

## Horizontal Cooperative Game Theory in Hotel Revenue Management

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**Abstract :** This research studies pricing strategy in cooperative setting of hotel duopoly selling perishable product under fixed capacity constraint by using the perspective of managers. In hotel revenue management, competitor's average room rate and occupancy rate should be taken into manager's consideration in determining pricing strategy to generate optimum revenue. This information is not provided by business intelligence or available in competitor's website. Thus, Information Sharing (IS) among players might result in improved performance of pricing strategy. IS is widely adopted in the logistics industry, but IS within hospitality industry has not been well-studied. This research put IS as one of cooperative game schemes, besides Mutual Price Setting (MPS) scheme. In off-peak season, hotel manager arranges pricing strategy to offer promotion package and various kinds of discounts up to 60% of full-price to attract customers. Competitor selling homogenous product will react the same, then triggers a price war. Price war which generates lower revenue may be avoided by creating collaboration in pricing strategy to optimize payoff for both players. In MPS cooperative game, players collaborate to set a room rate applied for both players. Cooperative game may avoid unfavorable players' payoff caused by price war. Researches on horizontal cooperative game in logistics show better performance and payoff for the players, however, horizontal cooperative game in hotel revenue management has not been demonstrated. This paper aims to develop hotel revenue management models under duopoly cooperative schemes (IS & MPS), which are compared to models under non-cooperative scheme too. Each scheme has five models, Capacity Allocation Model; Demand Model; Revenue Model; Optimal Price Model; and Equilibrium Price Model. Capacity Allocation Model and Demand Model employs self-hotel and competitor's full and discount price as predictors under non-linear relation. Optimal price is obtained by assuming revenue maximization motive. Equilibrium price is observed by interacting self-hotel's and competitor's optimal price under reaction equation. Equilibrium is analyzed using game theory approach. The sequence applies for three schemes. MPS Scheme differently aims to optimize total players' payoff. The case study in which theoretical models are applied observes two hotels offering homogenous product in Indonesia during a year. The Capacity Allocation, Demand, and Revenue Models are built using multiple regression and statistically tested for validation. Case study data confirms that price behaves within demand model in a non-linear manner. IS Models can represent the actual demand and revenue data better than Non-IS Models. Furthermore, IS enables hotels to earn significantly higher revenue. Thus, duopoly hotel players in general, might have reasonable incentives to share information horizontally. During off-peak season, MPS Models are able to predict the optimal equal price for both hotels. However, Nash equilibrium may not always exist depending on actual payoff of adhering or betraying mutual agreement. To optimize performance, horizontal cooperative game may be chosen over non-cooperative game. Mathematical models can be used to detect collusion among business players. Empirical testing can be used as policy input for market regulator in preventing unethical business practices potentially harming society welfare.

**Keywords :** horizontal cooperative game theory, hotel revenue management, information sharing, mutual price setting

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