategy could yield better results. Decision Analysis and sensitivity analysis further show that external factors such as marketing costs and uncertain demand conditions can influence the preferred strategy.

Thus, the combination of Game Theory and Decision Analysis provides a strong framework for evaluating competitive business decision-making.