

CAR PARK REVENUE MANAGEMENT

Common ways to dilute car park revenues when attempting to apply classical revenue management practices

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Introduction

Although many travel-related companies, including cruise lines, car rental companies, hotels, tour operators and even some golf resorts use revenue management techniques for decades, it is only since the very recent years that its principles have been applied to the parking industry.

This is mostly due to the remarkable shift of the sector, becoming more and more digital with the development of smart city concepts (including dynamic pricing policies), of parking pre-bookings, including the on-line push of inventories that were not even digitalized before (hotel car parks), the emergence of price comparators, etc.

All these moves have led to a completely new picture of the parking industry with a competition context that has become ferocious, forcing the traditional actors (airports, urban parking operators, etc.) to become much more agile regarding their prices.

There comes the question of the type of technique should they turn to?

Variable pricing is not dynamic pricing

There have been several actors, mostly booking system providers, that have proposed – and claimed to have developed – revenue management solutions for the parking industry.

What exactly do they propose? Mostly to help the parking managers pre-define situations where the prices will indeed be automatically generated:

- for example they enable them to say “when the occupancy rate of the park is planned to be higher than 80%, the price should be 20€/day”
- or “when there are already 200 registered bookings for a given entry date, the prices should be raised by 10%”,
- or any other sophisticated combination of weekday, period of the year, customer segment, entry time and why not weather conditions!

The problem is that the system does not give them any clue about the setting of the pricing rule parameters!

Such systems are sold as dynamic pricing solutions when they are only variable pricing solutions.

The Yield manager is therefore like Mickey mouse in the famous cartoon “The sorcerer’s Apprentice” using a technique that seems to help him in the beginning, saving him a lot of time and effort... but soon becoming a monster, out of any control: an infernal machine!

How indeed could anybody construct a sound pricing policy, based on manual pricing rules, that would still ensure revenue optimization and not... revenue dilution?



Occupancy optimization can lead to revenue dilution

In all sectors, occupancy rate is indeed the central core of a revenue management strategy, alongside with daily rates and revenue per available unit.

However, in the parking industry it is a fake friend and, unfortunately, the most common mistake made by parking managers is to consider the occupancy rate as the core metrics for car park revenue management.

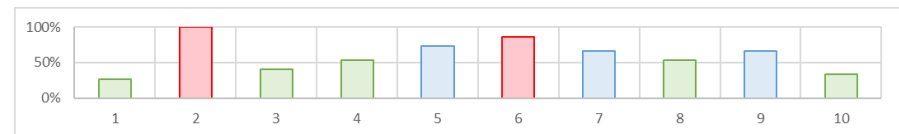
A false good idea: price upon occupancy rates

Let's consider a simple example of 10 consecutive days (it could be hours for city car parks or weeks for airport long-term car parks) with an inventory made of 15 parking spaces.

Let's now imagine that, for the 10 coming days, the occupancy of the various spaces is forecasted as follows (the grey boxes correspond to occupied places):

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
P 1	Grey	Grey	White	White	Grey	Grey	Grey	Grey	White	White
P 2	White	Grey	Grey	Grey	White	White	White	White	Grey	White
P 3	White	White	Grey	Grey	Grey	Grey	White	White	White	Grey
P 4	Grey	Grey	Grey	White	White	White	White	Grey	White	White
P 5	White	Grey	Grey	Grey	Grey	Grey	White	Grey	Grey	White
P 6	White	Grey	Grey	Grey	White	Grey	White	White	Grey	Grey
P 7	Grey	White	White	White	White	White	Grey	Grey	White	White
P 8	White	Grey	White	Grey	Grey	Grey	White	Grey	Grey	Grey
P 9	White	Grey	Grey	White	Grey	Grey	White	Grey	Grey	Grey
P 10	White	Grey	Grey	Grey	Grey	Grey	White	White	White	White
P 11	White	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
P 12	White	Grey	Grey	Grey	Grey	Grey	White	White	White	White
P 13	White	Grey	White	White	Grey	Grey	White	White	Grey	White
P 14	Grey	White	White	Grey	Grey	Grey	White	White	White	White
P 15	White	Grey	White	White	Grey	Grey	Grey	Grey	White	White

Which reads: the spot P1 is occupied on days 1 and 2, free on days 3 and 4, then occupied during 4 days until day 8, then free again the last two days. One can easily derive from this the following occupancy rates:



Nb	4	15	6	8	11	13	10	8	10	5
% Occ.	27%	100%	40%	53%	73%	87%	67%	53%	67%	33%

The park is forecasted to be full on day 2 and very saturated on day 6. Is it enough an information to base upon a pricing strategy in order to maximize the inventory revenues?

There are actors who apply a classical pricing routine like: “the higher the occupancy the higher the daily rate, and the lower the occupancy the lower the daily rate”. Doing so **they deliberately ignore the “entry information” (when do vehicles enter the parking lot and how long will they stay) which is the core reason for which the inventory will indeed be occupied the way they forecast it.**

It is rather easy to show that such occupancy-based pricing policies are not optimal as we will illustrate with simple examples.

One can easily imagine that a given occupancy situation can be achieved in many ways, in terms of length-of-stay composition, each of them corresponding to different revenue results.

Let’s then imagine different demand patterns all leading to the same occupancy situation (the one described above).

For example, let’s imagine, that people can book for only 4 types of stay: one-day, two-day, three-day or four-day stays. Moreover, let’s state that a standard price for each type of stay applies:

Customer type	Duration (day)	Daily rate	Total price
A	1	10 € / day	10 €
B	2	8 € / day	16 €
C	3	6 € / day	18 €
D	4	5 € / day	20 €

- For example, a one-day stay, type “A”, will correspond to a global revenue of 10€ with a daily rate of 10€.
- A four-day stay, type “D”, will correspond to a higher global revenue, 20€ but a lower daily rate: 5€.

Situation1: the extreme following pattern, for example, corresponds to the occupancy situation described earlier but with only short-stay tickets:

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	
P 1	A	A			A	A	A	A			
P 2		A	A	A		A	A		A		
P 3		A	A		A	A				A	
P 4	A	A	A	A	A	A	A	A			
P 5		A		A	A	A		A	A		
P 6		A	A	A		A			A	A	
P 7	A	A				A	A	A	A		
P 8		A		A		A			A	A	
P 9		A			A	A		A	A	A	
P 10		A			A	A	A	A			
P 11		A	A	A	A	A	A	A	A	A	
P 12		A	A	A	A	A			A		
P 13		A			A		A		A		
P 14	A	A		A	A	A	A		A		
P 15		A			A	A	A	A			
Nb	4	15	6	8	11	13	10	8	10	5	90
Rev	40 €	150 €	60 €	80 €	110 €	130 €	100 €	80 €	100 €	50 €	900 €
Occ.	27%	100%	40%	53%	73%	87%	67%	53%	67%	33%	60%

It corresponds to only one-day vehicles (type “A”) entering the car park. The global expected revenue would be 900€ (90 one-day tickets rated at 10€/day).

Situation2: Another equivalent situation in terms of occupancy is the following:

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	
P 1	B	B			D	D	D	D			
P 2		C	C	C		B	B		A		
P 3		B	B		B	B				A	
P 4	D	D	D	D	D	D	D	D			
P 5		A		C	C	C		B	B		
P 6		C	C	C		A			B	B	
P 7	B	B				D	D	D	D		
P 8		A		A		A			B	B	
P 9		A			B	B		C	C	C	
P 10					D	D	D	D			
P 11		D	D	D	D		D	D	D	D	
P 12		D	D	D		B	B		A		
P 13		A			A		A		A		
P 14	B	B		D	D	D	D		A		
P 15		A			D	D	D	D			
Present	4	15	6	8	11	13	10	8	10	5	90
Rev	68 €	152 €	0 €	48 €	122 €	72 €	30 €	34 €	72 €	10 €	608 €
Occ.	27%	100%	40%	53%	73%	87%	67%	53%	67%	33%	60%

In this case, the same occupancy is reached thanks to various lengths of stay: for example place P8 is occupied in days 2, 4 and 6 by 3 one-day stay vehicles (“A”) and then later on day 9 and 10 by one two-day stay vehicle (“B”), entering in day 8.

The result in terms of revenue is radically different: 608€.

Having this notion in mind, the fact that **the same occupancy situation can be achieved with different demand patterns**, can one still consider drawing its pricing policy upon the sole occupancy rate information?

Let’s see how some techniques have still developed, answering yes to the latter question. It is not rare indeed to see either software providers, pricing consultants or car park managers propose to apply the concept “the higher the occupancy the higher the daily rate, and the lower the occupancy the lower the daily rate”.

Pricing based on occupancy rates: a let’s cross the fingers strategy!

Let’s see to which results it can drive with a simple example, where the daily rate will depend on the forecasted daily occupancy rate (it could be at hour level, but the principle is the same). For a given booking request, the dynamic price will then be the sum of the daily rates for the days of the requested stay.

Let’s imagine the following dynamic pricing policy based upon occupancy:

Min Occ. Rate	Max Occ. rate	Price /day
0%	50%	5€ / day
50%	60%	6€ / day
60%	85%	8€ / day
85%	100%	10€ / day

Which reads: for an occupancy rate between 60% and 85% the daily rate to apply will be 8€/day (irrespective of the length of stay of the vehicle), whereas for an occupancy between 85% and 100%, the daily rate will be 10€/day, etc.

Let’s see what it gives for the vehicles of the **situation 1**.

The following table shows the various daily rates that would be demanded for each individual “A” ticket (in situation 1, only one-day tickets are observed).

Only on days 2 and 6 (depicted in red, in the below chart) will the rates be the ones corresponding to a normal one-day ticket. For the other days, discounts (up to 50%) will be applied in the hope that volume will compensate for revenue dilution.

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	
P 1	5 €	10 €			8 €	10 €	8 €	6 €			
P 2		10 €	5 €	6 €		10 €	8 €		8 €		
P 3		10 €	5 €		8 €	10 €				5 €	
P 4	5 €	10 €	5 €	6 €	8 €	10 €	8 €	6 €			
P 5		10 €		6 €	8 €	10 €		6 €	8 €		
P 6		10 €	5 €	6 €		10 €			8 €	5 €	
P 7	5 €	10 €				10 €	8 €	6 €	8 €		
P 8		10 €		6 €		10 €			8 €	5 €	
P 9		10 €			8 €	10 €		6 €	8 €	5 €	
P 10		10 €			8 €	10 €	8 €	6 €			
P 11		10 €	5 €	6 €	8 €		8 €	6 €	8 €	5 €	
P 12		10 €	5 €	6 €	8 €	10 €	8 €		8 €		
P 13		10 €			8 €		8 €		8 €		
P 14	5 €	10 €		6 €	8 €	10 €	8 €		8 €		
P 15		10 €			8 €	10 €	8 €	6 €			
Nb	4	15	6	8	11	13	10	8	10	5	90
Rev	20 €	150 €	30 €	48 €	88 €	130 €	80 €	48 €	80 €	25 €	699 €
Occ.	27%	100%	40%	53%	73%	87%	67%	53%	67%	33%	60%

Very likely to lose money! With such a pricing policy, the revenues (without volume compensation) is 699€.

Let’s see what it gives for the vehicles of the **situation 2**. The below chart shows the daily rates asked for each customer type, considering the days they would “cross” and their associated daily rates:

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	
P 1	7,5 €	7,5 €			8,0 €	8,0 €	8,0 €	8,0 €			
P 2		7,0 €	7,0 €	7,0 €		9,0 €	9,0 €		8,0 €		
P 3		7,5 €	7,5 €		9,0 €	9,0 €				5,0 €	
P 4	6,5 €	6,5 €	6,5 €	6,5 €	8,0 €	8,0 €	8,0 €	8,0 €			
P 5		10,0 €		8,0 €	8,0 €	8,0 €		7,0 €	7,0 €		
P 6		7,0 €	7,0 €	7,0 €		10,0 €			6,5 €	6,5 €	
P 7	7,5 €	7,5 €				8,0 €	8,0 €	8,0 €	8,0 €		
P 8		10,0 €		6,0 €		10,0 €			6,5 €	6,5 €	
P 9		10,0 €			9,0 €	9,0 €		6,3 €	6,3 €	6,3 €	
P 10		10,0 €			8,0 €	8,0 €	8,0 €	8,0 €			
P 11		7,3 €	7,3 €	7,3 €	7,3 €		6,8 €	6,8 €	6,8 €	6,8 €	
P 12		7,3 €	7,3 €	7,3 €	7,3 €	9,0 €	9,0 €		8,0 €		
P 13		10,0 €				8,0 €	8,0 €		8,0 €		
P 14	7,5 €	7,5 €		8,0 €	8,0 €	8,0 €	8,0 €		8,0 €		
P 15		10,0 €			8,0 €	8,0 €	8,0 €	8,0 €			
Nb	4	15	6	8	11	13	10	8	10	5	90
Rev	29 €	125 €	43 €	57 €	89 €	112 €	81 €	60 €	73 €	31 €	699 €
Occ.	27%	100%	40%	53%	73%	87%	67%	53%	67%	33%	60%

For example, the 2-day ticket (type “B”) entering on day1 and parking in place P1 will pay 5€+10€ (the daily rates calculated by the occupancy-based pricing policy) which corresponds to an average daily rate of 7,5€ (and a global revenue of 15€).

The global revenue is the same as in situation 1 (as the occupancy is the same and prices are based on occupancy), **which is clearly not normal as the market demand is completely different** (entries per length-of-stay segment are not the same!).

One can easily see that the prices proposed for the various customer types strongly differ from one day to another:

	Prices		Discounts	
	Max	Min	Original	%Min %Max
A	10,0 €	5,0 €	10 €	0% -50%
B	18,0 €	13,0 €	16 €	13% -19%
C	24,0 €	19,0 €	18 €	33% 6%
D	32,0 €	26,0 €	20 €	60% 30%

For example, the “D” tickets will sometimes correspond to a global value of 32€ (like the one entering on day5 in place P15) and some other times to a global value of 26€

(the one entering on day1 in place P4), while the original value is 20€ for 4 days of stay.

Many questions raise, like:

- How can one be reasonably sure that when the requested price is higher than normal (by "normal" we mean: "as observed in the past for the same length of stay") there will not be any customer refusing the higher price?
- How can one be reasonably sure that when the requested price is lower than normal, the volume will compensate for the daily rate?

There is no solid foundation for such reasonings and **the simple fact that a same given occupancy situation corresponds to so many different possible length-of-stay combinations should be an alert for those car park managers willing to adopt such risky pricing rules.**

Note that the **danger of such dynamic pricing policies** is not related to the level of discount or surcharge applied for a given occupancy situation, but to the fact that it is only based on occupancy. There is no reason that the two completely different demand patterns depicted above, should lead to the same revenue optimization results, just because they correspond to the same occupancy situation.

The way to optimize parking revenues clearly lies in other heuristics, not ignoring the length-of-stay demand patterns and capable to find the optimal combination between them all.