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Improving Hotel Revenue through the Implementation of a Comprehensive Dynamic Pricing Strategy: A Conceptual Framework and Empirical Investigation of Jordanian Hotels

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Abstract

The present study aimed to investigate the revenue implications of implementing a comprehensive dynamic pricing strategy in the hotel industry. To this end, the study proposed a conceptual framework that depicts the comprehensive dynamic pricing strategy as a composite concept combining dynamic pricing and value-based pricing along with a set of supporting tactics, including fenced pricing, product versioning, opaque pricing and bundled pricing. Principal component analysis was used with multiple regression analysis to identify the main components of the comprehensive dynamic pricing strategy and verify the impact of their implementation on the revenue performance of a sample of 131 Jordanian hotels during 2014-2016. The empirical results strongly supported the hypothesis that hotels that actively implement dynamic value-based pricing strategies and their supporting tactics achieve significantly higher RevPARs than those that do not actively implement these strategies and tactics. Accordingly, a set of recommendations were proposed to help hoteliers implement the comprehensive dynamic pricing strategy effectively.

Key words: Revenue Management, Dynamic pricing, Value-based pricing, Hotel pricing tactics.

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INTRODUCTION

The Jordanian hotel industry experienced a major setback during the past six years due to the unstable political situation in neighboring Arab countries. While the demand for hotel rooms fell by 18.2% between 2010 and 2016, the supply increased by 17.9% during the same period (Based on our analysis of statistics from the Jordanian Ministry of Tourism and Antiquities, 2016). This led to an industry-level overcapacity, forcing hoteliers to lower room rates in the hope that this will promote occupancy. However, while reducing room rates is a good tactic to improve occupancy, it is not an effective strategy to maximize hotel revenue. Past empirical evidence showed that although discounting room rates enables hotels to achieve relatively higher occupancy rates than those of their competitors, it does not allow them to reap relatively higher RevPARs (e.g. Enz et al., 2004 and 2009; Enz and Canina, 2010; Enz et al., 2015). The demand for hotel rooms is relatively inelastic, which means that reducing room rates may not stimulate sufficient demand to compensate for lower rates and allow for increased revenue (Canina and Carvell, 2005; Enz et al., 2009). Therefore, the discount pricing strategy is not a suitable approach to improving the revenue performance of hotels. What Jordanian hotels really need in these difficult circumstances is to improve both average room rates and occupancy to maximize RevPAR, and this can be achieved if these hotels implement a comprehensive dynamic pricing strategy. The advantage of this strategy is that it allows a hotel to maximize revenue by selling rooms at appropriate rates reflecting the current and expected level of demand, customer willingness and ability to pay and competitors' prices (see Badinelli and Olsen, 1990; Abrate et al., 2012; Bayoumi et al., 2013; Oses et al., 2016).

However, despite the practical importance of dynamic pricing strategy, the empirical investigation into the revenue implications of its implementation in the hotel industry is still relatively limited. Our review of previous literature showed that most of the existing research on hotel dynamic pricing was conducted

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in developed countries, while much less research was undertaken in the Middle East countries. To the best of our knowledge, no empirical study has been conducted so far in the Jordanian hotel industry. Moreover, the majority of empirical studies on dynamic pricing took the form of single case studies that aimed at formulating and testing dynamic pricing models for price and revenue optimization (e.g. Badinelli and Olsen, 1990; Badinelli, 2000; Bitran and Caldentey, 2003; Abdel Aziz et al., 2011; El Gayar et al., 2011; Bayoumi et al., 2013). Fewer studies were conducted to verify the implementation level of dynamic pricing at the hotel industry level (e.g. O'connor and Murphy, 2008; Abrate et al., 2012; Oses et al., 2016), and even less considered the impact of implementing a comprehensive dynamic pricing strategy on hotel revenue performance. Therefore, the current study sought to fill these gaps in the literature by examining the revenue implications of implementing a comprehensive dynamic pricing strategy in the Jordanian hotel industry. It is hoped that the results of this study will help hoteliers to gain a better understanding of how to implement dynamic pricing strategies and tactics in an integrated and effective manner and contribute to existing literature on this topic.

LITERATURE REVIEW

Empirical literature on hotel dynamic pricing can be broadly divided into three main strands. The first strand comprises single case studies that seek to develop and test proposed dynamic pricing models to improve pricing decisions and revenue (see Badinelli and Olsen, 1990; Badinelli, 2000; Bitran and Caldentey, 2003; El Gayar et al., 2011). For instance, Abdel Aziz et al. (2011) proposed a revenue management model that sets room rates dynamically each night rather than using a predetermined set of rates. The model incorporates the price elasticity of demand and uses a high-level simulation to estimate future bookings based on previous booking scenarios. The proposed model was found to contribute positively to room revenue. Likewise, Bayoumi et al. (2013) developed a dynamic pricing model using the concept of price multipliers that provide a varying discount/premium over some seasonal reference price. The application of this model to Plaza Hotel in Alexandria was found to improve revenue by 16% compared to what the hotel could have obtained using the original pricing strategy.

The second strand of empirical studies examined dynamic pricing practices and, more generally revenue management, at the hotel industry level. For example, Enz and Canina (2005) found, based on the positive correlation between the average daily rate and occupancy, that nearly all U.S. hotels adjust room rates in conjunction with occupancy changes. However, hotels that set room rates above the competition tend to adjust room rates more actively with changes in occupancy than those that set room rates below the competition. Similarly, Canina and Enz (2006) found that U.S. hotels that have relatively higher RevPARs than their competitors tend to adjust room rates according to changes in occupancy. They also noted that this practice is more prevalent in hotels that price above the competition than it is in hotels that price below the competition. Willie et al. (2015) examined the impact of revenue management application in both the U.S. and Canadian hotel industry, particularly hotels operating in Niagara. Based on ANOVA analysis, they found that hotels using revenue management system in an integrated manner with human capital and technology achieve higher revenue performance results. They also noted that the Canadian hotels apply revenue management more comprehensively than their U.S. counterparts, and are consequently being rewarded with relatively higher RevPARs.

Ivanov and Ayas (2017) investigated the application of various revenue management practices in the Turkish hotel industry. They found that Turkish hotels focus mostly on price discrimination and room availability guarantee, whereas overcontracting and overbooking are limited in use. They also found that most of these hotels do not have a revenue manager or a department specialized in revenue management; this function is usually the responsibility of the general manager, front office manager or marketing manager. In addition, they found that online travel agencies are the most important distribution channel used by these hotels, followed by the hotel's website, the travel agents and the tour operators. More importantly, they found that the application level of revenue management practices in these hotels depends on the hotel's category, its chain affiliation, location and size. Likewise, Rodríguez-Algeciras and Talon-Ballestero (2017) examined the level of revenue management application in the five-star Barcelona hotels. They found that although revenue management is a recent phenomenon in Barcelona hotels,

almost all of these hotels practice some sort of revenue management, whether or not they pursue the same strategies or tactics. They also found that most of these hotels have a revenue manager, yet they do not use specialized revenue management software. They further found that the implementation level of revenue management in these hotels is not determined by hotel size or management model (property, renting, franchising, or management). Rather, it is determined by chain affiliation and operational scope (national or international). In addition, they found that Barcelona hotels' customers consider dynamic pricing a fair practice.

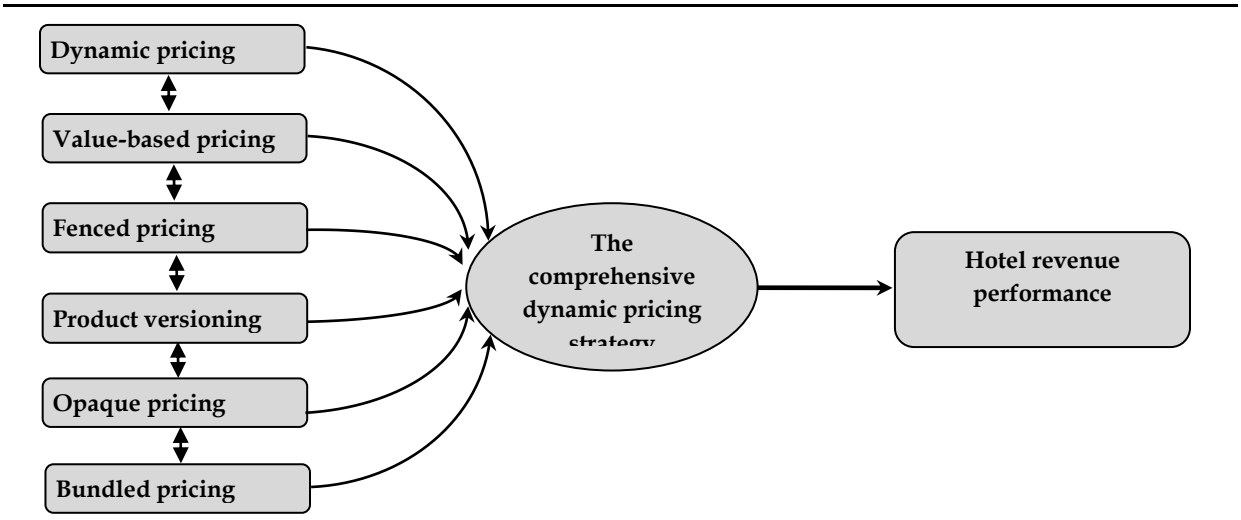
The third strand examined the evolution of hotel room rates through online booking channels and price-changing patterns. For example, O'connor and Murphy (2008) investigated whether four- and five-star hotels in six major European cities apply three techniques of revenue management: (1) varying room rates in response to changes in demand; (2) opening/closing electronic distribution channels in response to changes in demand; and (3) differentiating room rates on third-party channels according to changes in demand. They found that less than a quarter of the sample hotels employ the first technique, while the other two techniques are limited in use, indicating that there is no sophisticated revenue management in these hotels. Abrate et al. (2012) investigated the extent to which European hotels utilize dynamic pricing strategies by considering how hotel room rates change as approaching a predefined arrival date. They found that more than 90% of room rates change over time, and that the amount of change in these rates depends mostly on the customer type, the hotel's star rating and the number of competitors with available rooms. Likewise, Oses et al. (2016) examined price dynamics in the Basque Country's hotels between 2013 and 2014. The authors identified two different price-changing patterns favored by these hotels. The first pattern involves changing a number of room rates for adjoining, future overnight stay dates on the same date. The second pattern involves altering the room rate a set number of days in advance of the overnight stay date.

Unlike the above studies, the current study aimed to investigate the revenue implications of implementing a comprehensive dynamic pricing strategy in the Jordanian hotel industry, which remains a relatively underresearched industry. To achieve this, the study developed a conceptual framework that outlines the key elements of the comprehensive dynamic pricing strategy based on a review of previous literature (e.g. Badinelli and Olsen, 1990; Hanks et al., 2002; Wirtz el al., 2003; Kimes, 2009 and 2010; Tranter et al., 2009; Hayes and Miller, 2011; Anderson and Xie, 2012; Zhang and Bell, 2012; Oses et al., 2016). The conceptual framework depicted the comprehensive dynamic pricing strategy as a multidimensional concept incorporating dynamic pricing with value-based pricing, along with a range of supporting tactics, including fenced pricing, product versioning, opaque pricing and bundled pricing. The framework was based on the implicit assumption that the active and integrated implementation of these strategies and tactics allows the creation of an adaptive pricing structure capable of accommodating temporal changes in demand and differences in customer willingness to pay, which helps minimize lost revenue from empty rooms and cannibalization, thus improving average room rates and occupancy, and ultimately maximizing RevPAR (see Figure 1. below).

Lost room revenues arise due to the contradictory nature of hotel supply and demand and the perishability of hotel room nights. These characteristics make it difficult to modify supply to suit demand at all times, prompting hotels to adjust room rates dynamically according to time changes in demand. This process is known as dynamic pricing (Abrate et al., 2012; Oses et al., 2016). On the other hand, cannibalization occurs when customers leave a higher-priced market segment to grab lower-priced products offered by the same company to other lower-priced market segments (Tranter et al., 2009). In this case, high-priced customers would pretend to have low willingness to pay to avoid paying higher rates and benefiting from lower room rates (Hayes and Miller, 2011). Addressing this problem requires a set of proactive measures, including: grouping customers into different market segments according to their perceptions of the value of rooms and services; identifying the actual willingness to pay of each customer segment; maintaining a full separation between different customer segments; diversifying purchase options and prices as desired by each customer segment; and using opaque channels to offer discounted rates in an undisclosed way to price-sensitive customers (Hanks et al., 2002; Wirtz el al., 2003; Kimes, 2009 and 2010; Tranter et al., 2009; Hayes and Miller, 2011; Zhang and Bell, 2012; Anderson and

Xie, 2012). These measures can be implemented through the adoption of a value-based pricing strategy supported by a combination of tactics, including fenced pricing, product versioning, opaque pricing and bundled pricing.

Figure 1. The proposed conceptual framework



DYNAMIC PRICING

In the context of dynamic pricing, the room rate is set based on the date of booking and the date of arrival, and the evolution of bookings between these two dates (Badinelli and Olsen, 1990; Oses et al., 2016). Different booking dates for the same room category and arrival date are sold at different rates. Therefore, this process involves grouping all similar rooms into a single category, and applying a dynamic rate that varies according to the reservation time based on the current occupancy rate, available room inventory, competitors' rates and other considerations (Bayoumi et al., 2013; Oses et al., 2016). As time passes and more reservations are received, the residual room inventory and the forecast of demand over the time remaining before the arrival day can be used to adjust the room rate (Badinelli and Olsen, 1990) at different booking times until the day of arrival.

The room rate is also determined by the length of stay (Badinelli and Olsen, 1990). If an overnight room is considered a perishable product, different overnight stay dates are different products (Oses et al., 2016), meaning that each overnight stay by a customer in the same room can be sold at a different rate. Therefore, in the case of a multiple-night stay, the room rate can vary from one night to another depending on the demand level for each night of the customer's stay (see Noone and Mattila, 2009). From this point of view, the hotel can charge a different rate for each night of a customer's stay, or receive a daily rate equal to the average price of all nights the customer will stay at the room (Noone and Mattila, 2009; Kimes, 2010). By virtue of this, customers will pay different rates even when they have one and the same booking conditions depending on the time of reservation (Ivanov and Zhechev, 2012) and the length of stay.

VALUE-BASED PRICING

In addition to temporal changes in supply and demand, the room rate should also be adjusted based on customer willingness and ability to pay (Badinelli and Olsen, 1990). Since different customers place different values on the same product based on their perceptions and price sensitivity, they are willing to pay different prices (Hayes and Miller, 2011). Thus, if a room was sold at lower rates than what customers were actually willing to pay, the hotel would lose the consumer surplus and therefore gave up some revenue that could have been realized. Conversely, if the room was sold at higher rates than the

customers' willingness-to-pay, the hotel would lose these customers to competitors and suffer from low occupancy (Hanks et al., 2002; Hayes and Miller, 2011). In either case, the hotel would lose some potential revenue, lowering RevPAR. In order to minimize lost revenue, the hotel should understand the perceptions of current and potential customers of the value of rooms and services and match the prices it charges with customers' perceptions and willingness to pay (Tranter et al., 2009; Hayes and Miller, 2011). In this way, different customers are charged different rates, thereby capturing more revenue and satisfying more customers (Hanks et al., 2002).

SUPPORTIVE TACTICS

There are many tactics that can be used to leverage dynamic and value-based pricing, and more generally revenue management, without causing inconvenience to customers or creating potential for cannibalization. The most notable tactic is fenced pricing, which allows customers to segment themselves into appropriate price categories based on their willingness to pay and product characteristics (Hanks et al., 2002; Wirtz el al., 2003). Fenced pricing is essentially a self-selection process that involves offering a range of purchase options to customers to choose from based on their preferences and willingness to pay (Zhang and Bell, 2012). Purchase options (or price fences) can be diversified based on a number of logical considerations such as: payment terms, reservation method, time of booking, repeat purchase, length of stay, customer characteristics, motives of travel and accommodation, flexibility of cancellation and change, and so on (see Hanks et al., 2002; Wirtz el al., 2003; Kimes, 2009 and 2010; Tranter et al., 2009; Zhang and Bell, 2012).

By diversifying purchase options, hotels can effectively differentiate prices offered to customers, while preventing high-priced customers from trading into low price categories and restricting lower prices to price-sensitive customers, specifically those willing to accept restrictions for reduced prices (Hanks et al., 2002; Wirtz el al., 2003). Another effective way to diversify options is product versioning, which involves varying the form of the room or service and then varying the price (Hayes and Miller, 2011). By differentiating rooms and services by the level of amenities or service, hotels can appeal to different customer segments and make them feel like they are buying different products (Kimes, 2010). This tactic is cost-efficient, because the difference in cost between different product versions is relatively slight, while the amount of impact of these versions on customer perceptions is significant (Hayes and Miller, 2011).

In addition, lower room rates should be obscured through opaque pricing and bundled pricing. Opaque pricing, also known as opaque selling, is especially useful for hotels with excess capacity that seek to discount room rates in an undisclosed manner and sell them to a specific segment of customers through online booking channels, e.g., Hotwire.com and Priceline.com (Kimes, 2009). These discounts are specifically targeted to price-sensitive customers, who are looking for the lowest prices available without paying attention to the full details of hotels offering these discounts (Jerath et al., 2009; Anderson and Xie, 2012). For example, customers who buy a hotel room through Hotwire.com can only choose arrival and departure times, the hotel's sub-area within the city, and its star rating. These customers are not given the full details of the selected hotels or their specific locations until the completion of the purchase, but in exchange for accepting this ambiguity they can obtain discounted prices that are not refundable (Anderson and Xie, 2012). By doing so, hotels can sell available rooms at their actual rates to regular customers through normal booking channels, and sell vacant rooms at discounted rates to non-regular customers through opaque booking channels (Anderson and Xie, 2012). This helps hotels to sell additional rooms and maximize revenue, while maintaining rate and brand image (Kimes, 2009).

Bundled pricing, on the other hand, involves combining several products into one package sold at a specific price, usually less than the total price of the individual products included in the package (Hayes and Miller, 2011). Since the final package is sold at one set price, individual product prices are opaque to customers (Tranter et al., 2009). For example, if a hotel can combine the lower rate room with some other services (such as spa treatment and internet service), the actual room rate will be disguised, because it will be difficult for customers to determine the prices of the individual products included in the package (Kimes, 2009 and 2010). In addition to preventing high-priced customers from benefiting from lower

prices, this tactic also helps increase the total value of the purchase for customers who wish to purchase multiple hotel services at a discount, without compromising the integrity of the hotel's brand (Kimes, 2009 and 2010; Tranter et al., 2009; Hayes and Miller, 2011).

Thus, the effective implementation of a comprehensive dynamic pricing strategy that combines dynamic pricing, value-based pricing, fenced pricing, product versioning, opaque pricing and bundled pricing allows the creation of an adaptive pricing structure that helps to improve prices and occupancy, thus maximizing revenue from available rooms and services. Accordingly, the following general hypothesis can be proposed for this study:

H1: There is a significant positive relationship between the level of implementation of the comprehensive dynamic pricing strategy and hotel revenue performance. That is to say that: hotels that actively implement dynamic value-based pricing strategies and their supporting tactics achieve significantly higher RevPARs than those that do not actively implement these strategies and tactics.

The purpose of this study is to empirically test this hypothesis in order to verify whether the conceptual framework outlined above and thus the proposed comprehensive dynamic pricing strategy are applied in practice in the Jordanian hotel industry and the revenue implications thereof.

PARTICIPANTS AND PROCEDURES

The data were collected through a structured questionnaire delivered by the authors personally to 131 owners/managers of hotels located in three major tourist destinations in Jordan. The preliminary draft of the questionnaire was prepared in early 2017 based on our review of previous literature and the contents were verified by a number of academics and hotel managers. The final draft of the questionnaire was sent to hotel owners/managers between April and July 2017. The focus was on classified hotels located in Amman, Petra and Aqaba due to the significant activity of the hospitality industry in these destinations. At the beginning of 2017, there were 255 star-rated hotels in Jordan, of which 219 hotels were located in the above mentioned destinations. Of these hotels, only 131 hotels agreed to participate in the survey. These hotels comprised about 13,420 rooms, representing approximately 71% of the stock of rated hotel rooms, and 49% of the total hotel rooms in Jordan. Of the 131 hotels included in the sample, the majority were three-star hotels (33.6%; n = 44). Four- and five-star hotels comprised 17.6% (n=23) and 16.8% (n=22) of the sampled hotels respectively, while one- and two-star hotels represented 13.7% (n=18) and 18.3% (n = 24), respectively. In terms of location, the majority of the sampled hotels were in Amman (65.7%; n=86), while Aqaba and Petra hotels constituted 19.8% (n=26) and 14.5% of the sampled hotels (n=19), respectively.

MEASURES

Hotel revenue performance can be measured using a composite index such as RevPAR. To construct this index, each respondent was asked to report the annual average daily rate (ADR) and annual average daily occupancy rate (ADO) achieved by his hotel each year during the period 2014-2016. Each respondent was informed that ADR can be simply calculated by dividing the total room revenue for a given year by the total number of rooms sold during the same year. Likewise, each respondent was told to compute ADO by dividing the total number of rooms sold in a given year by the total number of rooms available for sale during that year. RevPAR attained by each hotel each year during the period 2014-2016 was then calculated by multiplying the hotel's ADR by its ADO, later by the authors of this study. Lastly, the mean RevPAR value for each hotel over the three-year period was calculated by summing the three-year values of RevPAR, and dividing the sum of these values by 3 years.

As mentioned earlier, the comprehensive dynamic pricing strategy can be seen as a construct consisting of a combination of pricing strategies and tactics. Therefore, a multi-item scale was constructed to measure this composite concept by using eighteen questions. Respondents were asked to indicate to what extent their hotels had been practicing a range of strategies and tactics related to dynamic and value-based pricing during the last three years (2014-2016). Responses to these questions were rated on an eight-point ordinal scale ranging from 1 (never) to 8 (always). Although the original measurement included eighteen items (i.e. questions), eight items had to be removed because they were either cross-

loaded or had factor loadings below 0.5 in the initial principal component analysis model. This process resulted in the retention of ten items that were used in the final principal component analysis model (Cronbach's Alpha = 0.883). The statements included in the remaining ten items are provided in Table 1 below.

Table 1. The ten questionnaire items used in principal component analysis

Items	*Questionnaire Items indicating dynamic value-based pricing strategies and tactics*
Dynamic pricing item 1	"Charging standard rates during high occupancy times and offering promotional rates during low occupancy times."
Dynamic pricing item 2	"Adjusting room rates day by day or even several times per day depending on changes in market conditions and competitors' prices".
Dynamic pricing item 3	"Adjusting room rates for a specific day in the future depending on the acceleration in booking pace for that day and the number of rooms remaining for sale".
Dynamic pricing item 4	"Setting the room rate at the time of booking, taking into account the possibility of changing the level of demand from night to another during the customer's stay at the hotel."
Value-based pricing item 5	"Selling the same classes of rooms at different rates to customers with different willingness to pay".
Value-based pricing item 6	"Pricing rooms and services in line with customer perceptions and valuations of the benefits offered by these products."
Fenced pricing item 7	"Adding more benefits to higher room rates (e.g. better amenities) and more restrictions on lower room rates (e.g. early booking, nonrefundable rates, cancellation penalties)", while allowing customers the freedom to choose based on their preferences and ability to pay.
Product versioning item 8	"Diversifying purchasing options by creating slightly different versions of the same room product ranging from low to high values and selling them to customers at different prices".
Bundled pricing item 9	"Offering low-priced rooms in an opaque way by packaging these rooms with other services such as transportation to and from the hotel, food and beverage, internet access, etc ".
Opaque pricing item 10	"Offering low-priced rooms for online booking through a third party website (e.g., Hotwire.com and Priceline.com), without revealing the hotel's identity or brand until the reservation is completed."

In addition, there are other variables that can affect hotel revenue performance and the implementation level of the comprehensive dynamic pricing strategy. These may include the hotel's size (in terms of number of employees and rooms), service orientation (limited or unlimited), chain affiliation

(independent, franchized or chain-affiliated), and so on. All these variables are assumed to be implicit in the hotel star rating variable. Therefore, the focus of this study was solely on the star rating variable, which was used as a control variable, and assessed by asking each respondent to indicate the star rating of his hotel.

DATA ANALYSIS

The empirical verification of the proposed dynamic pricing strategy and its impact on hotel revenue performance comprised two phases of analysis: principal component analysis (PCA) followed by multiple regression analysis. As discussed before, the proposed comprehensive dynamic pricing strategy is a composite concept encompassing ten items that indicate a set of strategies and tactics and their level of implementation in the hotel industry. From a statistical point of view, the inclusion of these items (i.e. observed indicators) as independent variables into a multiple regression model will inevitably cause a multicollinearity problem. To mitigate this problem and derive the key components of the proposed strategy, the ten items were subjected to PCA using the direct oblimin rotation method with Kaiser Normalization. The direct oblimin rotation method was applied, because it takes into account the presumed relationship between these strategies and tactics. After conducting PCA, the dependent variable, RevPAR, was regressed on the principal components derived from the ten items to verify whether the regression coefficients agree in terms of their signs and statistical significance with the predictions stipulated in the general hypothesis underpinning the proposed conceptual framework.

RESULTS OF PRINCIPAL COMPONENT ANALYSIS

The applicability of PCA was verified by examining the correlation matrix of the ten items (see Table 2. below). The correlation coefficients for the vast majority of the ten items were well above 0.30 and statistically significant at $p < 0.01$ and $p < 0.05$. The determinant of the correlation matrix was 0.012 above the rule of thumb of 0.00001. The overall significance level of the correlation matrix tested with Bartlett's Test of Sphericity was also statistically significant at $p < 0.001$ (Chi-square = 557.397). Furthermore, the Kaiser-Meyer-Olkin measure of sampling adequacy was about 0.87, indicating that the sample size was sufficient for PCA application. Together, these results suggested that the multicollinearity problem was not a major concern and that meaningful principal components can be extracted from the ten items (see, e.g., Sharma, 1996; Tabachnick and Fidell, 1989; Johnson and Wichern, 2007; Everitt and Hothorn, 2011; Field, 2013; Gie Yong and Pearce, 2013 for more detailed information about the application of PCA).

Table 2. Correlation matrix for the ten dynamic pricing indicators (strategies and tactics)

Variables	*Mean*	*Median*	*S.D*	*RevPAR*	*Item 1*	*Item 2*	*Item 3*	*Item 4*	*Item 5*	*Item 6*	*Item 7*	*Item 8*	*Item 9*
RevPAR	37.47	32.00	19.56										
Dynamic pricing item 1	5.65	5.00	1.63	.375**									
Dynamic pricing item 2	4.99	5.00	1.41	.281**	.680**								
Dynamic pricing item 3	5.05	5.00	1.64	.346**	.626**	.543**							
Dynamic pricing item 4	4.92	5.00	1.48	.357**	.529**	.509**	.431**						
Value-based pricing item 5	4.92	5.00	1.53	.231**	.655**	.667**	.577**	.442**					
Value-based pricing item 6	4.81	5.00	1.38	.344**	.567**	.457**	.545**	.517**	.471**				
Fenced pricing item 7	2.95	3.00	1.52	.176*	.537**	.506**	.450**	.441**	.523**	.333**			
Product versioning item 8	3.05	3.00	1.47	.304**	.444**	.231**	.265**	.161	.296**	.221*	.460**		
Bundled pricing item 9	3.09	3.00	1.45	.127	.471**	.394**	.415**	.322**	.338**	.315**	.423**	.312**	
Opaque pricing item 10	2.90	3.00	1.34	.118	.401**	.352**	.418**	.275**	.275**	.267**	.355**	.310**	.409**

**. Correlation is significant at the 0.01 level and *. Correlation is significant at the 0.05 level.

As shown in Table 3. below, PCA for the ten items resulted into two-component solution with eigenvalues greater than one. The eigenvalue for the first component is 4.924, and 1.078 for the second. The two principal components account for almost 60% of the total variability in the ten items. The first component accounts for nearly 49.2% of the total variability; whereas the second component explains just 10.8% of the total variability. In terms of component loadings, it is clear from Table 3. that the six items assessing the implementation level of both dynamic pricing strategy and value-based pricing strategy are strongly correlated with the first component, with positive loadings range from 0.745 to 0.827. Therefore, this component is referred to as the component of dynamic value-based pricing strategies and abbreviated as the "DVS component". On the other hand, the four items assessing the practical application of the supporting tactics are highly correlated with the second component, with positive loadings range from 0.679 to 0.794. Accordingly, this component is referred to as the component of dynamic value-based pricing tactics and abbreviated as the "DVT component".

Table 3. Results of the principal component analysis

Principal components	*Eigenvalue*	*% of variance*	*Questionnaire items*	*Loadings*	*Communality*
DVS Component	4.924	49.2%	Item 1 Dynamic Pricing	.827	0.746
			Item 2 Dynamic Pricing	.816	0.668
			Item 3 Dynamic Pricing	.767	0.607
			Item 4 Dynamic Pricing	.745	0.564
			Item 5 Value-based Pricing	.798	0.641
			Item 6 Value-based Pricing	.757	0.582
DVT Component	1.078	10.8%	Item 7 Fenced Pricing	.698	0.576
			Item 8 Product Versioning	.794	0.650
			Item 9 Bundled Pricing	.679	0.488
			Item 10 Opaque Pricing	.689	0.479

It should be noted that the correlation coefficient between the two principal components was 0.483. This is because PCA was performed by using the direct oblimin rotation with Kaiser Normalization, which allowed the extraction of correlated components.

RESULTS OF REGRESSION ANALYSIS

In the second phase of the analysis, the two principal components obtained from PCA were included in a multiple linear regression model as independent variables. Given its expected impact on hotel revenue performance, the star-rating variable was introduced as a control variable in the regression model. This variable was separated into two dummy variables, one for the midscale hotel category (i.e. three-star hotels) and the other for the economy hotel category (i.e. one- and two-star hotels). The luxury hotel category (four- and five-star hotels) was used as a reference group. The regression model was estimated as follows:

$$RevPAR_i = ß_0 + ß_1 DVS_{i,1} + ß_2 DVT_{i,2} + \delta_3 MHG_{i,3} + \delta_4 EHG_{4,i} + \varepsilon_i$$

Where, *RevPAR* denotes the RevPAR index and $ß_0$ refers to the regression constant. $ß_1$ and $ß_2$ denote the regression coefficients describing the effect size of both the DVS and DVT components on the RevPAR index, respectively. δ_3 and δ_4 are intercept shift terms for the dummy variables. DVS refers to the first component reflecting the application level of dynamic value-based pricing strategies; DVT denotes the second component indicating the implementation level of dynamic value-based pricing tactics. MHG refers to the dummy variable related to the midscale hotel category; EHG refers to the dummy variable

pertaining to the economy hotel category; and, ε is the error term. The null hypothesis that was tested by this regression model was that the RevPAR index is not significantly affected by both the DVS and DVT components; meaning that the regression coefficients of these variables are zero or the overall F-test of significance is not statistically significant.

Several steps were taken to ensure that the inclusion of the DVS and DVT components together with the RevPAR index in the model does not violate any of the classical requirements for multiple regression analysis. First, the assumption of linearity was verified using standardized residuals plots, where verification of scatter plots indicated a good linear relationship between the RevPAR index and each principal component. Second, the normal distribution assumption was verified using One Sample Kolmogorov-Simirnov Normality Test, where $p > 0.05$ for both the DVS and DVT components as well as the RevPAR index suggested that these variables did not significantly deviate from normal distribution. Lastly, it was established that there was no multicollinearity problem using collinearity diagnostics, which showed that Tolerance Statistics for both the DVS and DVT components ranged between 0.751 and 0.770, and that values of Variance Inflation Factor ranged between 1.294 and 1.332.

Table 4. Results of multiple regression analysis based on the principal component scores

Independent variables	*Unstandardized Coefficient*	*Standardized Coefficient*	*T value*	*Sig. level*	*F. value*	R^2
DVS component	5.043	0.258	5.589	.000		
DVT component	2.496	0.128	2.785	.006	124.985**	0.799
MHG variable	-27.146	-0.668	-14.679	.000		
EHG variable	-37.611	-0.876	-19.079	.000		

Adjusted R^2 = 79.20%, ** significant at $p < 0.001$.

As shown in Table 4. above, the overall model that encompasses the DVS, DVT, MHG and EHG variables is significant in explaining the RevPAR index, with almost 79.9% of the variation in this index is explained by these variables (R^2= 0.799). The high R-squared value, together with the overall F-test of significance value ($F = 124.985$, $p < 0.001$), indicate a strong association between the RevPAR index and all the independent variables under study. These preliminary findings provide partial support for the hypothesis underlying the conceptual framework of this study.

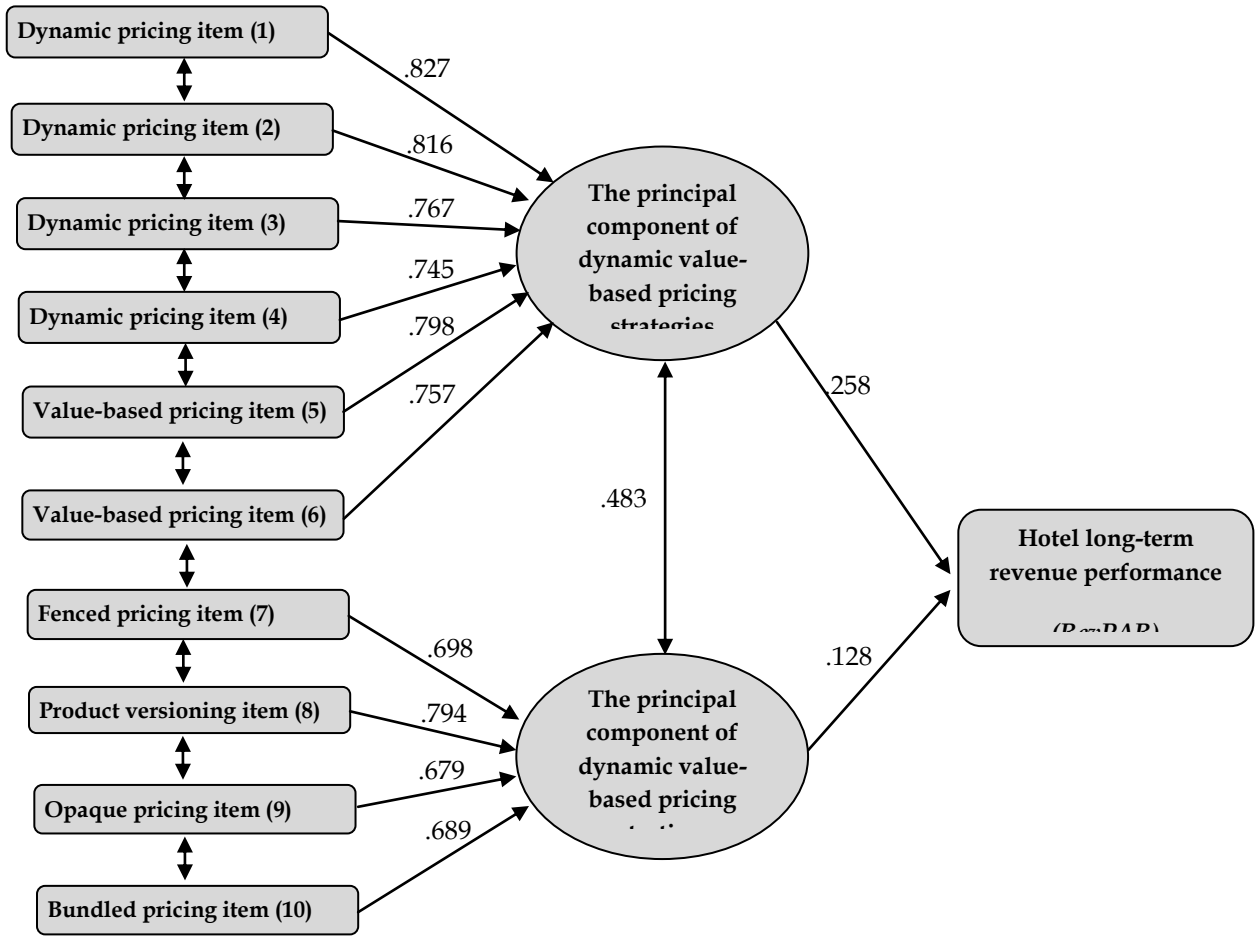
The regression coefficients (i.e. intercept shift terms) of the two dummy variables, MHG and EHG, are negative and statistically significant at $p < 0.001$, indicating that both economy and midscale hotels achieve significantly lower RevPARs than luxury hotels. More importantly, the regression coefficients of both the DVS and DVT components are positive and statistically significant ($t= 5.589$, $p < 0.001$ and $t= 2.785$, $p < 0.05$, respectively). The positive signs of these two coefficients indicate a positive relationship between the RevPAR index and both the DVS and DVT components. The significant positive coefficient of the DVS component implies that the greater the use of dynamic value-based pricing strategies, the higher the RevPAR achieved by the sample hotels. The same holds for the DVT component; the greater the utilization of dynamic value-based pricing tactics, the greater the RevPAR achieved by the sample hotels. Together, these results suggest that hotels that employ more elements of the proposed comprehensive dynamic pricing strategy perform financially better than those that do not, demonstrating the practical importance of implementing this strategy in the Jordanian hotel industry.

However, as shown in Table 4. above, the effect size of the DVS component (β_1= 0.258) appears to be twice as large as the effect size of the DVT component (β_2= 0.128). This difference in the effect magnitude can be attributed to the difference in the implementation level of the strategies compared to their supporting tactics. Returning to Table 2. above, it can be noted that the median responses to all the six items assessing the implementation level of dynamic value-based pricing strategies are 5, which implies that, on average, these strategies were often used by the sample hotels during the period 2014-2016. On the other hand, the median responses to all the four items that measure the application level of the supporting tactics are 3, suggesting that, on average, these tactics were rarely used by the sample hotels during the same period. Therefore, the low level of implementation of these tactics appears to have

diluted their impact on RevPAR, as evidenced by the bivariate correlation values for these tactics with RevPAR (range from 0.118 to 0.304). The opposite is true for strategies that seem to have been sufficiently used by the sample hotels during the period under review, and thus contributed more positively to RevPAR (ranged from 0.231 to 0.375).

Overall, the results provide strong support to the general hypothesis underpinning the conceptual framework of this study, which states that hotels that are more active in implementing both dynamic pricing strategy and value-based pricing strategy and their supporting tactics achieve significantly higher RevPARs than those that are less active in implementing these strategies and tactics (see Figure 2 below).

Figure 2. A summary of the empirical results obtained from PCA and MRA



IMPLICATIONS AND RECOMMENDATIONS

The implications of this study can be discussed in the light of the framework outlined in Figure 2. above, which is developed based on the empirical results derived from both principal component analysis and multiple regression analysis, specifically the principal components' loadings and multiple regression coefficients, taking into account the correlation matrix coefficients for the ten items encapsulated by these components, outlined in Table 2. As Figure 2. shows, based on the regression analysis results, there is a significant positive relationship between the RevPAR index and the two principal components that incorporate the ten items indicating dynamic pricing strategy and value-based pricing strategy and their supporting tactics. Together, the results suggest that adopting the proposed comprehensive dynamic

pricing strategy contributes positively to the revenue performance of hotels. This is especially true for hotels with limited and fluctuating demand, as is the case with Jordanian hotels, which suffer from poor demand due to the bad political conditions prevailing in the Middle East.

By decomposing the two principal components into their comprising items, we can come up with a number of recommendations on how hotels can implement a comprehensive dynamic pricing strategy that will enable them to maximize revenue from their available rooms.

First, it is recommended that hotels adopt a dynamic value-based pricing strategy that is capable of responding to time changes in supply and demand and competitors' prices. This strategy involves charging standard rates during high occupancy periods and offering promotional rates during low occupancy periods, while providing satisfactory services to customers. The strategy also requires that room rates be adjusted at different times of booking in line with occupancy rate, available room inventory and length of stay. In practical terms, this means setting a room rate for any specific day in the future depending on the acceleration in booking pace for that day and the number of rooms remaining for sale until the coming of that day, taking into account the expected changes in demand during the period in which the customer will be staying at the hotel. The strategy further involves pricing rooms and services in proportion with customers' different perceptions of the product value and offering the same categories of rooms and services at different prices to customers with different willingness to pay (see Badinelli and Olsen, 1990; Hanks et al., 2002; Noone and Mattila, 2009; Tranter et al., 2009; Kimes, 2010; Hayes and Miller, 2011; Bayoumi et al., 2013; Oses et al., 2016). These proposals are implicit in the six items that form the principal component of dynamic value-based pricing strategies, outlined in Figure 2 and described in Table 1.

Second, it is advised that hotels diversify their room offerings to suit different customers' preferences and willingness to pay by creating slightly different versions of the same rooms and diversifying purchase options based on a number of logical considerations such as: payment terms, reservation method, time of booking, length of stay, flexibility of cancellation and change and the like. It is also essential that hotels sell lower room rates in an undeclared manner, by packaging these rooms with other services and offering them through opaque channels. For example, they can use opaque online travel agencies to offer rooms at lower prices to non-regular customers, while using normal booking channels (i.e. the hotel's website) to offer rooms at their actual prices to regular customers (see Hanks et al., 2002; Wirtz el al., 2003; Kimes, 2009 and 2010; Tranter et al., 2009; Hayes and Miller, 2011; Zhang and Bell, 2012; Anderson and Xie, 2012). These proposals are implicit in the four items that comprise the principal component of dynamic value-based pricing tactics, shown in Figure 2. and described in Table 1.

Thirdly, with regard to Jordanian hotels in particular, these hotels have been shown to use both dynamic pricing strategy and value-based pricing strategy more frequently than their supportive tactics, and this behavior is reflected in the effect size of these strategies and tactics on RevPAR. The results indicated that the low level of implementation of tactics dilutes their impact on RevPAR. The opposite is true for strategies that seem to be used enough to contribute more positively to RevPAR. It is therefore recommended that these hotels implement dynamic value-based pricing strategies and tactics in a more active and integrated manner so that they can maximize revenue from the limited demand currently available in the market.

Lastly, given the need for accurate and immediate information to adjust room rates in different market segments and distribution channels in accordance with expected changes in demand and competitors' prices, it is proposed that hotels use advanced revenue management programs. By using the sophisticated dynamic pricing models included in these programs, hotels can predict room demand in the near future and set the appropriate rates for different room categories and different customers with different booking dates and different periods of stay and willingness to pay. This can help hotels reduce costs, save time and effort and achieve their revenue goals successfully. In addition, it is essential that hotels develop the skills of their staff to implement these strategies and tactics more effectively.

CONCLUSION

The purpose of the present study was to examine the revenue implications of implementing a comprehensive dynamic pricing strategy in the hotel industry. To this end, a conceptual framework drawing from previous literature on hotel revenue management and dynamic pricing was developed. The conceptual framework depicted the comprehensive dynamic pricing strategy as a multidimensional concept incorporating dynamic pricing with value-based pricing, along with a range of supporting tactics, including fenced pricing, product versioning, opaque pricing and bundled pricing. The framework was based on the implicit assumption that the active implementation of these strategies and tactics allows the creation of an adaptive pricing structure capable of accommodating temporal changes in demand and differences in customer willingness to pay, which helps minimize lost revenue from empty rooms and cannibalization, thus improving average room rates and occupancy, and ultimately maximizing RevPAR. Principal component analysis was used with multiple regression analysis to identify the basic components of the comprehensive dynamic pricing strategy and verify the revenue implications of their implementation in the Jordanian hotel industry.

Overall, the aggregated results of this study provided strong support for the general hypothesis underpinning the conceptual framework. The results suggested that hotels that actively use dynamic pricing and value-based pricing in conjunction with fenced pricing, product versioning, opaque pricing and bundled pricing achieve significantly higher RevPARs than hotels that do not actively employ these strategies and tactics. More specifically, the principal component analysis results suggested that the comprehensive dynamic pricing strategy consists of two main components, one is related to the level of implementation of dynamic pricing strategy and value-based pricing strategy and the other is related to the level of implementation of fenced pricing, product versioning, opaque pricing and bundled pricing. Moreover, the regression analysis results showed that both these components are positively and significantly related to the hotel's RevPAR, indicating a significant positive relationship between the level of implementation of the comprehensive dynamic pricing strategy and hotel revenue performance. This provides empirical evidence that adopting the comprehensive dynamic pricing strategy can contribute positively to the revenue performance of hotels; and, that hotels that employ more elements of this strategy can perform financially better than hotels that do not do so.

Despite the significant contribution of this study, it has a number of limitations. First, like any questionnaire-based study, the data used in this study largely depend on the credibility of the respondents and their personal interpretations of the questions included in the questionnaire. Nevertheless, the use of the questionnaire allowed access to internal data that might be otherwise difficult to obtain or measure, especially since this study examined multidimensional concepts in a sample that contained a large number of independent hotels, which tend not to disclose data to outsiders (95%, n = 124). In addition, this study did not address some of the factors that may be important to implement the comprehensive dynamic pricing strategy such as management structure, advanced revenue management programs, employee knowledge and experience in using various revenue management techniques. It is, therefore, recommended that future studies take into account these factors. Further empirical research at the intra-industry level is also recommended to locate differences in the extent to which dynamic value-based pricing strategies and their supportive tactics are implemented between hotels with different star ratings and service orientations. In addition, similar studies are needed to assess whether the conceptual framework of this study is generalizable to other contexts, such as restaurants and car rentals. Comprehensive research is also recommended to investigate the implementation level of the three main components of the overall revenue management strategy, namely, price management, capacity management and distribution channel management, and their impact on hotel revenue performance.

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