Implementing Revenue Management

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BMI - Paper

July 2011

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July 2011

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Foreword

One of the final compulsory parts of the master's program of Business Mathematics and Informatics at the Vrije Universiteit Amsterdam is writing a BMI-paper. The goal is to analyse and describe a subject in the field of BMI based on existing literature.

In this paper, implementing Revenue Management, I describe how a company can implement Revenue Management. Revenue Management is a management technique that was introduced by airlines and meanwhile applied in other branches. Because of this, I will not limit myself to the airlines. Application in other branches may just have a different perspective. Many aspects and characteristics of Revenue Management have given me much new knowledge. In the history described in the introduction, we will see that several aspects have played a role in the development of Revenue Management.

Revenue Management has aroused my interest through the various aspects involved in selling a product. This was in the lecture of Optimization Business Processes by Dr. Ger Koole last year.
On the other hand, which company does not want to increase its profits? I have worked for over ten years at Corendon International B.V. It started as a summer job and now I am leading various projects that affect business process automation. Corendon is a tour operator. There is also Corendon Airlines and that is the airline. Because, Corendon has no application of Revenue Management, it seemed very interesting to me to go into this subject. So I can examine how a company like Corendon can implement Revenue Management.

I would like to express my gratitude to Dr. Ger Koole of the Vrije Universiteit Amsterdam for his guidance and advice in the process of writing this paper. The discussions we had made me critical and motivated.

Summary

Revenue Management represents the technique that helps big companies or small and medium enterprises to achieve highest profits by correctly identifying the customer groups that the company has to serve, establishing the right (quantity of) products and services as well as setting up the optimal prices to be offered to these customers. Although, there is a lot of information in the literature about Revenue Management, however the less literature is focused on the process of the implementation of Revenue Management. Therefore, this paper attempts to bridge this gap by explaining the steps necessary to undertake for the Revenue Management implementation, gives an overview and identifies the risks involved in the process of the implementation. The following research questions were formulated in order to identify how Revenue Management can be implemented:

1. What is Revenue Management?
2. What are the effectiveness and advantages?
3. What are the aspects of starting Revenue Management?
4. What are the risks of starting Revenue Management for companies?
5. What are the steps to implement Revenue Management in a company?

This paper answers the research questions based on the extensive literature analysis. One of the most interesting findings of this research in order to implement the effective Revenue Management system is to know and use products and services specific for the company', pricing techniques and to know how those pricing techniques may affect the companies' targets and customer segments. Another important conclusion is that for the implementation of a effective Revenue Management system an excellent data quality is required. The utilisation of the incorrect, poorly collected data will lead to wrong estimates and forecasts. This may cause wrong interpretations and affect the financial position of the companies.

The companies that are willing to implement a Revenue Management system, are required to: a) build a business case and analyse own business, b) estimate the product or service price, 3) decide if the company prefers to buy or to build a Revenue Management system, and 4) collect, store and forecast data in the system.

Finally, developments in the field of Revenue Management will continue as long as the technology develops further and it is important to follow constantly and carefully this evolution.

Introduction

Before the beginning of Revenue Management, BOAC (now British Airways) experimented with differentiated products by offering capacity controlled "Early bird" discounts to stimulate demand for seats that would otherwise remain empty. In the early 1980's Yield Management started the deregulation of the US airline industry. People Express, one of the new airlines that emerged, offered customers a low-priced ticket with minimal comforts. Major Airlines, for instance American and United, decided to compete with People Express by offering a few seats at even lower prices but maintaining higher prices on the rest of their seats. In this way, they attracted the price-sensitive People Express customers while still maintaining their other higher-paying passengers. As a result, many People Express passengers switched to the major carriers, and People Express eventually became bankrupt. Former People Express chairman Donald Burr blames many of People Express's problems on the lack of a Yield Management system [Anon. (1992); Cross, R.G. (1997)]. Other industries took note of American's success and implemented similar systems. Robert Crandall discussed his success with Yield Management with Bill Marriott, CEO of Marriott International. Marriott International had many of the same issues that airlines did: spoilable inventory, customers booking in advance, lower cost competition and balancing supply and demand. Since "yield" was an airline term and did not necessarily refer to hotels, Marriott International and others began calling the practice Revenue Management [Cross, R.G. (1997)]. The company created a Revenue Management organization and invested in automized Revenue Management systems that would provide daily forecasts of demand and make inventory recommendations for each of its 160,000 rooms at its Marriott brand. Marriott's successful execution of Revenue Management added between $150 million and $200 million to the annual revenue. [Marriott, J. (2000)].

Revenue Management is applicable in various sectors. The most interesting sector for me is the tourism sector. Because the demand is high and remains high. That it remains high is because people will go on travelling. They can do it by car, train, bus or by plane. If they travel to another country and stay there for a few days, they will need a place to sleep. That could be their own house, a caravan or a hotel. However, in all these cases you will buy something and you'll have to decide where, when and what you would like to buy for which price. On the other hand, the seller has to decide how much he will ask for his product and how to maximize his profit. He can do so by using Revenue Management. There is a lot of information about Revenue Management, but what is still missing, is "Implementing Revenue Management". At the end of this paper I will give a survey of the steps for starting Revenue Management.

This paper first gives a brief overview of the definitions of Revenue Management. It will then go on to discuss its effectiveness and advantages. The third section of this paper will examine the aspects which are important for a company to start Revenue Management. In the fourth section the risks are described. The fifth section represents an overview of the implementation. In the last section you will find conclusions and observations.

1. What is Revenue Management?

A synonym for Revenue Management is Yield Management. This name is the traditional airline term. However, there are some differences between Revenue and Yield Management. One of these differences is that Revenue Management is more strategical and Yield Management is more tactical. Another difference is that Revenue Management is applicable in a wide area, Yield Management in a narrower area and Revenue Management considers costs.

When you sell a product or a service you are focused on a number of decisions. Think for example of selling a cup of coffee. You have to decide how much you want to ask for each cup. Pricing correctly is very important. You don't want to put off potential buyers, but you don't want to lose potential profits either. Another point is: what do you want to do at the end of the day? You can offer the last portion at a lower price, but then you have to decide how low. If the price is too low, customers will distrust the quality. Independent of the price, you also have to decide about the number of the cups you want to sell, the quantity. These are all common issues for the Revenue Management system implementation.

Another example and the most familiar example probably, comes from the airline industry, where tickets for the same flight may be sold at many different prices. This depends on product restrictions as well as the remaining time until departure and the number of sold seats. The use of such strategies has transformed the transportation and hospitality industries and has become increasingly important in retail, telecommunications, entertainment, financial services, health care, hotels, car firms and manufacturing. Revenue Management seems to have various definitions. I will discuss a few of them in the following text below.

A few statements made about Revenue Management are:

"Yield Management is an approach to maximizing profit by carefully monitoring and managing pricing, inventory availability and sales. It means managing the trade-off between filling all available capacity and charging the highest unit price, and ensuring that those customers most willing to pay for a product or service can do so"[Andersen, A. (1997)].

"Revenue Management is the art and science of predicting real-time customer demand at the micro market and optimizing the price and availability of products" [Cross, R.G. (1997)].

"Yield Management is a method which can help a firm to sell the right inventory unit to the right type customer, at the right time and for the right price" [Ingold, A. (2000)].

“Revenue Management is concerned with such demand-management decision and the Revenue Management methodology and systems required to make them. It involves managing the firm’s ”interface with the market” as it were – with the objectives of increasing revenues” [Talluri, K.T. (2004)].

“Yield management is the process of understanding, anticipating and influencing consumer behaviour to maximize yield or profits from a fixed, perishable resource (such as airline seats or hotel room reservations)” [Mauri, A.G. (2007)].

As you can see, different definitions are presented above. Although they differ, they also exhibit some similarities. By summarizing the content of the presented above definitions, it is possible to conclude that Revenue Management represents the technique to optimise revenue of a certain company by selling the right (quantity of) products at the right time, for the right price and to the right customer.

Does this mean that every company, which sells products or services, can apply Revenue Management? Let us consider the airline industry, businesses with a perishable inventory or business dealing with seasonal services and articles. For than timing is all-important. When demand varies over time, a business has both the opportunity to raise prices during periods of strong demand and they run the risk of excess inventory when demand is weak. If we compare this for example to a supermarket and the demand of a certain product is high, there is the possibility of replenishment. When the price of a product is too high and no one buys it, there is the possibility to lower the price. Back to the airline industry, there is no possibility to add extra seats to the airplane when the demand is high and there is fixed capacity. The ticket for a flight has to be sold before the plane takes off. Once the plane has departed, the unsold seat inventory has no value and the product or service is perishable. That means that there are high fixed or sunk costs. In our supermarket this is not the case. The basics that make the difference for companies to use Revenue Management are: a) perishable inventory, b) fixed capacity, and c) high fixed or sunk costs [Cross, R.G. (1997)].

The efficiency and advantages of Revenue Management are described in the next chapter and the third chapter is about the aspects that follow the basics.

2. Effectiveness and advantages

This section describes the real-life examples on how the companies realized financial benefits at different levels of company functioning through effective Revenue Management or advice. These examples were taken from big-scale (hotel, airlines) and small-scale (Small and medium (SME)) enterprises. The presented below examples show how the implementation of the Revenue Management system or advice through low-cost and high revenue policies, modernization of the company and investment into the Revenue Management decision support system or changing the way the business were done previously has helped the companies to increase their revenue, “bit” the competitors and retain old or attract new customers.

Several authors report “success stories” on how effective Revenue Management has been done in practice [Andersen, A (1997), Unternehmen und Märkte (1992), Cross, R.G. (1997)].

For example, in 1989 The Carlton Beach Hotel in The Hague has successfully introduced and implemented its own Revenue Management system, designed to serve specific needs of the Hotel. Since the implementation, the hotel reported an increase in revenues by 20% and the profits by 17% [Andersen, A. (1997)].

Another example of successful Revenue Management system can be found in British Airways. Among the reported in 1992 reasons of company success were cost cutting and sophisticated Yield Management. The company attributed its success to being “a low-cost and high-revenue carrier” [Unternehmen und Märkte (1992)].

The next successful Revenue Management implementation example can be found within the Austrian Airlines company, that has been one of the most consistently profitable airlines in Europe in the past decades. During the Gulf War that has caused profits of the most airlines to decline, the Austrian Airlines has experienced its “twenty-first consecutive year of profits” [Cross, R.G. (1997)]. This has proven the company’ capability to perform effectively during extremely cyclical periods. The company owes its success to smart investment choice into a Revenue Management and decision-support computer system. This system has helped to monitor all historical data on the company flights as well as has made it possible to perform flights forecasts up to a one year period with high precision. Moreover, the new Revenue Management system has allowed the company management to look for future business opportunities by supplying it with decision-making tools to forecast future flights demand. In addition, the implementation of this system has enabled the company to keep her prices at stable level while other companies were trying to survive by lowering their flight prices [Cross, R.G. (1997)].

Finally, the Revenue Management success stories can be also found within Small and Medium Enterprises (SME). For example, Cross (1997) gives an example of the barbershop whose owner was not initially able to run her business optimally. On some week days, her barber salon had few clients while in the weekends it was “packed”, resulting in “unhappy and un-served” customers. By functioning in such a way, the owner had constantly incurred high losses. By following the Revenue Management advice which was to offer the customers discount (20%) if they visit the salon on the week-days and raise the price slightly (20%) if they visit it in the weekends, the owner was able to changed the way her business were functioning. The implementation of the advice has created the smooth customer flow, made her clientele “happy” due to better customer services and, most importantly for the owner itself, has increased business revenue up to 30%.

The previous examples demonstrate that the effectiveness of Revenue Management should be company or industry specific. While companies have a lot of common features that are important for the Revenue Management (for example, demand for customers, operating costs), they differ in offering different products and services. Those product and services, depending on the industry, require specific attention while implementing the Revenue Management system. Most companies start thinking of Revenue Management after a few years when everything is running as desired. They think there is some strategy that tells them what to base their prices on to help them earn more. However, there is no one strategy that tells you at which price you could sell a ticket. Nor is there a strategy which tells you at which price you could offer your hotel room. Nevertheless, Revenue Management is not based on setting and updating prices, but on setting and updating availability of price classes, where each class has an associated price that remains constant through the booking period [Phillips, R.L. (2005)]. Finally, Revenue Management is not only based on maximising revenues either. Besides the fact that airlines benefit from implementing Revenue Management, it also has advantages for the customers. Indeed, they make use of the various offers. Customers for whom a seat or a service is very important are happy to get this seat or service, in spite of the price.

3. Aspects of starting Revenue Management

In Chapter one, the three basics of Revenue Management are described. In this chapter we will have a closer look at the different aspects.

Companies often have the problem that they have a product with a fixed capacity and they have to sell this within a fixed period. If the market is characterized by customers who are sensitive to price and those who are insensitive to price, this creates an opportunity to sell the product to different customer segments for different prices. Airlines have done a good job of segmenting their passengers by willingness to pay. So there is a difference in price for customers who book ahead and customers who book a few days or weeks before departure. So think of families who plan their holidays one year before and on the other side business travellers, who need to be more time-sensitive. They are unable to qualify for the lower rate. Segmentation is not only based on charging different prices at different points in time, but also on offering a higher service level for a higher price. For instance, in a plane the passenger could choose a seat with extra legroom or in a hotel the customer could choose for a room with street view, pool view or sea view or, back to a time-based example, you could choose for travelling during the weekend which is much more expensive than travelling during the week. This is because of the higher demand in the weekend. Another important point is that business travellers are generally charged the higher price than the leisure travellers because the availability of seats is more important for business travellers and that is mostly why they are willing to pay the higher price. Each of these necessary ingredients will be discussed be below.

1. Segmentation

Segmentation can be defined as the process of classifying customers into different groups or segments based on their observed or inferred characteristics. The objective of segmentation is to identify who is buying the product, how the customers buy it, when do they buy and what type of attributes they prefer. Based on their own preferences, some customers will value the product proposed by the company more than other customers. Based on this, they will be willing to spend more money on the product [Cento, A. (2006)]. This was the case in Chapter 2 where the customers at Carol's barbershop valued "Saturday haircut" more highly than the discount on weekdays [Cross, R.G. (1997)]. In order to be successful, it is necessary for a company to segment its customers into groups. Some of them can be classified by price sensitivity (youngsters, parents with children, elderly people), others by time sensitivity (business travellers, emergency travellers). More segmentations are presented in Appendix 1. Another important group of the customers can be classified per industry as different industries offer dissimilar service charges to students, families, pensioners, crew, tourist and business travellers [Cento, A. (2006)]. Segmentation is also applicable in other industries. Table 1 gives an overview of some of these classifications.

Table 1 Customer segments and sub-segments by industry

Industry	Customer segments
Hotels	Leisure, meetings, location, contract accounts, single or double occupancy, facilities
Airline	Business, leisure, students, children, youth, seniors, groups, military
Freight	Small, medium, large volumes
Energy	Office, retail, restaurant, grocery, school, guaranteed, controlled lighting

2. Price management

Revenue Management has been seen by some researches as a form of price discrimination - the application of the different prices for similar products to different customer groups. By offering multiple rates to different customer groups, firms hope to diversify and increase their revenue or retain their current revenue level. Furthermore, price management has been seen as systematic offering different prices to different customer groups in response to changes in demand and its characteristics [Ingold, A. (2000)].

For instance, some passengers who are quality-oriented, can influence the demand for the certain company product by their personal characteristics and willingness to pay as well as they their price elasticity. The price elasticity gives the percentage change in quantity demanded in response to a one percent change in price, by holding constant all the other determinants of demand. This result can be used to estimate or a price change leads to an increase in sales or just a revenue decline. Leisure travellers may be very price elastic, and the business traveller may be more time sensitive and less price elastic.

Other examples of using price management are early booking discounts for those customers who are booking early at the company as well as offering the supplements for travellers in the on weekend. By doing so, the company can cover some major costs and can concentrate on more expensive offers (charging higher price) to receive more revenue. By doing so, it is important that a company realizes which products (or services) it can offer at profitable price for each specific customer segment. Hence, price management plays an important role for the Revenue Management systems [Phillips, R.L.(2005)].

3. Demand forecasting

The accurate demand forecasts are essential to a Revenue Management system. Ingold (2000) argues that by forecasting potential demand based on the historical sales data and envisaged future events, the companies can predict both: the size of targeted market segments and the price that each segment will be willing to pay for the product or service. For example, in the airline industry, the widespread information on demand and booking patterns are necessary for the future revenue forecasting. If the company knows what was the demand for the certain destinations in the previous years, it can estimate the demand for the coming year(s) for the similar products/services, taking into account the market situation and the economic situation in the country or in the world. Further, a company can use obtained demand information to classify its customers and assign the concrete price for each specific customer class in the most optimal way that increases the company revenue.

Each industry, however, faces specific difficulties in the forecasting of demand. For instance, in the airline industry it is important to take into account the period of seasonal peaks and off-peaks in demand for flights. The tour operators and travel agencies have sales peaks around holiday periods.
The restaurants and theatres have higher sales in the weekends.

In the certain industries the price for the products or services may influence the demand. Therefore, it is essential for all companies and establishments to adjust to these seasonal periods or price changes in order to be able to correctly predict the demand for their products or services and gain the maximum feasible revenue [Cross, R.G. (1997)].

4. Availability

Limiting or shifting the availability of certain products or services according to customer demand in a specific period is important for Revenue Management [Andersen, A. (1997)]. For instance, if there is no supply for a deluxe room, while demand for the standard room exceeds supply, the company can sell the deluxe rooms for the same price as the standards. Otherwise the rooms are empty and will not be sold. This is because of selling something rather than nothing. In this situation is the demand high and the company has the possibility to make their capacity high as well. In some businesses is there a probability to move a capacity from one place to another, for instance the demand in Maastricht is higher than in Groningen because of the early holiday period in the south of the Netherlands, it is possible that an airline decides to depart with more planes from Maastricht rather than Groningen. It is vital for companies to sell a product before the expiration date, otherwise it is worthless. As stated above you cannot sell an empty seat on an airplane that has already taken off or you cannot sell last night's empty hotel room. On the other hand, it may be that all the products have sold out before the expiration and to other customers the company has to sell "no". In that case it can occur that the airlines may sold out the flight, but on the departure day the plane takes off with empty seats. These passengers, who book a seat, but do not show-up at the departure time, for whatever reason, are called no-show passengers. This is not the case for just the airlines, hotels and restaurants have the same problem with customers who make a reservation and do not show up. Another possibility is that they cancel the reservation within a few hours before expiration. The airlines and hotel industry have good cancellation policies to protect themselves, for restaurants is this not always the case. One of the methods that companies apply to protect themselves against the no-show passengers and the possibility that a reserved capacity can later be cancelled is by overbooking. Overbooking means that more products are reserved than there is capacity [Koole, G. (2010)]. Thereby it is essential that companies develop an overbooking policy, to develop this, a firm must have more information about the number of no-show passengers and cancellations on a flight over time. It is also possible to develop other methods to avoid no-shows, like customer reminders, deposits, standby passengers, overselling or no money back guarantees. Standby passengers are arriving at the airport and they do not know before the take off time if they will be go with that flight [Shaw, S. (2004)]. The only way that they will travel is if there will be an empty seat, caused by a no-show passenger. Another alternative to overbook is the acceptance of go-show passengers. Go-show passengers in the airlines

are passengers who show up at the airport while passengers are checking in for the flight and want to go with that flight if there will be any empty seat. In case of a fully booked flight, this means if there will be any no-show passengers on the flight. The difference with standby passengers is that they reserve and get a standby ticket and go-show passengers emerge at the airport in the hope that they goes along. Overselling means that customers who pay the high price are reserved despite of the capacity and customers who pay a low price are advised to take an alternative product [Koole, G. (2010)]. The alternative could be depart of another airport or depart one day before or one day later.
However, overbooking can also cause problems if everyone who had made a reservation comes. Mostly in such a situation like this, there are also standard policies, one of them is that the passengers will be served by others or given compensations [Cento, A. (2006)]. In addition, employees have to be trained in how to handle in situations of overbooking because, both customer and employee satisfaction may suffer. Finally, this means that companies selling perishable products carry a high revenue risk. Revenue Management can be used as a technique to reduce this risk by creating a certainty about the demand for those products and by using overbooking policies.

5. Product differentiation

We have seen in market segmentation that the company can divide their products among different classes based on characteristics. Product differentiation is more to add extra services to the basic product of the supplied quality. The customer has a preference for certain aspects of a product, therefore other instruments than just the price can be used. Some examples are standard floors or a room with a view in hotels, fast check-in, more legroom seats in planes, the various classes of rental cars and private vs. semi-private rooms in hospitals. Nowadays, more and more airlines count the baggage separately and so it's not included in the paid ticket price anymore. The customer have to pay for it, if they want to make use of the extra service. So companies differentiate their products by removing the standards and adding these standards to the extra services. Companies do this, because of lowering the price sensitivity by the customer. So the price of the ticket is cheap, but you have to pay for extra services like printing the ticket and boarding pass or the permission to check-in with more bags. These extra services are price related, others could be quality related, like a private transfer from airport to hotel and back, priority boarding and online check-in and select preferred seats. Mostly, product differentiation is used as a tool to hinder competition. A customer can choose for a product because of the (low) price, an offered product quality or the imago/brand. There are some airlines with a low-cost imago like Ryan Air, Easy Jet and Corendon is also one of them. Or another example is KLM with a more quality and on-time performances. The truth is that the customers choose their favourite. A company can only attract them, for instance with commercials or convenience websites.

6. Booking classes

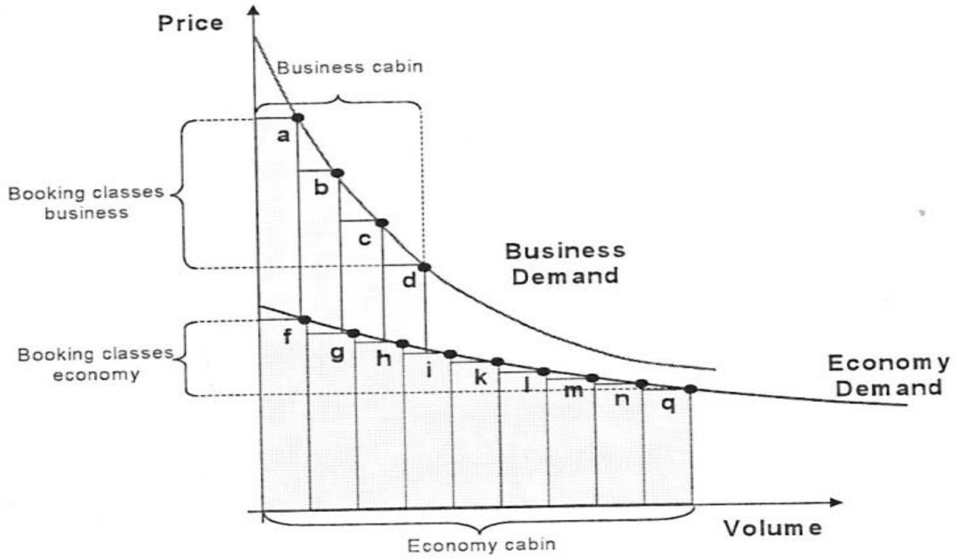
In the previous aspects were some points of booking classes described. One of them is that companies divide their products in different classes. For instance, in the airlines this may be one class that allows changes of tickets one week before departure and another class allow no changes anymore. Once booked, it is not possible to change in this class or to cancel and get refund. The development of classes could be based on the date of booking compared with the date of departure or how long the length of stay will be. Passengers within the same booking class receive the same quality, but it is not always the case that they indeed sit next to each other. There are no standards among airlines; each airline sets their own booking classes. Below in figure 3 some classes of the airlines in the United States are illustrated:

Table 2 Example of common used booking classes in the United States by airlines.

A	First class discounted
C	Business class
D	Business class discounted
F	First class
J	Business class premium
P	First class premium
S	Standard class

Below, graph 1 is the price plotted against the volume and it is divided into several booking classes. This represents more booking classes and more volume for the economy class and less for the business class. Where the price is higher for the business customers instead of the economic priced customers.

Graph 1 Demand curves for economy and business product, the use of booking classes to price discriminate the passengers [Cento, A. (2006)].



7. Reservation negotiation

In many tourism businesses the management is implementing its decisions into the systems about pricing the capacity. That means they create opportunities to negotiate [Andersen, A. (1997)]. These negotiations are mostly intended to increase revenue, and on the other hand, if the company do it right, do they have a satisfied customer. Negotiation exists of up-selling and cross-selling. "Up selling" or "up-grading" is when the costumer has made a reservation and the agent is asking the customer if he or she want a room with sea view or the agent is asking for a travel insurance. The agent is trying to sell you more than just the holiday. When have chosen an accommodation and it is already fully booked, the agent can say two things:

- Sorry, there is no place.
- This one is fully booked, but I have a better accommodation on offer for you.

This means that the first answer is no entry and the second one is a possibility. Option two, where the agent suggests an alternative product, is called "cross-selling". Usually there is some probability that a customer, when denied a booking at a lower rate class, will agree to buy the requested service at the applicable rate for a higher rate class. These kind of sale techniques are very important. This is because of selling something rather than nothing. An example is the reservation system of Corendon, gives comparable alternatives of hotels or flights, if a customer's initial request is fully booked. So the agents at the call centre of Corendon do not have to search for an alternative, they get it automatically, which is very time consuming and customer friendly.

In the book of Andersen (1997) and in the paper presented by IDeaS (2005), they have shown the five functional aspects first:

1. Market segmentation
2. Price management
3. Demand forecasting
4. Availability
5. Reservation negotiation

After these aspects four characteristics are shown:

1. Perishable inventory and/or seasonable demand
2. High fixed or sunk costs
3. Fixed capacity
4. Advance purchase of products or services

These characteristics are the basics for implementing Revenue Management, as described in Chapter 1. There are many similarities and applications between them. That is why I have merged them into the 7 important conditions that form the aspects for starting Revenue Management. Some of these aspects written for different businesses are shown in Table 3 below.

Table 3 Industries with different segmentations [Talluri, K.T. (2004)]

REVENUE MANAGEMENT CRITERION	Industry: *AIRLINES*	*HOTELS*	*CAR RENTAL*	*FREIGHT TRANSPOR-TATION*	*HEALTH CARE*	*BROAD-CASTING*	*TELEPHONE*	*GOLF*
Market Segmentation	Market is segmented between business and leisure travel using Discount Fare Restrictions	Can pursue airline strategy	Can pursue airline strategy	Market is segmented by type of commodity to be transported	Time Sensitive Care vs. Postponable Care, Clinical Care vs. Surgical Care	Guaranteed Spots vs. Preemptable Spots vs. Rotatable Spots	Businesses vs. Residences Wire or Landline vs. Wireless or Satellite	Member vs. Guest or Walk In Senior vs. Adult vs. Child
Unit of Fixed Capacity	Flight	Hotel	Car Fleet	Truck, Train	Hospital	Television Show	Phone Network	Golf Course
Unit of Perishable Inventory	Departing Seat	Room Night	Car Day	Trailer/Boxcar Departure Labor	OR Room Hour/ Bed Night	Advertising Second or Minute	Line Minute vs. Airtime	Tee Time
Low Marginal Costs for Incremental Sales	Passenger Meals, Processing	Order Processing, Room Cleaning	Order Processing, Car Cleaning	Order Processing, Freight Handling Gas	Order Processing, Meals, Supplies	Order Processing Distribution Channel	None?	Order Processing
Bookings Taken in Advance	Yes (up to a year)	Yes	Yes	Yes, but often close to departure	Yes, for elective procedures	Yes	Not usually	Yes
Demand Forecasting Cycles:								
Seasonal	Yes	Yes	Yes	Yes	?	Yes	Yes	Yes
Day-of-Week	Yes	Yes	Yes	Yes	?	Yes	Yes	Yes
Time-of-Day	Yes	Not usually	Sometimes	Sometimes	?	Yes	Yes	Yes
Other	-	-	-	-	?	Popularity of show	-	

4. The risks

We now have insight in the aspects and the importance of Revenue Management for a company. Nevertheless, there are risks that are extremely important for the implementation of Revenue Management. In this chapter we will discuss these risks.

In the introduction you have read about People Express's eventually declared bankruptcy. Former People Express chairman Donald Burr claims many of People Express's problems on the short of the Revenue Management system [Cross, R.G. (1997)]. What Donald Burr did not know about Revenue Management and did not realize its power, killed People Express [Cross, R.G. (1997)]. In summary, what Burr did was ignoring Revenue Management, and this has cost him his business. Taken together, is it for a company very important to know what they are doing.

Another risk that is also very important for a company who plans to start Revenue Management is making good and confirmable analyses. Nowadays, more companies know of the existence of Revenue Management. On the one hand, that is fine, as more companies implement Revenue Management, the more applicable it will be in different industries, but on the other hand, more people will proclaim themselves as experts. Hence, it is difficult for companies who start implementing Revenue Management to divide the sheep from the goats. Therefore, the major pitfalls will be discussed below to protect the company.

Pitfalls

In Revenue Management it is important to keep possible pitfalls in mind. Forewarned is forearmed [Cross, R.G. (1997)].

The company should not want to immediately start implementing. Firstly, the company has to take time to achieve the goals and to record them. Thus, the mentality to "just do it" has to be changed, before implementing, because what is done in a hurry, is seldom done well. Therefore, the company have to evaluate what they want to achieve with the implementation.
In the company is one person with all the final responsibility for the Revenue Management system. This person is not the technician or the sales manager, because they have their own work and it should not be diluted by other functions. So, this person have to concentrate on all the elements that are required for the implementation of a Revenue Management system.

1. Besides the final responsible person, also other specific roles (data collector, analysers and controllers) have to be distributed. Not everyone has to interfere with anything or just want to do things by themselves. A good task distribution is very important for a disciplined process and also teambuilding is of great importance.
2. Mostly firms are concentrating on the technological aspects of the implementation, but more important are the stable business requirements. This means that companies have to create and achieve goals. Everyone in the company working with the system has to know and agree with the importance of having a Revenue Management system.
3. You have to keep an eye on your data, in case of a very exceptional event. You have to take this into account for the deviation. Think for instance of an earthquake in Japan. In that case most passengers would not go to Japan. Or the September eleven attack led to a major crisis in the airlines. Most people were afraid to fly and they chose to vacation in their own country or without a flight for years. Consequently, you have to adjust your historical data in these cases manually to prevent wrong forecasts.
4. In Chapter 1 the basics of Revenue Management are written. One of them is that Revenue Management is applicable for companies dealing with perishable products. In Chapter 3 is written that companies selling perishable products carry a high revenue risk. The risk here is because companies have to sell their product before the expiration date and this means that they have to well price their products or they have to minimize the unsold products.

All of these pitfalls demonstrate that Revenue Management can be extremely advantageous, but it can also be riskily disruptive. If companies price their products incorrectly, it is possible that Revenue Management systems make incorrect decisions [Ingold, A. (2000)].
Different risks for a company represented above. The disadvantage of Revenue Management for the customer is that guests can regard it as unjust if they have paid more than others. Imagine for example that you are sitting on a plane from Amsterdam to New York and you have paid in total six hundred Euros. On board you are sitting next to a man who paid three hundred euro's for his flight. How do you feel? The point is, Revenue Management gives consumers a wide range of options. It isn't unethical for businesses to charge different rates for the same product because, in fact, the product is not the same. For instance, a seat available six months in advance when the plane is half booked, is not the same product as a seat saved for the last few days when there is limited inventory and peak demand. Similarly, a Saturday haircut with a two-hour wait is not the same as one with a brief wait. Therefore is it important for companies to know how to handle with customer that contact the company, because of feeling mislead.

5. The steps

The company has to keep in mind that there is no one strategy that can be applied to every business, also described in Chapter 2. Similarly, a company must set clear and manageable objectives. These objectives must be communicated within the company and everyone should be aware of this. Based on these stated objectives, an effective adaptation of its techniques to your own market, products, competition, culture, corporate mission and constraints may play a role to achieve the goals. Therefore it is important that some steps are taken to implement Revenue Management in order to succeed. This consist of the following steps:

1. Building a business case and analysing your business

As one of the first steps in the implementation of Revenue Management, preparing a business case can be a critical factor in helping a company to understand the level of investment and to make good decisions [DeLain, L. (2004)]. During the development of a business case can also be decided to postpone the implementation. So the business case should be present a clearly outline of the implementation with the consequent costs and profits to get. Thereby is it also important to involve the workload and the necessary resources that are available or need to be purchased in the business case.

For a company it is important to analyse its business before implementing a Revenue Management system, because the implementation is expensive and time consuming. There will be also organizational changes and it is crucial to involve the whole team in the process. So, they think together and sometimes this cause the company to rethink its position in the marketplace. Thereby it is necessary to compare the current situation with what the company ultimately want to achieve. Another point that is important for the business case is to analyse how you would price your products and where you do base you prices on. This pricing is for different products as well as the same products. This is called price discrimination, written in Chapter 2 in the price management aspects. Therefore, the company has to decide if they want to use some tactics to price their products. One of these tactics could be “group pricing”. Group pricing is the tactics of offering for the same product different prices to different groups of customers. The idea is to offer a lower price to customers who are not willing to pay and higher prices to those who are [Phillips, R.L.(2005)]. In Chapter 3 are written examples of this type of pricing, in section segmentation. Another tactic is called “channel pricing”. Channel pricing means that companies sell the same products for different prices through different channels. An example of this is a roundtrip New York-Tokyo ticket purchased from many airlines in Japan will usually cost more than the same ticket purchased in the United States [Phillips, R.L.(2005)]. For that reason people mostly book a flight to a place in middle of the final destination and are booking from there the ticket to the final destination.

2. Product price estimation

In implementation of the Revenue Management system the estimation of the product prices plays an important role. For the company, it is important to understand how much products and services its customers buy as opposed to the price the company is offering. Pricing has become an important part of the business, because it is one of the effective variables that companies use to promote their products or to demote their products. Price is not only important financially, but also operationally [Bitran, G. (2002)].

Within the implementation of the Revenue Management system, the pricing managers should undertake the different choices regarding the structure and the level of the prices to be offered to the customers. Shaw (2004) argues that, for example, in the airline business, the offers of the discount rates that are given to the passengers should be constantly controlled otherwise the passengers with low price elasticity will take advantage of the discounted price. Accordingly to researcher, the control of discounted prices should be done in two ways. Firstly, the Revenue Management system should be used in order to estimate the number of "low-price" seats that can be offered on different flights. Secondly, some restrictive conditions that influence the price and help the airlines to offer a low price for price-sensitive customers should be carefully designed. Among those restrictive conditions are: a) the minimum length of stay, b) the maximum length of stay; c) an advance ticket purchase; d) the preferential pricing; and d) pricing as part of a tour package [Shaw, S. (2004)].

2.1 The minimum length of stay condition

The minimum length of stay condition represents the restriction that bases the price of the ticket on a minimum length of stay of passenger at destination location and is considered to be the most useful in pricing of the product. The possibility of sooner return under this condition is allowed, however, offered low price is not valid anymore for the customer and her or she is required to pay the full price [Shaw, S. (2004)].

2.2 The maximum length of stay condition

The maximum length of stay condition is almost the same as the minimum length of stay but in reverse order. This means that the price is based on a maximum length of stay. In case the passenger is willing to stay longer, he or she has to pay the full price, instead of the price with discount. In general, this restriction is not used very often [Shaw, S. (2004)].

2.3 An advanced ticket purchase

An advanced ticket purchasing represents the restriction for passengers who book a ticket at low price that they have to pay (as total amount) immediately or within a few hours/days. Once the price is paid and the reservation is done, there is no option to change or cancel the reservation, in such a case they have to book a new flight [Shaw, S. (2004)]. This is mostly used by low-cost airlines, such as Ryan Air.

2.4 The preferential pricing

The preferential pricing represents restriction when the discounts are mostly offered to different segments, like children, elderly people, military, diplomats or sailors and their families. This type of pricing is called "stage-of-life" pricing and is often based on certain (international) law. The preferential price that is based on strictly regulated conditions, is often described as a "discriminatory" as gives big discounts to certain population groups. Although, the fairs are profitable for the mentioned groups, the airline may have difficulties in withdrawing discount or introduce new price as the mentioned population groups are protected by law and governments [Shaw, S. (2004)].

2.5. Pricing as part of a tour package

The pricing as part of a tour package represents the restriction when the flights that are given for the low price, are possible for the customers only in combination with a hotel bookings. This option, represents the limitations for wholesalers and for business travellers. The wholesalers, in turn, are forced to add the accommodations or other features to their products which makes it difficult to sell them. Consequently, the business travellers become dependant on accommodation or location which is not what they want during their journey [Shaw, S. (2004)].

3. Buying or building the Revenue Management system

A company can decide to buy a Revenue Management system from specialised companies, such as Ortec [1]or can decide to build self a Revenue Management system. Buying a Revenue Management system means that there will be come external professionals to the company. Firstly, they have to understand your way of doing business, your products and the prices based on different or the same products. Companies are not always happy to expose to outside professionals. Besides, there is often heard to these outside professionals and they are mostly more convincing by telling about the importance of buying a Revenue Management system, then someone who works for the company. On the other hand, the company should take account into fixed costs, for paying the outside professionals during the whole implementation and mostly also during the usage of the purchased Revenue

[1] http://www.ortec.nl/

Management system. Building a Revenue Management system is in the first place maybe looks like a cheaper alternative than buying a system, but when wrong decisions are based on data with mistakes and (wrong) forecasts, the building can become quickly more expensive. Therefore, it is important to build a Revenue Management system by experts and step by step. So companies who have trained experts in this area and know how their reservations systems are working, will decide mostly to build a Revenue Management system instead of buying one. A reservation system is an main facility for any Revenue Management implementation, because the company get all the data and information from the reservation system. For example, American Airlines was able to do better than People Express in part, because they had a computerized reservation system called SABRE, which allowed them to save seats for last-minute booking passengers. SABRE combines the functions of a computerised reservation system (CRS) and a global distribution system (GDS) [Talluri, K.T. (2004)]. A Global Distribution System makes a conduit connecting available between the reservation system and a number of important sales channels, for instance the various travel agencies. The way companies manage their inventory is still dictated by the capabilities of their own reservation systems [Talluri, K.T. (2004)]. The most important part of a reservation systems, is the part where bookings are controlled and where the reservation system determines the available booking classes.

The Revenue Management system may need to communicate directly with the GDS. More often, the Revenue Management system communicates only with the firm's own host reservation system. Prior to the forecasting run, the Revenue Management system needs to download the current number of total reservations and remaining capacities. A real-time communication is essential between the reservation system and the GDS, because of having the most up-to-date information in the system. A potential problem for the airlines is the abuse by travel agents [Talluri, K.T. (2004)]. For instance, a travel agent may be able to book a package, because it is cheaper than booking a return flight and what they do is cancel the (unnecessary) hotel later. There are a lot of abuses like this and this lead to a significant revenue leakage to airlines. So, managers should properly monitor.

Reliability, redundancy and good back-up procedures are essential for a Revenue Management application [Talluri, K.T. (2004)]. For example, if a Revenue Management system is down, is the management of the classes out of control and this can lead to a significant loss of revenue. The user interface is an important component of a the building Revenue Management system. For the user interface it is important that it is efficient. The user interface supports for instance the prices, the forecasts, the creating of groups, the availabilities and the controls. Java/XML is the language of choice in user interface design, because with a web interface, no special software needs to be installed and every browser can be used to download and run the interface, only an internet connection is needed [Talluri, K.T. (2004)].

Finally, if the company has decided to build a Revenue Management system, they have to keep in mind, that the Revenue Management system needs to be implemented at three levels [Phillips, R.L.(2005)]:

a) At the **strategic level** it requires identifying customer segments and creating differentiated prices.

b) At the **booking-control level** it requires determining in real-time whether or not booking request should be accept or rejected. The reservation system include a booking limit for each class. When a booking request is received, the reservation system checks the booking limit for the associated class. If there is sufficient availability, the request will be accepted and the system automatically updates the limits, otherwise it will be rejected. This is all done very rapidly.

c) At an **intermediate level**, tactical Revenue Management periodically recalculates and updates the booking limits used for booking controls [Phillips, R.L.(2005)].

4. Data storing and forecasting

Revenue Management system represent a part of the computer system that requires different data inputs in order to make future demand forecast. Therefore, the efficient collection and the storage of the data in the Revenue Management system is required to make a good forecasts. Lots of data should be collected, corrected and stored in the system. This process represents the most difficult and time bounded part. The collected historical data should be cautiously analysed and reviewed, and the wrong data should be eliminated. After the data has been stored, the company can start the forecasting process [Talluri, K.T. (2004)]. Forecasting is essential for the company every-day business operations as it informs management on the future business prospects. The forecasting process is usually based on the carefully established forecast model that applies at least the previous twelve months company' transactions data. Additionally, the seasonality and historical trends should be incorporated into estimation in order to account for possible repetitive for the company sales patterns. Finally, the forecast should be adjusted for own actions of the company that may have influenced, for example, the historical booking pattern [Cross, R.G. (1997)]. Although, the forecasting process itself is not difficult (implying that the forecasting system is correctly established), the achievement of good forecasts is difficult. Therefore, Cross, R.G. (1997) suggests the use of the following rules for a good forecasting: a) the forecast should remain at detailed level; b) big amount of data should be employed in the analysis; and c) he forecasts have to be adjusted frequently to possible economic or company-specific changes.

Talluri (2004) identifies two types of Revenue Management forecasts: a) Quantify-based Revenue Management Forecast and b) Price-based Revenue Management Forecasts. The first type is mostly applied by airlines and hotels. Besides the demand data, Quantify-based Revenue Management Forecast requires the information on the way the reservations for different customer types arrive during the booking period. Additionally, this type of forecast needs the estimation of the cancelled bookings and "no-show" probabilities of the passengers. The second type is based on the estimation of the demand functions parameters by looking at the historical price-demand of the product. In summary, it is important for a successful Revenue Management implementation to develop a good forecasting system.

In addition, Raza (2008) argues that it is important for a company to adjust the data forecasts when the economic, financial or company- specific changes take place. Those forecasts are not always simple to achieve and the managers are required to present the data objectively and truly. Often, it is important to produce re-forecasts as the some random events can diminish an accuracy of the forecasts despite of reasonable amount of data one may use, data accuracy or even forecasting methodology. In order to keep forecasts "up-to-date", the re-forecasting as well as reviewing and reassessing of the data itself is necessary.

In summary, the important steps to implement a Revenue Management system are:

1. Building a business case and analysing
2. Product price estimation
3. Buying or building the system
4. Data storing and forecasting

Appendix 2 represents a day in the life of a Revenue manager and Appendix 3 represents a Revenue Management process flow , which can be serve as inspiration for a starting Revenue manager.

Challenges for a later stage are implementing competition and customer behaviour.

Conclusion

The goal of this paper is to describe the implementation of Revenue Management in a company. This is accomplished by first defining the term Revenue Management. In the definition it has become clear that it is a particular strategy which is all important to companies that deal with perishable inventory, fixed capacity and high fixed or sunk costs. This means that Revenue Management is not applicable in supermarkets but it is of great use for airlines. For example: a flight from Amsterdam to Antalya is sold at a great variety of prices by many different companies, while the distance from Amsterdam to Antalya is still the same. KLM does not fly to Antalya, but their subsidiary undertaking Transavia does, because it is mainly a seasonal destination with many tourists. In this way they keep their customers. Since, so many airlines supply, it is very important to offer an affordable price and achieve maximum revenue. That's why KLM has a big Revenue Management department and Sundio has implemented a comprehensive Revenue Management system.

It is impossible to implement Revenue Management overnight, many aspects have to be considered. In almost all the books I read only 5 aspects were taken into consideration. I think two aspects need to be added: product differentiation and booking classes. Product differentiation, because it does not only involve adding an extra service, but also because you have to be able to provide it. It keeps you on your toes. Booking classes, because you have to decide where you want to base your booking classes and, more importantly, what restrictions you want to apply to them.

The most difficult, but also most interesting chapter was the last one: steps in implementing Revenue Management. During my research I have not encountered any scheme that accurately describes the steps to take, or which method to employ where Corendon is concerned. At Corendon a "just do it" culture prevails. According to Robert G. Cross this is one of the risks [Cross, R.G. (1997)]. That's why it is important to start by building a business case and analysing this business, so that both the needs and expectations are clearly stated. Corendon is a big family, but each department is responsible for its own performance. In this way, you involve them in a topic they all benefit from. One of the other difficulties for Corendon to implement Revenue Management is the third step: Data storing and forecasting. Corendon is a tour operator and not an airline, but they have their own airline. The hard part is to get the required data from the reservation system. One of the results of this research is that you have to base decisions on historical data. So, the knowledge of your own reservation system is crucial. The final step involves buying or building a system. The findings of this research suggest that Corendon should build its own system. For, they do not only offer tickets, but their revenue largely comes from the so-called package trips. A package trip means a combination of tickets, hotel and transfers.

Implementing Revenue Management in a tour operator is more complicated than in an airline. According to Kevin Pak this means more than millions of different prices [Pak, K. (2011)]. In my opinion is it recommended that further research be undertaken in this area.

Finally, I would like to mention: “What you don’t know about Revenue Management, could kill you”[Cross, R.G. (1997)].

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Appendix 1: Some common segment bases used in Revenue Management [Talluri, K.T. (2000)]

Basis	*Comments*
Time of purchase	Used in the airline, media, retail, cruise line, and natural-gas industries. Separates low- and high-valuation customers depending on the value of buying early or late.
Time of reservation	Need not be the same as time of purchase. One can reserve early and purchase by a deadline. The firm takes the risk that you would not purchase by the deadline but cancel. Hotels, Airlines let you do this.
Day of week	Hotel, energy, and airline industries have peak demand during week-days. Weekends and weekdays also separate leisure from business customers.
Cancellation likelihood	In reservation-based industries, the service is used in the future. Customers differ in their uncertainty that they will use the service. This uncertainty is sometimes correlated with willingness to pay (as the case of business customers). As this is private information, customers are asked to self-select between a penalty for cancellation or a high price.
Senior and youth	Used in airline, movie theater, railways, and hotel industries. Directly observable and correlated with lower income and less willingness to pay.
Options and premptability	For instance, in media advertising, budgets may not be fixed when a firm buys ad space. So the firm buys options (similar to reservation without purchase). Premptability is also a common practice in the electricity, gas, and manufacturing industries. Customer gets a cheaper rate, but customer takes the risk that demand exceeds capacity and he will get preempted. Similar to airline standbys. Airlines are also often suspected that they use overbooking to preempt lower-paying customers, but this is not the case.
Channel	Easily identifiable. Different channels attract different types of customers. Far-away outlet stores separate low-search cost, low-valuation customers from the high-valuation customers. Sometimes, a channel offers the firm different informational content on the customers (Internet) and sale possibilities, allowing it to segment. For instance, last minute sales or auctions by airlines; customized pricing by e-tailers.
Trip length and length of Stay	Used by airlines, hotels, and rental-car companies. Longer stays (more than six days) or trip length signifies leisure customers.
Saturday-night stay	Businessmen prefer to return home by Friday night. So giving a discount only for trips that include a Saturday night stay will preclude businessmen purchasing at that rate.

Basis	*Comments*
Group discounts	Groups are generally considered leisure customers. Beyond the segmentation aspect, it is volume discounting as the firm lessens the risk of unused inventory by selling a large block.
Package	Package holidays (e.g., airline, hotel room, and car) combined with some trip restrictions limit the product to leisure customers.
Business and individual	Used in retail, telecommunication, and energy industries. Identifiable at the time of the contract.
Size of business	Used in retail (e.g., PCs). Segmented as small, medium and large. The service requirements and sales effort vary by size of the client, so the firm can customize the product (or discounts).
Spend amount	Casinos and hotels track customer spend on food and beverages, gambling, and other services. Discounts may be tailored based on this quantity.
Loyalty	Repeat customers have a higher lifetime value for the firm. By using store discount cards or frequent-flyer cards, customers can be separated based on their loyalty.
Frequency	Frequent customers are not only loyal; they also provide more information about their preferences. Based on past purchasing habits and the frequency of purchases, the firm can separate frequent buyers from infrequent buyers.
Delivery time	Used in manufacturing, freight and package Delivery Industries. Customers with express orders are willing to pay more. The value of the service to the customer in a rush is much higher than normal. This is a easily implementable segmentation in most cases.

Appendix 2: A DAY IN THE LIFE OF A REVENUE MANAGER [Haley, M.(2004)]

A DAY IN THE LIFE OF A REVENUE MANAGER

Christopher Bates is the regional director of revenue management for Millennium Hotels in the Americas. Hospitality Upgrade *wanted to know what revenue managers do all day. We asked Bates: he laughed, took a deep breath and started talking—fast.*

"Every morning starts with a review of the nightly reports – the pick-up reports for the previous day, the revised forecast through month end, and so on – to see what changes have occurred, in which market segments and for which dates. We also look at any flags the revenue management system has come up with for us to review," said Bates.

These changes are then reported to the other department managers at the morning's operations meeting, where they discuss actions to cover any specific issues. "And there's always something!" said Bates. "Then we go back to make the various rate/room availability changes we need in the different distribution channels – the PMS reservations module, the CRS, GDSs, merchant model extranets and so on – and update the forecasts once again.

"It sounds obvious, but it's essential to make sure you do have availability where and when you need it, and that never stops for the rest of the day. You have to check today's figures to see if you want to put any last-minute availability out on the merchant models, make sure VIP arrivals have the right room blocked, review guest requests to make sure you haven't overbooked specific room types you'll need later, monitor extranet allocations and pick ups, check call conversion rates, keep an eye on the reasons for declines and denials to understand the actual demand," said Bates.

Also most revenue managers are either reservations managers or have reservations managers reporting to them. "So there is all the daily activity in the reservations department to manage as well – general booking issues, processing no-shows correctly once you've ensured that they really are no-shows and haven't just been entered into the system under a different name, handling travel agency commission queries—it never stops.

"Twice a week we have a specific revenue management meeting with the GM, controller and director of sales and marketing," said Bates. "Here we review current status and forecasts, look at specific business opportunities, restrictions and rates by market segment, and any exceptional circumstances that will influence previous forecasts. Then it's back to the systems to input the various adjustments."

Working the old way with fixed allocations for different channels had the advantage that you would get a message when a channel's block was used up, but with most hotels on free sale it's way too easy to oversell the property at discounted rates. "Automated systems and interfaces make a very significant difference," said Bates. "All your main channels now look at the same availability and restrictions. But you do have to understand what the systems do before you can start manipulating their results."

Appendix 3: Revenue Management process flow [Talluri, K.T. (2000)]