THE FUTURE OF PRICING

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HSMAI Europe January 2020

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Since its inception in the late 90s and early 2000s, pricing and revenue management has become a key function in hospitality. In the early days of revenue management, revenue managers focused on inventory optimization, opening and closing pre-set rates according to demand to ensure the best possible utilization of the limited capacity of hotel rooms. Today, a dynamic distribution marketplace allows consumers review all the prices in the market, making pricing a critical focus for revenue management.

Evolutions in the digital space, and related technical and analytics advancements, continue to drive revenue management practices and systems forward. It is clear that the future of pricing in hospitality is data, automation, and analytics. The only question is how to best automate to align with your market and strategy. In this paper we explore the current state of revenue management and the approaches used by revenue management systems (RMS) to support hotel revenue management. We also explore new trends in revenue management systems and analytics that are shaping the future today. Finally, recognizing that revenue management technology is not a "one size fits all" product, we make recommendations regarding RMS approaches and trends that hoteliers should consider, based on their specific market and strategy.

TABLE OF CONTENTS

Since its inception in the late 90s and early 2000s, pricing and revenue management has become a key function in hospitality. And for good reason. Research has shown that a 1 percent price increase, if volumes remain stable, increases operating profits by 8 percent, which is nearly 50 percent higher than achieving a one percent decrease in variable costs.[1] According to a series of studies sponsored by the Cornell Center for Hospitality Research and STR, an ADR focused strategy (as opposed to occupancy) results in better RevPAR performance, regardless of economic conditions, chain scale or geography.[2]

In the early days of revenue management in hospitality, revenue managers focused on inventory optimization, opening and closing pre-set rates according to demand to ensure the best possible utilization of the limited capacity of hotel rooms. This worked well until the emergence of the internet brought on eCommerce and the OTAs in the late 90s and early 2000s. It suddenly became much easier for consumers to directly compare all of the prices in the market, so hotels needed to compete more directly on price, and pricing became a focus for revenue management.

Evolutions in the digital space like social, mobile, last minute booking apps, location-based marketing and technology-enabled, alternative lodging providers continue to put pressure on pricing. Changing consumer expectations of the buying process on digital platforms and an eye on recent trends in air travel pricing have brought the hospitality industry to the brink of a potential major change in the way that rooms are sold. Industry experts are starting to talk about shifting from selling room types and rate plans to a new paradigm that allows guests to customize their room selection by picking attributes of the stay based on their own preferences and price sensitivity.

Regardless of whether you believe the industry will successfully execute this migration, or if it will even work for your company, it is clear that pricing will continue to evolve over the next few years. It is critical for hospitality leaders in general, and revenue managers in particular, to understand where these trends are going, and how to prepare themselves and their organizations to continue to drive profitable revenue through pricing.

One size will never fit all for hospitality companies, given the diversity of markets – and business strategies - across the globe. The most effective approach to pricing will depend on the size and type of hotel, and the market in which it operates. One thing is universally true, however: hotels will no longer be able to stay competitive with a manual approach to revenue management. The future of pricing in hospitality is data, automation, and analytics. The only question is how to best automate to align with your market and strategy.

1 CURRENT STATE OF PRICING IN HOSPITALITY

Revenue management has evolved into a "must have" discipline for lodging companies, and most have invested in people to support pricing, whether it's a centralized, corporate function, or a property-level role. This function is responsible for managing pricing across segments, including group, wholesale, transient and corporate contracting, as well as ensuring the right rates are for sale through all owned and third-party channels.

While the revenue management function has grown in size and influence in the past few decades, widespread adoption of automation to support this function has not grown as quickly. Current estimates are that less than 20 percent of hotels have an automated revenue management system to support day-to-day pricing decisions.[3] Even with potentially thousands of pricing decisions that can be made across the booking horizon, most revenue management functions are "manually" setting rates with the support of nothing more than a spreadsheet tool like excel and market intelligence from their partners.

Revenue management systems (RMS) are designed to support the pricing process by forecasting demand, optimizing against that demand, producing a set of rates and availability controls that should maximize room revenue, and sending those decisions to the selling systems. These systems automate the daily pricing process, leaving revenue managers free to focus on exception management, strategy development and execution. Those firms that take advantage of RMSs tend to see a relatively significant and sustained lift in performance. Success of these systems, however, is at least partially dependent on the ability of selling systems (PMS and CRS) and distribution partner infrastructure to support their decisions.

With more and varied influences on pricing power, like social sentiment and competitive positioning, as well as the growing complexity of channels and partners, pricing without analytical or automation support risks leaving a good deal of money on the table. As the landscape continues to evolve, those hotels that are not automated will continue to fall farther behind.

The future of pricing is automation!

In the rest of this paper, we will help prepare you for automation by describing common and emerging pricing techniques and outlining how automation helps to support them.

1 https://www.mckinsey.com/business-functions/marketing-and-sales/our-insights/the-power-of-pricing

2 Enz, Cathy A., Canina, Linda and van der Rest, Jean Pierre (2015). Competitive Hotel Pricing in Europe: An Exploration of Strategic Positioning [electronic article]. Cornell Hospitality Report, 15(2), 6-16. And Enz, C. A., Canina, L., & Noone, B. (2012). Strategic revenue management and the role of competitive price shifting [Electronic article]. Cornell Hospitality Report, 12(6), 6-11.

3 Skift Research, as of April 2019

2 REVENUE MANAGEMENT AND PRICING TECHNIQUES

This section will outline some pricing techniques well suited to hospitality companies. Some have been in use since the inception of revenue management, whereas others are emerging due to changes in consumer buying behavior and advances in technology. Most companies will leverage a combination of these techniques together to maximize revenue potential. Of course, hospitality companies should have their market strategy, brand, operating environment and internal infrastructure firmly in mind before determining which pricing techniques are most appropriate for them.

Inventory Management

Early application of revenue management in hospitality focused on the most effective utilization of the limited capacity of hotel rooms. These techniques continue to deliver value today and form the core RM approach for many hotels.

Overbooking

Overbooking is, perhaps, the most straightforward form of revenue management: selling room reservations beyond capacity in anticipation of cancellations and no-shows by transient guests, and/or groups not utilizing the full block of inventory reserved for them. In early applications of revenue management, before advanced deposits or strict cancellation policies became common practice, overbooking often resulted in significant revenue benefits.

As overbooking practices advanced, properties began to realize the advantages of overbooking at the room type level. When room type demand is uneven, room-type overbooking practices can help a hotel achieve maximum utilization and revenues by overselling lower-valued room types, and then upgrading or upselling guest reservations into higher-value rooms.

From a technology perspective, most Property Management Systems (PMS) & Central Reservation Systems (CRS) support overbooking. Many RMSs provide overbooking recommendations, however, not all RMSs support both property- and room type-level overbooking controls.

Inventory-Based Restrictions

Inventory-based restrictions are used to restrict bookings for the property as a whole, or for specific room types or rates on or over a specific date or set of dates. These restrictions allow a property to manage length of stay, maximizing revenues across multiple dates, as opposed to maximizing individual stay date revenues. For example, using a MinLOS restriction on a peak night can often increase occupancy (and revenue) on the shoulder nights (the nights before and after the peak night), as it restricts one night only bookings on the peak night, which would block the room from being booked on the shoulder days. There are also rate level restrictions that allow companies to shut down certain rates that can be "yielded" (i.e. do not have last room

availability associated with them). Rate level restrictions can be used in tandem with length of stay restrictions for more detailed control.

Inventory restrictions only apply on dates where demand exceeds hotel room inventory (supply), and when there is at least some portion of demand for lengths of stay greater than one night. The more detailed rate level restrictions apply only when the property has discounted rates that can be restricted (such as a publicly available advance purchase or negotiated contract rates).

Support for these types of restrictions varies greatly across different systems. Most PMS and CRSs provide some restrictions, but the available set can vary widely. Similarly, not all distribution partners support these types of controls. RMSs also vary quite widely in their ability to support different types of restrictions and to pass those controls to selling systems.

Price Management

With the advent of the internet, ecommerce and the online travel agencies, consumers had direct access to all the prices in the market. This meant that hotels had to put more focus on price management. Like most things in pricing and revenue management practice, the more detailed the pricing the more potential revenue benefit (lift). However, there are costs and complications that come with choosing a more detailed pricing approach that hotels need to consider before making these choices, as these costs and complications might outweigh the associated revenue benefit.

Length of Stay Pricing

Today, most hotels manage price through a stay date, or daily pricing, approach, where the price is set for a given night, and all guests that book the same rate for a given night at the same point in time, (as the price will be adjusted as arrival date approaches) will pay the same amount, regardless of arrival date or length of stay. This form of pricing is simple to manage, and widely supported by selling systems and third-party partners.

Code Example:

Properties with longer average length of stay, and clear distinctions in price sensitivity across segments, could benefit from length of stay-based pricing. With this approach, the price is set not at the stay-night (daily) level, but rather individually for each arrival date and length of stay. This approach can have benefits even when the property isn't expected to fill. However, there are significant complexities and costs associated with this technique. Properties using length of stay-based pricing need to manage a much larger set of prices, which can be challenging in and of itself for revenue managers. Further, many distribution outlets don't accept length of stay based pricing, so the pricing must be converted from length of stay to stay-night for these outlets, potentially resulting in rate parity violations. Finally, not all selling systems (PMSs and CRSs) or RMSs support length of stay-based pricing.

Room-Type Level Pricing

Due to the complexity of managing room type pricing, particularly in a manual environment, most hotels choose to manage a base room type directly and let the selling system calculate all other room type pricing based on differentials from the base room type. Revenue managers can change these differentials on unusual days (or by season), but such exceptions can prove difficult and time-consuming to manage on a regular basis. With RMS automation, managing room type differentials according to demand becomes a viable option. For properties with multiple room types, and distinct demand patterns for them, pricing by room type can provide additional, and possibly significant, revenue benefits.

BAR Spectrum Pricing

Most hotels that adapted to managing pricing early configured their selling systems (PMS/CRS) with rate spectrums, also known as Best Available Rate (BAR) spectrums to manage the price of a primary selling rate (BAR). This allows the hotel to raise and lower rates according to demand patterns. Price management is relatively simple, as the revenue manager is only responsible for managing the base rate and any restrictions, manually or with a system.

The relationship between BAR and other rates is then managed within the CRS and PMS, via pre-defined relationships. The differentials between rates for room types are fixed, as are the percentage discounts for promotional rates (AAA, Loyalty). The hotel determines how many BAR levels there are on the spectrum, and which rates are linked (corporate rates, for example) to BAR.

Continuous Pricing and Open Pricing

Recently, hotels begun to move to several variations on BAR pricing. One option is known as continuous BAR pricing. The property defines a floor and ceiling on the base rate, and the price is allowed to vary at any amount between those boundaries, subject to whatever marketing rules make sense for the business (for example, all rates must end in .00). The pre-defined, limited set of price points available in a BAR spectrum is extended, allowing the property to drive incremental lift over traditional BAR spectrum pricing. This works best with automation, as analytically derived rates can capture demand at each interval of price sensitivity. Room-type differentials, and linked rate discounts can still be configured, and restrictions would still be used similarly to traditional BAR.

Another variation on this has come to be known as open pricing. With this technique, there are no defined BAR spectrums, and no enforced percentage or dollar differentials between the base rate and related rates. This allows complete freedom to vary discounts and differentials according to demand. For example, when demand for suites is low, you can shrink the differential between suites and base rooms to make the upsell more attractive. A rate in the package path might be 5% off BAR when demand is high, but 20% off when demand is low. Another aspect of the open pricing technique is the avoidance of restrictions. The preference is instead to manage prices to ensure that all rates are always available, until the property is sold out.

The open pricing technique shifts the majority of pricing calculations from the selling system to revenue management. The CRS or PMS calculates fewer rates and deploys fewer restrictions. The goal is to drive more revenue by being nimbler when responding to market conditions, because the hotel is able to manage more rates at a greater level of detail. Portions of the gaming industry have long leveraged this technique, both in

analytical and manual environments, although in high volume environments, differentials are defined, and only managed during exception periods. Moving from traditional BAR pricing to a more flexible option depends on the capabilities of the selling systems, although many popular systems can handle this type of functionality, with some reconfiguration. With automation, as more decisions are made on the RMS side, the volume of the integration with the selling systems increases. This can put pressure on the selling systems, and cause lags or fails.

Multi-Rate Plans

More recently, we have seen hoteliers extending their publicly available rates, by adding value-add elements like breakfast, discounted advance purchase rates with cancellation penalties, and loyalty discounts. This adds additional opportunity to capture value (managing these rate differentials on a day to day basis) but adds complexity to pricing decisions. Moving to a multiple-rate model can also bring additional complexities for third-party distribution, potentially impacting rate parity agreements or display order.

Attribute-Based Shopping and Pricing

The latest emerging pricing technique in hospitality is attribute-based selling (or attribute-based shopping). In the attribute-based approach, rather than defining room types and rate types, the inventory is broken down into components or attributes. Room attributes are things like king or queen bedding, floorplan, floor location, view, or guest occupancy. Rate attributes include advanced purchase, or add-ons like breakfast. A base rate is defined, and for each attribute the base rate is either marked-up or marked-down. Pricing management in this approach moves from managing large numbers of disparate, pre-bundled rate products (by room type) to managing the base rate and the mark up/down differentials for the various attributes, which could mean a significantly smaller number of individual prices.

Many believe that the ability for the consumer to search for exactly what they desire, and only pay for what they value, will not only improve the customer booking and stay experience, but will drive revenue and profits as well. Attribute-based selling facilitates the search process, making it more like shopping on retail sites, removing friction and adding flexibility. Many point to airline companies' success with unbundling (a similar initiative that drove significant profits for that industry) as reason to believe that an attribute-based selling and pricing model offers significant revenue opportunity for hospitality, as well.

However, broad implementation of attribute-based pricing model in hospitality will not be easy. Core hospitality technology systems including PMS, CRS, website and RMS will need to be overhauled to handle his change. Third party distributors will need to adjust their internal processes, or risk being out of parity. Some industry wide standardization of attributes will be required. Airline unbundling of components like bags and seats created significant consumer satisfaction issues. Hotels may face the same risk of consumer perceptions of "nickel and diming," making proper operationalizing of this technique crucial to its success.

3 AUTOMATED REVENUE MANAGEMENT AND PRICING APPROACHES

Once a hotel has determined the revenue management and pricing techniques that will best support their strategy and market conditions, it is time to consider automation. Many of the techniques described above have significant revenue lift potential, but the level of detail required makes them nearly impossible to effectively implement in a manual environment. Automation requires investment, so the hotel must have a clear idea of their strategy and how the system will benefit them before embarking on the process. Selecting a system and then adapting the strategy and pricing techniques to that of the system can result in sub-optimal results and poor user adoption. In the section that follows, we will describe automation approaches, connected to the techniques we previously described.

Automation is typically achieved with some combination of business rules and analytical support. Analytics provide forward looking, mathematical guidance, and business rules adapt that to the operating environment and company business practices. Successful automation balances these two techniques without constraining the system's ability to provide value and the user's ability to interpret and implement outputs.

Automation will change the job of the revenue managers. In manual environments, revenue managers adjust price and track the impact on demand. In most cases, with an RMS, the revenue managers must change from managing price to managing demand. Revenue managers will need to have a good understanding of market dynamics (events, competitive effects), and ensure that the system is interpreting these dynamics correctly. For most RMS systems, this means that a revenue manager's first step is to review and adjust the system's demand expectations, as opposed to overriding a system-generated price they don't agree with. Changing from managing price to managing demand can be quite tricky for incumbent revenue managers. Investing in significant upfront training and ongoing follow up is essential to ensure the system is being leveraged properly.

As with any automation initiative, particularly those supported by analytics, the quality of your data is key to success. You will need to plan for an extensive review of business practices that impact data quality, as well as reviewing where the data leveraged by the system will be sourced and what the definition of key data fields are. The importance of this exercise cannot be overstated and should be considered the very first step in any program. Early efforts to ensure data quality will pay benefits quickly to any RMS effort.

Business Rules

The simplest form of automated pricing support is a rule-based solution. In a rule-based system, the system checks for a set of conditions, and then produces a pricing decision based on these conditions. For example, "if it is 7 days from arrival, and more than 75% of rooms have been booked, then set the rate at $200". As one can see in this simple example, it is possible to produce a rules-based system in simple tools (spreadsheets) without any analytical support like forecasting or price sensitivity. This makes the system relatively easy to implement, and to understand – especially for staff that have limited exposure to more complex analytics.

Business rules make up an element of even the most advanced RMSs. These systems typically depend on business rules to guardrail pricing decisions, ensuring that the pricing decisions ultimately fit into the overall business environment. However, overly tight rules can constrain even the most advanced pricing decision system to the point it provides no more value than a simple rules-based system. Any configuration of business rules, regardless of the system, should therefore be approached with purposeful planning, and careful tracking.

Analytical Support for Inventory Optimization

This section will describe some of the analytical approaches that support the inventory optimization techniques described previously.

Overbooking

Analytical support for overbooking is relatively straightforward: cancellation and no-show activity must be forecasted for each arrival date, including group block utilization, and this forecast is then used to calculate appropriate overbooking levels considering risk tolerance and consumer impact. For simple properties, a property level forecast is sufficient. For more complex properties that want to leverage room type overbooking, forecasts of demand and cancellation/no shows at the room type level are required.

Displacement-Based Restrictions and Pricing

RMSs use the concept of displacement to recommend restrictions. If the analytics determine that a particular rate or stay pattern will block (displace) a higher revenue generating pattern, that rate or stay pattern should be restricted. Analytically determining if, where, and when to apply these types of controls requires both a detailed understanding of remaining rooms to sell, as well as detailed forecasts, typically including length of stay, rate and room type.

Some systems (RMS, CRS, PMS) support hurdle rate restrictions (a.k.a. bid price) to account for displacement. Hurdle rates are an output of sophisticated revenue management analytics and represent the minimum acceptable value of a room. Any rates that are lower than the hurdle for a given room type should be restricted. The hurdle rate is defined at the room type level by stay date, but applied at a rate level, arrival date, and length of stay – providing very detailed controls to help maximize lift.

When used in conjunction with a BAR spectrum, a hurdle rate can also be used to manage price, by selecting the rate from the spectrum closest to (but still above) the hurdle rate. Displacement-based pricing, using the hurdle rate, works best when there are many rates sold to distinct market segments and occupancy is high. Displacement-based analytics balance demand from multiple market segments with different rates (i.e. corporate, discount, group, transient with different price sensitivity) against each other to establish the value of a room. With nothing to trade off, displacement assumptions begin to fail. Similarly, when expected occupancy is low, presumably, you would accept every booking; therefore, there are no tradeoffs to be made and the hurdle rate approaches zero, lowering the rate. RMSs that utilize displacement-based pricing need to have business rules to ensure that prices don't drop too far, but this means that whenever the hotel isn't expected to sell out, the system always recommends the lowest configured price. Further, while displacement works when managing a single BAR, without some form of price sensitivity element, a displacement-based model has no basis for independently managing multiple rates (e.g., advanced purchase).

4 PRICE OPTIMIZATION

As the limitations of displacement-based pricing have been recognized, RMS developers have begun to build systems that price based on a model of the price / demand response. This analytic approach to pricing, known as price optimization, is more robust than displacement-based pricing because it can be utilized effectively in both low and high demand periods.

With the prevalence of BAR-based pricing, and with BAR or BAR-equivalent rates making up much of the bookings for many hotels, simple property-level price-sensitivity-based models aren't overly difficult to produce and can bring value to hotels with simple rate structures and demand patterns that weren't well served by displacement-pricing. Further, there is broad support across industry selling systems and distribution outlets for BAR – and so this "under the hood" change to RMS analytics approach has little or no impact on those systems.

Price optimization can also be used in an environment with multiple rates, room types and length of stay, providing significant benefit. However, accepting pricing at this level may require more significant changes to the selling systems, as not all systems support pricing decision upload from RMSs in the volume or level of detail required.

Price optimization can go hand in hand with displacement techniques for more complex properties. For example, these hotels may still offer rates that can be closed, so the concept of a hurdle rate still applies. Calculating that hurdle rate becomes slightly more complicated because it will depend on the price calculated from the price/demand relationship, as well as the demand from the segments with rates that can be restricted.

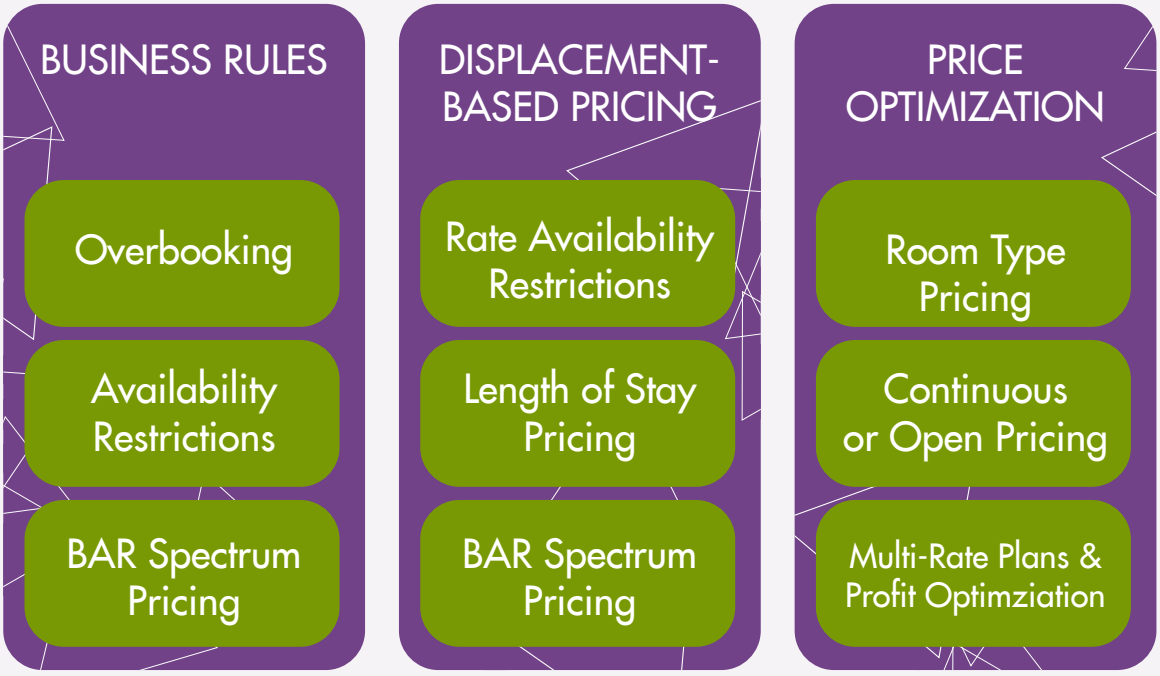

Figure 1: Automation Support for Common Pricing Techniques

5 NON-ROOMS REVENUES AND PROFIT OPTIMIZATION

The industry has, for some time, discussed the importance of considering non-rooms revenues in making rate and availability decisions. Revenue managers recognize that some guest segments are more likely to spend in non-rooms outlets than others, and so they should be favored. Casino hotels have been at the forefront in considering a guest's total value in setting rates, encouraging high value gamers to stay and play by offering highly discounted or even comped rates.

Introducing consideration for non-rooms revenues into revenue management practices brings a number of challenges. The first challenge is tracking non-rooms revenue back to the guest, so that it can be recognized and forecasted for future reservations. Few properties have a robust way to track all spend across the property back to a guest or guest segment. For example, gaming firms have developed sophisticated methods for tracking gaming revenues but have generally poor support for tracking other non-rooms revenues.

The second challenge is the application of cost. Cost is often ignored in revenue management practices and systems, as the marginal cost of an occupied room is generally quite small relative to typical room rates and is relatively consistent. However, marginal costs are typically higher for non-rooms items, and can vary widely across source. For example, the marginal cost of restaurant revenue is high and quite different from those of catering and banquets or retail – so these costs must be considered, as the various revenues are no longer equal in value. Hence, an approach that considers these non-rooms revenues quickly moves from revenue management into what is better described as profit management, or profit optimization.

From an analytics perspective, a move to profit optimization also brings challenges. The most significant of these is dealing with the impact of these additional revenues, and the conversion to profit, in approaching price-demand sensitivity. Having converted much of the analytics to tracking and predicting the full value of guest's spend, it is nevertheless critical to distinguish that the guests initial purchase decision – whether to book a room, and which room to book – is based on the room rate. As such, the demand sensitivity portion of a demand forecasting model will need to continue to consider room rate value alone, even as the decision optimization portions of the model convert to consider the full profit value of the guest.

6 ATTRIBUTE-BASED PRICING

As noted above attribute-based selling, and its partner attribute-based pricing, start by moving away from static rate bundling and fixed room type definitions – a move that simplifies pricing conceptually, but introduces practical problems to selling systems, distribution partners, and RMSs. In this section we will discuss two specific challenges with attribute-based pricing: the pricing of attributes and inventory management.

As discussed earlier, an attribute can be a room attribute (bed type, floorplan, floor location, view, or guest occupancy), or rate attribute (advanced purchase, or add-ons like breakfast). It is possible to use a fixed rate for these attributes, possibly varying by day of week or season, but static rates will likely not capture the full revenue potential of attribute-based selling. However, analytically pricing these attributes requires predicting guest demand for attribute selections, based on attribute pricing, which can be quite complex. Price sensitivity will depend on the attractiveness of each attribute as well as the price implications of combination of attributes, and this interdependency will be difficult to calculate. Analytical approaches to calculate price sensitivity at this level, like conjoint analysis, choice modeling or controlled experiments, have been used in other industries, but have yet to be proven out in hospitality with available hospitality booking data.[4]

Moving away from the use of room types as a primary unit of sale also introduces complexities for inventory management, as it impacts booking counts and room assignments. Under this new technique, how will revenue managers and front desk agents know what rooms are still available for sale? Some have suggested that the attribute-based model will allow hotels to continually "re-optimize" remaining inventory, finalizing room assignments upon arrival. This can represent a huge change to current practice, and likely will involve some additional analytical or systems support. Overbooking will also be impacted. To ensure that revenue is not impacted by no-shows or cancellations, it might be necessary to forecast cancellations by attribute type, and change the way that overbooking is managed in the CRS and PMS.

This is not to say that attribute-based pricing is not achievable. At this point, with significant investment already underway by a number of important industry players, it seems likely that some form of attribute-based pricing will be implemented by some portion of the industry. However, much of the industry will remain tied to pre-bundled rate products and room types for the foreseeable future. This raises the question of how each type of player will compete in a "hybrid" market, and how distribution partners will adapt to support the new model, while serving their existing clients. It seems logical that the revenue potential of attribute-based selling will be impacted in an environment where not all players have adopted this capability.7

4 B. Vinod, "Hotel retailing with attribute-based room pricing and inventory control," Journal of Revenue and Pricing Management (2019), 18:429-433

7 DETERMINING YOUR FUTURE

The next generation of pricing techniques, like price optimization, profit optimization and attribute-based selling have increased in complexity and sophistication, evolving with an increasingly complex and data-intensive environment. Yet, they have been developed by building on, or working hand in hand with, widely practiced techniques. These techniques continue to deliver significant value if they are implemented in the right way for the appropriate property and market conditions. Ensure that your company is not missing out on something that can be implemented relatively easily and could deliver significant value. Keep in mind, given the wide diversity of scale, level, and market conditions, there isn't one dominant technique that will work best for all hotels. Each company will need to figure out what will work best for them.

These emerging techniques are not yet widely practiced, in most cases, because current people, process and technology are not quite prepared yet to fully and broadly implement them. Implementation in most cases will require significant change across multiple departments and technology platforms.

In this section we will discuss how to determine which of these techniques might benefit your organization and what you need to plan for.

Price Optimization

In today's competitive environment, price optimization is one technique that most, if not all, hotel types would benefit from to some degree. As bookings move to digital channels, consumers have easy access to all rates in a market, so hotels need to compete more directly on price. Therefore, hotels must understand the impact of their price, and their competitors' prices, on their demand. Price optimization provides that capability.

Who can benefit?

Price optimization is generally applied to market rates, so the more transient demand that a hotel serves, the greater the positive impact of pricing based on the price/demand relationship. The more granularly this relationship can be calculated, the greater the benefit. For example, for properties with many room types, calculating price sensitivity at the room type level (as opposed to hotel level), means you can price room types independently according to demand, driving more revenue lift.

Economy or limited service hotels will benefit from price optimization alone in their automated systems, but, as we described earlier, more complex properties may need to incorporate displacement-based techniques with price optimization for full revenue benefit.

How to Prepare

Price optimization is driven by the relationship between demand, supply and price. Properly implemented, price optimization should analytically account for the price-demand relationship for your demand, and the impact of competitor pricing on your demand. It also needs to account for supply at any given time, meaning how many rooms are left to be sold. This is a complex calculation, requiring analytical support. You need to plan to invest in an analytically driven pricing system.

As noted earlier, price optimization solutions can generally work within the BAR spectrum approach– meaning minimum change to selling systems will be required. This should be sufficient for economy and limited service hotels. However, larger and more complex properties should consider allowing the RMS to manage more rates directly and more granularly, which means moving to continuous BAR or open pricing (see previous section).

The move to price optimization does impact the job of the revenue manager directly. As described previously, they need to shift to managing demand, ensuring the system has the full picture of market dynamics, as oppose to managing price directly. Continually overriding a price-optimized price will degrade system performance. Training and monitoring over time will be required.

Profit Optimization

The casino industry pioneered analytical profit optimization for their player segments. If casino revenue management focused on simply optimizing room revenue, players that are incentivized to come to play through a discounted room rate would be yielded out. The predicted gaming value of the guest must therefore be accounted for in the displacement-based optimization, and the discount (or comped) rate by segment is calculated by comparing the gaming segment's value to a displacement value that includes predicted gaming spend. This technique has proven extremely successful in driving enterprise profitability for casino hotels, where the vast majority of room demand comes from casino segments. Hotels with significant non-rooms revenue have been interested in replicating this success.

The rising cost of distribution has also driven interest in profit optimization. The relatively high cost of acquisition means that some channels are more profitable than others, so comparing top line revenue across channels is no longer enough. The challenge with accounting for distribution or acquisition costs, is that rate parity agreements limit the potential to offer different rates based on the profitability of the channel. That said, there is always the potential that you would adjust pricing across all channels based on the volume of business predicted to come in through any one channel.

Who can benefit?

Properties with a diversity of owned, non-rooms offerings can benefit from a profit optimization approach. This includes resorts, casino hotels, integrated resorts or city center properties with a significant variety of food and beverage offerings. Simpler properties may not see the benefit to justify the investment, even considering high acquisition costs.

How to prepare

Outside of casino segments, revenue management and selling systems are not set up to fully deploy profit

optimization, although work is currently advancing in this area to support non-gaming hotels and non-gaming segments. Much like price optimization, the complex and interrelated tradeoffs required to execute this at a level of detail that drives value makes the problem difficult, if not impossible, to solve manually.

The biggest challenge most companies will face is the data requirements associated with total segment spend, because it requires bringing together information from disparate selling systems. To reiterate the point we made earlier, this will likely require an extensive data quality initiative on the front end.

It is important to note here that profit optimization considering guest value does not necessarily imply customer-centric pricing. The RMS can take spend at the segment/channel level (which makes the data collection a bit easier and more reliable) and make recommendations at a channel or segment level (depending on how price can be executed). If you are considering customer-centric or personalized pricing, profit optimization will likely be an important input to the successful implementation of that technique, but the execution of customer-centric pricing happens in the selling systems.

In preliminary testing, profit optimization tends to trade off some ADR for occupancy. This RevPAR tradeoff is made as the system expects additional spend once guests are on premise – producing a greater overall property profit. This makes intuitive sense, but it could negatively impact RevPAR, while increasing profits. If you are going to go down this road, you need to realign metrics to account for this shift. This will require ensuring everyone who tracks the RevPAR metric is on board with the change.

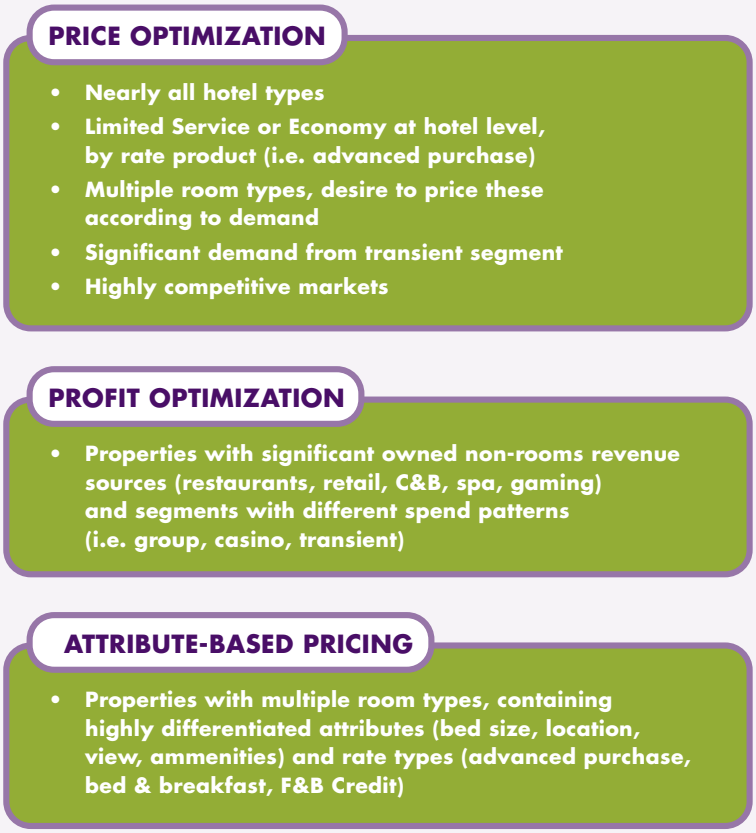

Figure 2: Emerging Pricing Techniques and What Fits Best

Attribute-Based Pricing

As a reminder, we define attribute-based pricing as dynamic pricing for pre-defined attributes that supports attribute-based selling. It is possible to have attribute-based selling without dynamic attribute-based pricing, and there is probably some up-sell value in the fixed price approach over the current room type/rate plan practice. However, the full value from attribute-based selling is likely only going to be realized if there is some degree of dynamic pricing of attributes.

Who can benefit?

Attribute-based pricing will be most effective for complex properties with many room attributes that are clearly differentiated (view, balcony, size, fireplace etc.), and/or with the possibility of a variety of rate distinctions or package add-ons (flexible rate, breakfast, spa, food and beverage). The simpler the property, the less advantage gained from splitting out the room into its component pieces. For example, an economy or limited service hotel that has only one room product, and no non-rooms revenue outlets could very easily implement multi-rate display with price optimization to offer optimized advanced purchase and flexible cancellation rates in their current infrastructure, rather than making the significant investment in booking engine and selling system changes that attribute-based pricing requires.

How to Prepare

Attribute-based pricing requires a clear and differentiated list of attributes that drive customer value. The strategy around defining these attributes will be key to the success of driving incremental revenue and profits. For example, do customers notice, or value, the difference between a 480 square meter room and a 520 square meter room? Too fine of a distinction among attributes will add noise and reduce confidence in output, impacting revenue gain. Similarly, selecting the right number of attributes that facilitate choice without adding too much work or overhead to the search is extremely important. You want shoppers to feel that they have choice and flexibility to customize without the confusion of too many options.

Organizations will need to plan for a period of test and learn to establish the value of attributes, as there will likely be no data to tune the models initially. This could involve both live test and some off-line research or experimentation.

Selling systems and RMSs will need to be completely revised to change from selling the current cross of room type and rate type to selling the base room plus room attributes. This will be a significant change management effort, so companies need to be sure that they will get a corresponding return. Revenue management teams will need to adjust their thinking to understand the drivers of demand for the base product versus the drivers of value on the various attributes, adding an additional layer of complexity to that job.

As we alluded to before, there is a very real danger that the move to attribute-based pricing will have a negative impact on consumer satisfaction. When the airlines unbundled their products, and began charging for seat location and checked bags, there was significant consumer backlash. Resort fees, cleaning fees and parking fees are already garnering negative consumer sentiment. Hotels need to be very careful that the benefits of flexibility, improved search and customization are reinforced, not the fact that each attribute adds to the base price.

Artificial Intelligence and Machine Learning in RM Analytics

Artificial Intelligence (AI) and Machine Learning (ML) are not technically new pricing techniques. Rather they are analytical approaches that support the pricing techniques we have previously described. However, there has been so much talk about these capabilities associated with revenue management, that it is worth understanding what they are broadly, how they relate to pricing generally, and how they can be implemented in the pricing and revenue management function.

AI refers to the theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages. The value of AI is in its ability to automate complex, but routine, tasks ordinarily performed by humans (categorizing pictures, scanning resumes for best fit candidates or recommending products). ML is a subset of AI that refers to algorithms that teach a computer to learn to solve a problem on its own. ML is particularly useful for complex problems where outcomes can be widely varied, and ever changing. Good ML applications are image detection (you don't have to show the computer every picture of me for it to know this one is me), spam detection (with ever changing language) and recommendation engines (as new options are added, preferences evolve over time, and more behavioral data is collected).

Most of these algorithms are not new. The theory has been around for decades or more, and some of the algorithms are even widely used, but under a different category. The reason there is increased excitement in this area is that advances in computing power mean these techniques can finally be used to solve real world business problems, using all available data, at the speed of business.

Business leaders should approach this capability with excitement and caution. These techniques will allow us to unlock insights that were previously inaccessible, and can free up valuable human time for strategic, business impacting, work. However, there are some significant challenges with these algorithms that need to be well understood, before they are widely implemented.

AI & ML algorithms require specialized skills sets, repeated development iterations and lots of compute power to execute. You are likely going to acquire them from a vendor partner, and so you will need to plan to invest time and resources to successfully acquire, configure and implement.

AI & ML algorithms are the very definition of "black box". The complexity of the algorithms makes it very difficult at times to understand why the model makes a recommendation, or how it is thinking. If you trust the data inputs and the strategy, this might not be too much of a problem. However, revenue managers are frequently called on to explain their pricing strategies, so if the analytical processes supporting those strategies are not transparent, the organization could lose confidence.

AI & ML algorithms learn on your data, and therefore behave only as your data dictates, unless otherwise specifically specified. This means that if there are missing data or biases (unintentional or otherwise) the results will also be biased. There are many examples of this already in industry, and there will be more if leaders are not very cautious and aware of their data's limitations.

Best fit for RM

There have been decades of research and practice for revenue management analytics, beginning with the airline industry and continuing in hospitality, which means an extensive amount of testing (and trial and error) to develop best practices. As far as hospitality analytics go, despite limited implementation, revenue management analytics are relatively mature. As such, one would be right to be skeptical of a completely reinvented approach, relying on AI & ML, without any demonstration of material benefits over existing, well researched, approaches. Making this distinction is understandably technical, and potentially quite out of the scope of a revenue leader's responsibility. Make sure someone on the team evaluating a potential vendor partner can help you determine the robustness and appropriateness of the analytical approach.

AI and ML could be effectively incorporated in the revenue management analytical process in the following ways:

- **Data modeling** like no-show/cancellation rates, detailed price sensitivity or detailed competitor effects
- **Forecasting**, not replacing all RM system forecasts, but specifically used for more volatile forecast
- **User feedback**, providing natural language processing support to facilitate help search or improve user performance by suggesting next steps, surfacing relevant data or providing further analyses
- **Personalization**, at the point of purchase, leveraging RM pricing recommendations, recommend products or packages according to guest preferences and price sensitivity

8 CONCLUSION

Pricing continues to be a critical capability for lodging companies to drive profits and remain competitive in a rapidly evolving world. Companies need to be proactive in determining what their revenue strategy is, and how pricing contributes to that strategy, or they will be left behind.

Hotels have had a reputation of putting themselves at the mercy of innovations driven by partners and vendors. Recent innovations in pricing capabilities, like price optimization, profit optimization and attribute-based pricing will be no different, unless hoteliers commit to taking control of their future. In most cases, adopting one of these techniques will require planning, research and significant change management. Those companies that begin this journey today will be much better positioned to successfully implement it when the technology stack and the organizational capabilities are ready.

It is easy to get caught up in buzzwords and promised profits. It's much harder to spend the time thinking through implications, selecting the right strategy and sticking to your plan. However, this is the only route to success if hotels want to remain competitive and stay in control of their profits.

Here are our recommendations to ensure you are well-positioned to take advantage of what's next in pricing:

1. Shore up your use of the existing techniques first, even if it's in a manual environment. Get the basics right. Advances in pricing are built with the existing foundation in mind, so you have to get that right before you move forward.

2. Make sure your entire organization is clear on the strategy. Define the strategy and then determine what technology will be required to support it. Work with counterparts in sales, marketing and operations to ensure you are aligned on goals and outcomes and start early in socializing any upcoming technology implementations to ensure broad support for your projects.

3. Start working on your data, and the business processes that impact your data, now – and expect to keep this up after any system implementation. If you are considering any automation initiative, this is a crucial first step, and one that always takes longer than expected. If you are already automated and want to put a new technique like profit optimization or attribute-based pricing on the roadmap, this goes double. Both of these techniques will require accessing new data sources, ones that revenue management doesn't typically work with, so ensuring quality in this data early will lead to earlier and greater success with these endeavors.

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Dr. Kelly McGuire, Principle, McRevenue, LLC is an author and analytics evangelist. She is passionate about helping hospitality and gaming businesses infuse science into the art of hospitality with big data and analytics, through strategic investments in technology, talent and business process redesign. She helps organizations turn desire into strategy and strategy into execution to ensure the organization responsibly and effectively realizes value from data, analytics and technology investments. She is the author of two books on analytics in hospitality, "Hotel Pricing in a Social World" and "The Analytic Hospitality Executive".

She recently served as senior vice president, revenue management, distribution and direct marketing for MGM Resorts International, where she oversaw strategy and execution of revenue management, distribution and direct marketing for MGM's Las Vegas resorts, and guided the selection and implementation planning for MGM's revenue management and distribution technology roadmap. Prior to joining MGM, Kelly served as vice president, advanced analytics at Wyndham Destination Networks where she led a team of scientists and developers that built custom analytical solutions for Wyndham's vacation rental business, as well as the RCI exchange. Before joining Wyndham, she was executive director, hospitality and travel global practice at SAS, the world's largest privately held software company, where she specialized in analytics solutions for hospitality and travel companies. She holds an MMH and a PhD in revenue management from the Cornell School of Hotel Administration and is a past board member of HSMAI Americas Revenue Management Board.

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Thank you!

HSMAI Region Europe wishes to express gratitude to both Kelly A. McGuire and Alex Dietz for sharing their knowledge and working together with HSMAI to produce and distribute this publication amongst HSMAI's members.

HSMAI is a global organization founded in the US in 1927. HSMAI Region Europe is the European arm of the organisation. HSMAI Region Europe is committed to growing business for the hotel, event and travel industry and their partners, and is the industry's leading advocate for intelligent, sustainable revenue growth on a local, national and European level. The association provides practical tools, insights, and cutting edge expertise to enable knowledge sharing and enhance professional development as well as fuel sales, inspire marketing, transform businesses digitally and optimise revenue. This white paper contributes to our commitment to our members.

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