

Yield Management: Editorial Introduction

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"Yield Management, which involves the allocation of seats to different classes of customers (paying different prices) has produced significant improvements in load factors and revenues for airlines and represents a major success for OR" Ormerod¹

According to the popular press and media a common discussion point amongst customers of service industries is why one person is charged more than another for what is apparently the same service or product. Typical anecdotal questions include 'Why is the passenger in the next seat on an aeroplane paying less than half of the fare that I have been charged?' or 'Why is it costing me £70 to travel to London from Birmingham on the train when the passenger across the aisle has a ticket that cost only one quarter of this?' The answer to this perceived unfairness is usually due to Yield Management (YM), sometimes also called revenue optimisation.

Given that service organizations operate in a wide range of markets which are composed of widely ranging elements that are expressed to differing degrees, then to define optimum pricing for any given service, in any set location and at a particular time provides a considerable challenge for members of the operational research community who may be involved. The problem has been expressed as one of matching a probabilistic demand to a set of finite resources in a manner that will optimise profit.

When a company is constrained by capacity, financial success is often determined by management's ability to exploit the capacity efficiently. The effective use of capacity is essential in capacity-constrained firms such as airlines, hotels and train-operating companies. In order to unlock and manage this process, an operational research approach is needed where the modelling of scenarios involves thousands of decision variables. These variables involve decisions about competition, cancellation rates, variable pricing and duration.

YM² had its origins in the deregulation of the US airline industry, although it is difficult to pinpoint an exact time for its inception. The major airlines, American, Delta, PanAM, United and Continental, came under pressure in terms of capacity management from a new 'start-up' airline PeopleExpress. This new airline began operating a 'no- frills' service out of the unfashionable Newark Airport (near New York) at unbeatably low prices to a number of high volume destinations. American eventually countered this competition by the use of a form of price discrimination. They offered some seats at a price which was lower than that which PeopleExpress could match economically, but maintained higher fares for those passengers who were willing and able to pay more. In this way, American were able to draw the low-spend passengers away from PeopleExpress, whilst maintaining the late booking, high-spend business and first class passengers who gave a high yield or revenue. This eventually led to the demise of PeopleExpress and their eventual take-over by erstwhile competitor Continental. The full story of this dramatic period in aviation history is recounted by Cross.³

The tools and techniques of YM are now widely recognised and used by an increasing number of service industries to maximise the utilisation of available capacity over time and to underpin financial viability. These service industries have a commonality: to sell a unit of inventory (time or space) and/or service product that is perishable. The application of YM has been used in a wide array of service industries, including hotels, package holidays, cruise ships, car rental, air and rail transportation and television advertising. These industries have the similar characteristics of constrained capacity, which is expensive to add to and a perishable service. Thus unsold capacity represents lost revenue, which cannot be recouped by later sale.

A commonly recognised broad definition of YM is 'the process of allocating the right capacity or inventory unit to the right customer at the right price so as to maximise revenue or yield'.² In the airline industry yield is normally represented as the revenue per passenger mile or kilometre (RPM/RPK) where yield is a function of both the price that the airline charges for its differentiated service options and the number of seats sold at each price.⁴ In the hotel industry YM is concerned with the market sensitive pricing of fixed room capacity relative to a hotel's specified market segments. Here the goal of YM is the formulation and profitable alignment of price, product and consumer. Thus in the hotel sector YM has been defined as a 'revenue maximisation technique which aims to increase net yield through the predicted allocation of available bedroom capacity to predetermined market⁵ segments at optimum price'.⁵

Therefore a range of papers have been selected for this part-special issue that address the contribution of operational research's understanding and knowledge of YM. These papers are drawn from and build upon the 'Yield Management' stream, organised by the guest editors at the Operational Research Society's 39th Annual conference held at Bath University in September 1997.

Botimer and Belobaba,⁶ in their paper *Airline Pricing and Fare Product Differentiation: A New Theoretical Framework*, illustrate how the conventional theory of price discrimination overestimates passenger demand and then develop a generalised cost model of airline fare product differentiation that includes information on the relationship between competing airline fares and the impact of restrictions on the buying behaviour of customers. Passengers who can meet certain restrictions may switch to lower fares, but seat inventory control can be used to prevent this from happening. Their model can also be used to develop the optimal price for joint fare products.

Coughlan⁷ developed a paper entitled *Airline Overbooking in the Multi-Class Case*, illustrating how airlines over-book to protect themselves against no-shows. Some airlines use a level control approach in which reservations are accepted until the total number of reservations exceeds an authorisation level. Coughlan tested two direct search methods to find the optimal authorisation level for each class and compared the results to the heuristic cabin-based approach used by Aer Lingus. He found that the Aer Lingus model was more conservative than his proposed approach and that his method would result in revenue improvements of 1-2%.

Kimes⁸ determines in her paper *Hotel Group Forecasting Accuracy* the effect of accuracy of group forecasts and identified the associated factors. Kimes showed that hotels with lower group forecasting error tended to be larger, depended more on group business, and made frequent updates. She also noted that experienced employees learned that frequent updates were the key to the reduction in forecast errors. The papers make a contribution to the understanding of group forecasting and group forecasting error, as this is essential to the successful implementation of YM techniques in hotels and other capacity constrained sectors.

Jones⁹ examines *Yield Management in UK Hotels: A Systems Analysis*. In the study a systems analysis was undertaken in order to develop a conceptual model of YM. Soft Systems Methodology¹⁰ was adopted to frame an answer to this question. Two emergent themes evolved from the study: first, planning, design and configuration of hotel YM issues; and second, those issues relating to implementation. The paper gives a systems analysis over- view of YM in UK hotels.

Therefore a range of papers have examined the contribution that Operational Research makes to YM. The editors hope that practitioners, academics, students, researchers and interested parties will be able to find some knowledge from the papers that promote understanding and new knowledge about the practices of YM.

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