

## **Temporal pricing in tourism**

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# Chapter 7 Temporal Pricing in Tourism

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## Chapter Learning Outcomes

At the end of this chapter you will be able to :

- Explain the history and development of temporal pricing in the tourism context.
- Identify the key temporal factors and characteristics of pricing in the tourism industry.
- Select suitable temporal pricing tactics and strategies to maximise revenue.
- Anticipate future changes to temporal pricing practice in the tourism industry.

### 1. Introduction

This chapter introduces the key theoretical principles of temporal pricing and explains how they are operationalised within the context of the tourism industry. Temporal pricing is a key element within the overall practice of revenue management which can be defined as “the process of allotting the right capacity to the right customer at the right price, at the right time, so as to maximise revenue,” (Nair, 2019: 287). Considering temporal pricing in this way requires the critical relationships between time, demand, price, and capacity to be highlighted. This can be further explored by examining the temporal aspects of a given tourist journey and showing how they are factored into the price decisions made by companies in the industry.

When setting a price for their products and services, hotels, airlines and visitor attractions consider a range of key temporal factors to decide on the prices and inventory controls set for certain periods. Companies will consider the forecasted *demand for the arrival date* of the tourist, *the booking window* or in other words, the time between the tourist making the booking and their arrival, the *duration* of their stay, flight or visit and the tourist's individual balance of *price sensitivity versus time-sensitivity*. Companies use a combination of forecasting, price discrimination and inventory management to manage these temporal

factors to maximise revenue and profit often using a blend of automated systems, big data analytics and tacit market knowledge (Egan and Haynes, 2019).

## **2. History and Development of Temporal Pricing in the Tourism Context**

Over the last five decades temporal pricing has increased in complexity and digitalisation, with the introduction of automated decision-making systems using data analytics (Hormby *et al.*, 2010). It has also increased in scope, with its use expanding into many sectors within the tourism industry. However, the first use of temporal pricing can be attributed to the airline sector. In 1972 Ken Littlewood of British Overseas Airways Corporation (BOAC) established what is now known as 'Littlewood's Rule'. This rule saw the airline sector experiment with the concept of forecasting demand for different fare types to calculate their different anticipated revenue yields. More discounted fares were issued if their expected revenue value exceeded that of the anticipated values of full-fare tickets (Smith *et al.*, 1992). This evolved further as a result of the deregulation of the airline sector in the late 1970s. A consequence of this was reduced government control over routes and fares, which consequently made the sector more attractive to new entrants, particularly budget airlines, such as PEOPLExpress in the USA.

This immediately led to dramatic increases in competition and falling profits for the existing legacy airlines. It was Robert Crandell, CEO at American Airlines who saw temporal pricing strategies, or yield management as he entitled it, as a solution to this problem and pioneered the first yield management computer system, DINAMO (Dynamic Inventory Allocation Modelling Optimizer). American Airlines introduced non-refundable discount fares controlling the number of seats sold at that lower price whilst saving seats for higher-paying, later-booking passengers, thus maximising revenue per flight through achieving an optimum fare mix. American Airlines was able to control the availability of discounted fares through its computer systems so as to not make the business model unprofitable (Yeoman and McMahon-Beattie, 2016). Budget airlines that did not have these yield systems available tended to respond with drastic, unprofitable and unsustainable reductions in ticket prices causing severe financial pressures.

Through these temporal pricing strategies American Airlines achieved revenue growth of 14.5% and key budget competitors such as PEOPLExpress went out of business. In the mid-1980s, the CEO of Marriott International, J.W. Marriott Jr. met with Robert Crandell of American Airlines. At a time when the hotel sector was facing similar increased competition from budget operators, J.W. Marriott Jr. immediately saw the advantages of utilising similar strategies. He realised that the airline and hotel sectors shared the same characteristics of perishability and constrained supply. Although Marriott preferred the term 'revenue management' to 'yield management' (Hormby *et al.*, 2010), it too implemented a computer system that applied targeted discounts to price-sensitive market segments based on demand and variable lengths of stay, whilst keeping rooms available for later booking, less price sensitive customers.

The current century has witnessed the success of these temporal pricing strategies result in expansion into other areas of tourism through further recognition of the shared characteristics of perishability and constrained supply. The most important areas to try to

embrace temporal pricing in recent years have been capacity restricted tourism destinations such as national parks (Schwartz *et al.*, 2012) and visitor attractions such as theme parks (Heo and Lee, 2009).

### 3. Operationalising temporal pricing to optimise revenue and the future of temporal pricing

#### 3.1 Tourism industry characteristics

One of the key reasons J.W Marriott Jr. met with Robert Crandell of American Airlines was that he saw it possible to replicate the success temporal pricing had at American Airlines, given that the hotel and airline sectors shared some common characteristics which underpinned its operationalisation (see Figure 1). Whether the tourism product or service is a hotel room, an airline seat, a ticket to a visitor attraction or entry to a tourism destination, the characteristics of perishability, constrained supply, variable demand patterns, segmentable markets and high fixed costs versus low variable costs all apply. Firstly, perishability means tourism inventory has very little or no shelf-life. Once that hotel room, airline seat or entrance ticket has gone unsold, that sale is lost for ever. It cannot be resold at another time, in contrast to, for example, the sale of a pair of shoes in a retail store. Secondly, constrained supply means it is very hard for tourism businesses to vary the supply of their products and services to meet short-term changes in customer demand. Thirdly, the tourism industry is also characterised by highly dynamic demand patterns driven by seasonality and other factors such as working patterns and even short-term weather changes. In fact, estimating future demand in the tourism industry is complex because it can be influenced by many different environmental factors as well as characteristics personal to the individual consumer. Fourthly, tourists are easily grouped in distinct market segments based on their relative time-sensitivity and price-sensitivity. Finally, the industry tends to have high fixed costs, such as aircraft leases, but low variable costs associated with selling additional inventory within the overall available capacity.



Figure 1 – Tourism industry characteristics relevant to the temporal pricing process

We will now explain the temporal pricing process that allows for the correct alignment of time, demand, price and capacity to maximise revenue (Yeoman *et al.*, 2001).

### 3.2 Temporal Pricing Process

The temporal pricing process (as shown in Figure 2) is operationalised through the interrelationships between forecasting, price discrimination and capacity control with the overall aim being to maximise revenue at a specific point in time whilst factoring in the key characteristics of the tourism industry, as highlighted previously.

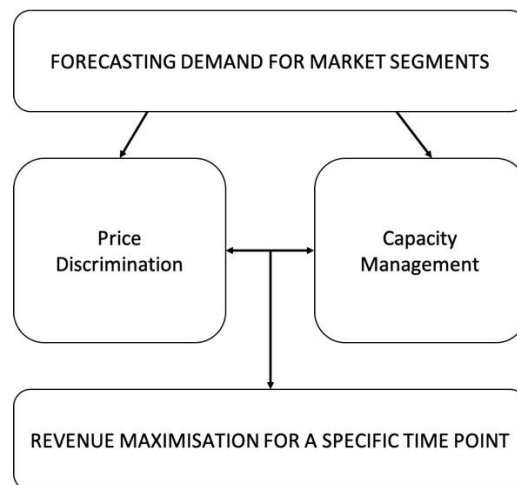


Figure 2 – The Temporal Pricing Process for Revenue Maximisation

The first step in this process is the forecasting of demand for market segments. Price discrimination and capacity management requires accurate demand forecasting. A range of factors impact the demand for a certain arrival date in the future and should be factored into the forecasting process. These include weather, customer booking patterns and historical no-show and cancellations rates (Yeoman *et al.*, 2001). It is also common practice for forecasts to be reviewed on at least a daily basis in order to maintain their accuracy and update temporal pricing decisions and strategies as the date of arrival comes closer. This helps to counter the variable demand patterns in the tourism industry, although there may be less variability in areas of the industry that are seasonally driven such as some tourist destinations and theme parks (Heo and Lee, 2009).

Forecasters must also take into account the differing levels of demand for each market segment at different points in the booking cycle. Forecasters are aware that some market segments will have demand earlier in the booking cycle where the booking window is longer, such as leisure markets and that some may have greater demand later in the booking cycle where the booking window is short, such as business markets. It is also important to recognise that market segments that are more time sensitive such as the business market are generally also less price sensitive and vice versa for leisure markets. This enables price discrimination to take place where different prices can be charged for the same tourism product or service, based on whether the market segment contains early booking, price sensitive customers or later-booking, price insensitive customers. However, if a tourism business finds itself with lots of spare capacity very close to the date of arrival,

the low marginal cost of sales and the high fixed costs, coupled with the perishability of tourism inventory, may mean the business accepts a lower price (Heo and Lee, 2009).

This practice of price discrimination links closely to capacity management and the controls applied to ensure that the right prices go to the right customers at the right time to maximise revenue. The common goal here is to avoid the displacement of higher paying customers who book last minute by lower paying customers who book early. For some visitor attractions it may also be about protecting the quality of the experience and the sustainability of the destination (Heo and Lee, 2009; Schwartz *et al.*, 2012). Common capacity controls include payment controls such as advanced purchase, cancellation restrictions such as non-refundable fares and duration restrictions such as minimum length of stay. Transparent capacity controls also help justify to customers why they are being charged different prices for the same product or service (Heo and Lee, 2010) and avoid them viewing this as an unfair practice. This is especially important in parts of the tourism industry where temporal pricing practices are less well established and therefore less accepted by customers.

The other element of capacity management is the avoidance of inventory going unsold, especially important given the perishable nature of the tourism industry. It is a long-established reality that customers often either don't show up for their hotel booking, flight or visitor attraction booking or cancel at short notice. This can leave tourism businesses with unsold inventory at the last minute with no hope of recapturing demand that was there earlier in the booking cycle. Therefore, there is a risk that inventory perishes and revenue is lost. Tourism businesses avoid this through the process of overbooking. In essence this means over-selling for a certain arrival date based on a historically based estimate of no-shows and last-minute cancellations. This practice is most common in the hotel and airline sectors. Although over-selling can maximise revenue, it must be managed carefully as if the expected number of no-shows does not occur, other customers may be denied boarding to an aircraft or may be outbooked from a hotel. This can lead to financial and reputational damage for the tourism companies through compensation and customer complaints. A renowned example of this is the United Airlines incident in 2017 where a passenger was forcibly removed from an overbooked flight causing a public outcry on social media (Ma *et al.*, 2019).

However, it is important to recognise that within the area of tourism destination management the notion of capacity controls often have alternative aims to pure revenue maximisation, especially for some tourism attractions that have a non-profit making business model. In this context capacity controls are more likely to be driven by social and moral issues such as controlling visitor capacity to protect the destination or attraction from overcrowding and reduce visitors' physical impacts (Schwartz *et al.*, 2012). This is particularly the case for heritage destinations where increasing the entry prices at times of high demand may be used to lessen negative impacts of over-capacity and protect it for future societies (Fyall and Garrod, 1998). The overall aim of temporal pricing processes in these types of attractions would therefore be to manage visitor load rather than increase revenue, in contrast to the more commercially focused areas of the tourist industry such as hotels and airlines. However, there appears to be a gap between the recognised need to use price strategies and capacity control processes in visitor attractions and tourism

destinations and their implementation in practice. Here revenue management implementation is often limited in terms of scope and sophistication (Leask *et al.*, 2013). This is currently due to a lack of access to technologically driven revenue management systems, limited use of price discrimination and challenges with the collection of consistent and reliable visitor data.

### **3.3 The Future of Temporal Pricing**

Since the revenue management systems designed by American Airlines in the 1970s, temporal pricing processes have been driven by changes and advancements in technology, despite some areas of the industry, in particular visitor attractions, benefitting less from the on-site revenue management systems on offer to hotels and airlines (Leask *et al.*, 2013). One of the most important areas of advancement has been the automation of these revenue management systems (Buhalis and Leung, 2018). However, revenue technologies are likely to continue to develop in sophistication and scope due to advances in technologies such as artificial intelligence, big data analytics and machine learning. It is likely that such developments will also enable an increase in the sensitivity of temporal pricing processes to the needs, values and buying behaviours of individual customers. Prices will not just be set for market segments, but for individuals. The following vignette explores the issues of personalised pricing in more detail.

#### **Vignette – The ethics of personalised pricing**

***The increasing analytical capabilities of machine learning and artificial intelligence tools embedded within revenue management and pricing systems are allowing for businesses in the tourism industry to provide unique price points for individual consumers based on their consumer profiles and online behaviour (Botta and Wiedemann, 2019). This is often termed 'personalised pricing' and is a practice likely to grow. In fact, Airbnb already has a machine learning tool that creates personalised offers based on 70 different demand and customer related factors.***

***Instead of tourism businesses having five to ten market segments they will have hundreds of micro-segments based on a range of consumer behaviour factors (Friedll and Hadwick, 2019). For example, for an airline, this could mean an offer in which the travel, wireless connectivity, a checked bag and a warm meal is included in the overall offer price. If the business can add value to the customer's request by addressing an additional need or desire then the result should be increased revenue and customer satisfaction.***

***However, there are ethical issues that surround the use of personalised pricing which must be considered in order not to result in the opposite reaction – dissatisfied customers and lost revenue! For instance, would you really charge a woman less than a man for entry to a theme park? The answer is hopefully, no! Personalised pricing practices must be based on segmentation using context and behaviour, rather than the protected characteristics of an individual such as gender (Schofield, 2019). This would be viewed as illegal in many countries. In addition, if consumers are unaware of, do not understand, or cannot avoid personalisation then it can also be viewed as an unfair practice. The key,***

***therefore, to the successful use of personalised pricing is transparency, restricting the use of consumer profiling where possible and allowing consumers the right to opt out of such personalised pricing practices should they wish to (Botta and Wiedemann, 2019).***

#### **4. Chapter Summary**

This chapter has provided an introduction to the temporal pricing process within the tourism industry through the identification of the key temporal factors and characteristics of pricing in the tourism industry, such as the impact of perishability on pricing. It has explained the history and development of temporal pricing through its origins in the airline and hotel industries to now being considered by visitor attractions and tourist destinations. It has shown how temporal pricing decisions that maximise revenue for tourism businesses can be reached through the accurate forecasting of demand and the setting of price discrimination and capacity management strategies. Finally, we have considered the increasing sophistication of revenue management technologies and the move from pricing based on market segments to personalised pricing through the development of revenue management systems driven by big data analytics, artificial intelligence and machine learning.

#### **5. Self-reflection Questions**

Can you identify the four key temporal elements of the tourist journey from a revenue management perspective?

When might a customer consider price discrimination to be unfair?

Can demand forecasting ever be totally accurate?

Should automated revenue management systems replace human decision-making on pricing?

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