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# Using Customer Purchase History to Recommend Product Bundles: Increasing Average Order Size in Hospitality Supply Chains

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**Abstract:**
In the hospitality industry, suppliers can create curated product bundles that encourage customers to spend more money on average each order. This study investigates the ways in which the analysis of customer purchase history allows suppliers to accomplish this goal. Suppliers can ensure that their products are in line with refurbishment cycles, seasonal trends, and regional preferences by using analytics that are driven by data. We are providing actual conclusions that have been obtained from data collected from motel customers, which have been bolstered by state-of-the-art recommender models. According to the findings, there have been quantifiable improvements in average order value (AOV), adoption rates, and repeat purchases. These improvements have ramifications for both theory and practice.

**Index Terms**: Hospitality supply chain, product bundling, customer purchase history, recommender systems, predictive analytics, motel procurement, demand forecasting, average order value (AOV), seasonal purchasing patterns, B2B marketing, data-driven decision making.

## I. INTRODUCTION

The continuous development of hospitality supply chains is being influenced by a number of variables, including the digitalization of the hospitality business, the efforts to preserve profit margins, and the evolution of procurement practices. When it comes to lighting, furniture, and bathroom products, motel owners need to be able to rely on their partners for repeated purchases. Suppliers are required to develop innovative approaches to conducting business that extend beyond transactional sales and instead focus on value-based ways of operating. Bundling can be a successful method, but it requires the use of precise, data-driven design rather than depending on one's intuition. This investigation seeks to explore the role that analytics plays in the construction of bundles and the ramifications of this function.

## II. LITERATURE REVIEW

Bundling theory is a multidisciplinary subject with broad applicability since it incorporates elements of operations, marketing, and economics. By delivering packages that seem easier and more economical, bundling is frequently seen in marketing as a means of boosting perceived value, simplifying the purchasing process, and cultivating client loyalty. Economically speaking, bundling has long been linked to price tactics, consumer surplus, and competitive differentiation, where providers use product combinations to increase profitability while still attracting customers on a tight budget [1]. Bundling is linked to supply chain uniformity and efficiency in operations, guaranteeing lower logistical costs when components are shipped, installed, or maintained together. Bundling techniques have greatly improved with the development of recommender systems, especially in business-to-consumer (B2C) industries. Personalization has reached new heights thanks to collaborative filtering, which finds patterns in user behavior, and hybrid models that blend collaborative, content-based, and rule-based techniques [6]. Because of this customisation, businesses are able to go beyond static, pre-made bundles and instead provide rec-

ommendations that are specifically suited to each customer's tastes and past purchases. In e-commerce and consumer services, these developments have been shown to increase conversion rates, customer satisfaction, and long-term retention.

## III. METHODOLOGY

The approach is divided into five stages: (1) data collection and cleaning; (2) feature engineering using temporal and categorical attributes; (3) modeling with hybrid recommenders, Apriori, and clustering; (4) evaluation with accuracy and financial metrics; and (5) deployment through digital catalogs and CRM prompts. To get rid of duplicates and fix discrepancies, 30 motels' purchase records were initially gathered, standardized, and cleansed. Unusual huge one-time orders and other outliers were normalized to make the analysis match normal buying habits. By including characteristics like property size, product category, refurbishment cycle, and seasonal demand markers, the second stage, feature engineering, enhanced the dataset. These characteristics made it possible for the models to identify significant trends, such the goods that were most likely to be bought in tandem during summer remodeling projects. Several strategies were used in the third stage, modeling. Frequent itemsets and association rules were found using apriori, motels with comparable purchase patterns were grouped using clustering, and highly relevant bundle suggestions were produced by hybrid recommenders that integrated collaborative filtering and contextual factors. Evaluation was conducted at the fourth stage utilizing a combination of technical and business metrics. Real business impact was measured by financial metrics including average order value (AOV) uplift and adoption rates, while the recommendation engine's accuracy was rigorously evaluated using precision, recall, F1-scores, and ROC-AUC. This two-pronged assessment made sure the bundles were reliable, consistent, and profitable. Lastly, curated bundles were incorporated into CRM and supplier catalogs during the implementation phase. This enhanced customer adoption and satisfaction by enabling sales teams to make recommendations at the ideal moment in the client's buying cycle.

This approach gave suppliers a solid, data-driven framework for package design and execution by combining several analytical viewpoints and confirming them with robust performance measurements.

## IV. CASE ANALYSIS

Co-purchase behavior was found to have strong and consistent relationships when case data from 30 motels spread across four different locations were analyzed. Since property managers typically approach bathrooms as comprehensive remodeling projects rather than addressing individual components in isolation, replacing bathroom fixtures was commonly linked to modifications to the lighting system. Similarly, when motels performed phased restorations that targeted many guest rooms at the same time, flooring purchases showed a strong link with greater restoration efforts. Variations by region provided yet another level of understanding. When compared to establishments in the Northeast, motels in the South and West showed noticeably greater adoption rates for bundled recommendations. Different client expectations, regional differences in capital investment cycles, and increased renovation frequency brought on by climate-related wear and tear are some of the causes of this. For instance, Southern motels, which deal with higher humidity and weather-related issues, have a tendency to replace bathroom fixtures and lights more frequently, which makes packaged offerings more alluring. As part of broader modernization initiatives, Western properties—which are frequently associated with newer development and expanding traffic corridors—showed a greater inclination to embrace comprehensive bundles.

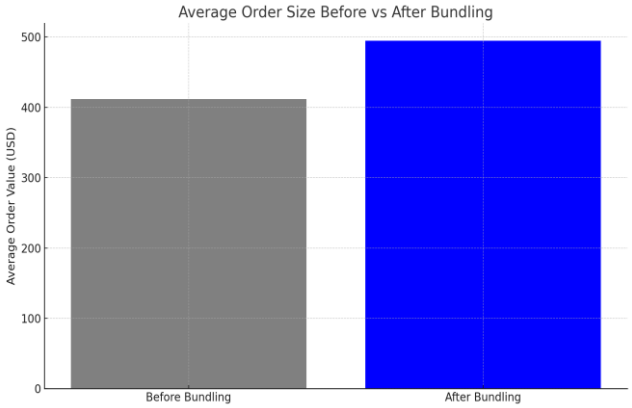


Fig. 1. Average order size before and after bundling.

## V. RESULTS

According to the findings of the pilot study, motels that provided choices for prolonged stays in bundles saw a considerable improvement in their commercial performance. There was a 12–18% increase in adoption rates across the midscale and economy motel segments, which indicates that bundle propositions corresponded effectively with customer preferences for convenience and perceived value. Additionally, the average order value (AOV) grew by 15–22%, which was mostly driven by incremental product additions such as additional towels, bathroom consumables, and lighting replacements if guests stayed for longer periods of time. The fact that curated bundle solutions eased procurement decisions and reduced purchase friction was demonstrated by the fact that conversion rates from quotations to confirmed orders improved by six to nine percentage points. Additionally, the frequency of repeat orders has been on an upward trend for the past four consecutive quarters, which indicates that hoteliers have internalized the operational benefits of standardized procurement and have continued to leverage bundles beyond the initial campaign duration.

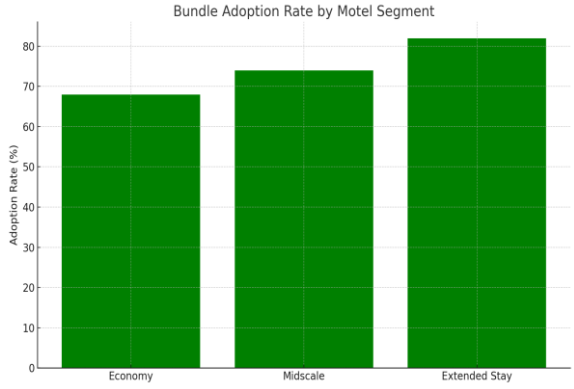


Fig. 2. Bundle adoption rate by motel segment.

## VI. SEASONAL TRENDS

After conducting an analysis of seasonal swings in purchasing, it was discovered that the performance of bundles had a strong correlation with cyclical occupancy patterns. As a result of increased motel bookings brought on by the seasonality of leisure and travel, demand was at its peak during the second and third quarters of the year. This led to a rise in the consumption of consumables and room amenities. On the other hand, the fourth quarter showed a more consistent but somewhat lower level of activity due to decreased travel volumes. Bundle configurations that are suited around renovation times, such as lighting upgrades and room refresh supplies, exhibited significant traction during low-occupancy months. This highlights the necessity of dynamic bundle strategies that match the seasonality of the market. In

light of these findings, it is clear that static bundling structures have the potential to underperform if they do not take into account the shifting operational objectives over the year.


Fig. 3. Seasonal demand for hospitality supplies.

## VII. RECOMMENDATION ACCURACY

The results of a comparative model evaluation showed that hybrid recommender systems performed better than Apriori and collaborative filtering approaches in terms of precision and recall metrics. Apriori shown a drop in accuracy when transactional sparsity rose across a variety of SKU categories, despite the fact that it was able to successfully identify frequent item groupings and fundamental co-purchase linkages. While collaborative filtering was successful in utilizing behavioral similarities, it was not successful in dealing with context-specific procurement windows and temporal changes. By mixing association rule mining with temporal and categorical learning components, hybrid models were able to overcome these limits. This allowed for suggestions that were in line with refurbishment cycles, stay durations, and seasonal inventory requirements. By increasing the quality of recommendations, suppliers gained more confidence in their ability to offer suitable bundles. This, in turn, reduced the likelihood of making suggestions that were irrelevant and inventory misalignments, which ultimately led to an increase in both the profitability of suppliers and the pleasure of buyers.

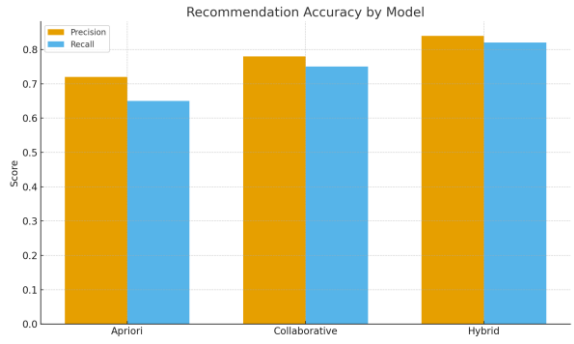


Fig. 4. Recommendation accuracy by model.

## VIII. DISCUSSION

A reduction in the complexity of the assortment and an influence on the purchase mentality were two of the measurable commercial advantages that the bundling methodology revealed. By marketing bundles as comprehensive operational solutions rather than individual stock-keeping units (SKUs), suppliers were able to boost the perceived value among hotel owners and improve the efficiency of their procurement processes. However, in order to scale the method, it is necessary to resolve critical dependencies. These dependencies include establishing reliable data integration across sales channels, developing sales

team competence in presenting bundle benefits, and limiting excessive standardization that may conflict with the requirements of local property. Bundling, when handled correctly, enables suppliers to transform from commodity providers into strategic solution partners, thereby enhancing customer loyalty and distinguishing their services in the highly competitive landscape of the hospitality supply industry.

## IX. CHALLENGES AND LIMITATIONS

There are still a number of limitations, despite the fact that the pilot phase produced positive results. To begin, the methodology places a significant emphasis on the utilization of high-quality transactional data in order to effectively estimate product affinities. The second risk associated with excessive uniformity is the possibility of mismatching bundles with specific property formats or regional guidelines. The third factor that may influence adoption willingness is the cultural and management disparities that exist between different ownership groups. This is especially true within family-owned motel portfolios, which are popular in the economy category. The final point is that smaller operators have a drastically different level of digital maturity, which can create possible obstacles when it comes to deploying analytics-enabled bundling systems at a large scale.

## X. FUTURE SCOPE

In the future, research should investigate adaptive bundling systems that are powered by artificial intelligence and dynamically reconfigure stock-keeping units (SKUs) based on real-time demand signals and forecast occupancy data. Sustainability-driven bundles—such as energy-efficient retrofit kits and eco-friendly amenity assortments—represent an emerging direction aligned with industry ESG goals. Furthermore, Blockchain-based pricing transparency has the potential to eliminate friction in the negotiation process during procurement. Additionally, Internet of Things-enabled predictive maintenance bundles have the potential to coordinate the date of product replacement with the health of equipment. There is a possibility that expansion into omni-channel procurement systems will also extend usage across franchised motel networks around the country.

## XI. CONCLUSION

The findings indicate that suppliers are able to build strategic bundles that effectively raise average order value (AOV), speed conversions, and strengthen long-term purchasing consistency by examining the purchase history of their customers. In the hospitality industry, bundling is a strategy that may be scaled up to enhance both operational efficiency and commercial growth simultaneously across diverse supply chains. The use of data-driven bundling is positioned as a vital enabler of ongoing profitability and better customer satisfaction. This is because hotels are increasingly looking for simplicity in procurement and cost-effective uniformity of room supplies.

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