

Chapter 1

Introduction

1.1 Importance of RM

Everyone who sells either products or services or both faces a number of fundamental decisions.¹ A child selling sweets outside her house has to decide how much to ask for each sweet, which day to have her sale, and when to drop the price, if necessary, as the day rolls on. An apartment owner renting an apartment must decide when to list it, what the selling price should be, which offer to accept, and when to lower the listing price—and by how much—if no offers come in. A mathematics teacher offering private mathematics lessons needs to set the price per lesson, decide which in days to offer her service and at which price, how to adapt the price in case of limited demand, and so on.

Anyone who was ever confronted with such decisions knows the uncertainty involved. Your objective is to sell at a time when market conditions are most favorable, but who knows what the future might hold? You want the price to be right, i.e. not too high that you put off potential buyers and not so low that you lose out on potential profits. You would like to know the willingness to pay of buyers, i.e. how much they value your product, but more often than not you must just guess at this number.

In fact, it is not easy to find anyone who is entirely happy with their selling and pricing decisions. Even when you succeed in making a sales, you regularly wonder whether you should have waited for a better offer or whether you accepted a price that was too low.

In the business world selling decisions are even more complex. Here is an example: how can a company segment buyers by providing different conditions and trade terms that profitably exploit their different willingness to pay or buying behavior? Once a firm segments customers, what prices should it charge each

¹ This chapter has been integrated with inputs adapted from Talluri and van Ryzin (2004) with the kind permission of Springer.

segment? How can a company design products to prevent cannibalization across sales channels and segments? If the company sells in different channels, should it use the same price in each channel? In which way should prices be adjusted over time based on seasonal factors and the observed demand to date for each product? How should a company handle the pricing and allocation for products that are substitutes, e.g. different car categories for rentals, or complements, e.g. seats on two connecting airline flights? If a product or service is short in supply, to which channels and segments should a firm allocate the products or services?

RM deals with such demand-management (DM) decisions² and the methodology, systems and processes required to make them. This implies managing the company's "interface to the market" as it were, with the objective of increasing revenues. RM can be regarded as the complement of supply chain management (SCM), which addresses the supply decisions and processes of a firm, typically with the objective of lowering the cost of production and delivery. It is today one of the most successful application areas of operations research (OR).

Over the last decades roughly synonymous names have been given to the practice—*yield management* (the traditional airline term), *pricing and revenue management*, *pricing and revenue optimization*, *demand management*, *demand chain management* (favored by those who intend to create a practice parallel to supply chain management)—each with its own nuances of meaning and positioning. Here we use the more standard term revenue management to refer to the wide range of techniques, decisions, methods, processes, and technologies involved in demand management.

1.2 Motivation and Background

The motivation to conduct this research on the employment of RM³ in the process industry (PI)⁴ comes from a series of interactions with top executives of several corporations in different locations in my professional activity as management

²These can be referred to as either sales decisions, i.e. we are making decisions on where and when to sell and to whom and at what price, or demand-management decisions, i.e. we are estimating demand and its characteristics and using price and capacity control to "manage" demand.

³The notion of RM, also called yield management, revenue optimization and demand management (Talluri and van Ryzin 2004), encompasses the strategies, tactics and tools aiming at the maximization of revenues by allocating a company's capacity to different customers at different price levels. It's success determined a widespread application of RM. However, with strong origins in the airline industry, this industry and the service industries in general, are nowadays the main field of its application. RM covers the systematic use of tactical and operational instruments to maximize revenue for capacities that are fixed in the medium term, for stochastic demand and for cases where no make-to-stock (MTS) production option is available.

⁴The process industry comprises businesses that add value to materials by mixing, separating, forming, or generating chemical reactions. Processes may be either continuous or batch and generally require rigid process control and high capital investment (Wallace 1984). Examples of

consultant. What emerges is that several manufacturing companies are seeking new and sustainable levers to improve profitability.

In the discussions we had, executives indicated two major sources of profitability of the past: Product innovations and cost cutting initiatives. Clearly, both of these sources will remain profit drivers at any company, but both also have clear limitations (Simon et al. 2006).

In fact a product, service or process innovation can boost in a sustainable way both revenues and profits. The issue is however that innovation pipelines typically require several years and substantial investments before they generate returns. A large breakthrough or a new blockbuster that leads to pioneer profits represents the exception rather than the rule. It is therefore not a short-term, nor typically a medium- or long-term profit lever.

Also the profit potential on the cost side is often limited: Many companies interviewed in the exploratory research for this work state that they have already made very substantial gains from cost reductions. In addition, the economic crisis of 2008 forced corporations to reduce the cost basis considerably (Simon et al. 2013).

Managers need therefore to find new approaches to improve profitability, and a key area to work on has been found on the market side, more specifically on the revenue optimization and pricing side (Tacke et al. 2012). Even companies known to be best in class in many areas, like General Electric (GE),⁵ a leading U.S.-based manufacturing company, state that while on the cost side they are very accurate and have invested a lot to make sure that they optimize the cost lever, on the pricing side there is significant room for improvement. Jeffrey Immelt, CEO of GE, stated in this regard: “Not long ago, a guy here named Dave McCalpin did an analysis of our pricing [. . .] and found out that about \$5 billion of it is discretionary. [. . .] It was the most astounding number I’d ever heard [. . .]. We would never allow something like that on the cost side. When it comes to the prices we pay, we study them, we map them, we work them. But with the prices we charge, we’re too sloppy” (Immelt and Stewart 2006).

The CEO of a European lubricants company summarized this challenge: “In the last five years, we have been working on increasing profits by reducing costs through a global SCM excellence program. I do not expect significant additional benefits from this initiative. Pricing and RM are concepts that have only recently been discovered by us and in the manufacturing industry in general. Even if there is no industry-wide RM approach, we need to find a way to embed RM in the organization”.⁶ The sales and marketing VP of a corporation active in the metal industry made a similar statement: “We successfully reduced costs with a dedicated

process industries include food, beverages, chemicals, pharmaceuticals, petroleum, ceramics, base metals, coal, plastics, rubber, textiles, tobacco, wood and wood products, paper and paper products, etc. (IIE 2013). The process industry accounts for more than 50% of the industrial sector’s GNP of several western countries, e.g. 58% in Germany (Destatis 2013).

⁵ GE is regarded as best in class or among the top companies on a global basis in the application of the Six Sigma approach (Eckes 2001) or for its innovation capabilities (Magee 2009).

⁶ Source: Interview conducted during the exploratory research.

internal task force. However our attention to the market side was never as systematic and structured as on the cost side. We clearly need to catch up if we want to further improve our profitability. We have put RM and pricing excellence on our agenda”.⁷

Employing RM and thus optimizing pricing in the manufacturing environment, and more specifically in the process industry, is considered by many corporations⁸ as one of the key topics for the coming years. A confirmation of the fact that the employment of RM in the manufacturing industry is seen as an important topic is evidenced by the fact that, since we started exploring this subject, we have received attention from academic journals (Kolisch and Zatta 2009, 2012, 2014), magazines for practitioners,⁹ newspapers (Noack 2005) other academic researchers from prestigious universities quoting our work (e.g. Buhl et al. 2011; Huefner and Largay 2013; Kocabiyyikoglu et al. 2010, 2013; Mohaupt and Hilbert 2014) and publishers (Zatta 2007) was constantly high.

1.3 Objectives of the Book

To the best of our knowledge, there is no large-scale quantitative cross industry, international study of the efficacy of RM in the PI and on the profit expectation of companies introducing RM vis-à-vis the realized profit impact after its introduction: this gap will be closed by this research.

The objectives of this research are therefore threefold: First, to explore the implementation of RM in the PI starting with one of the largest European economies, namely Germany, to assess since when, how and with which approach RM is applied in the PI, while also evaluating barriers as well as chances, risks and perspectives of the companies. Second, this research extends this assessment geographically to Europe and North America and compares similarities and differences between the two regions. Third, we verify the benefits of RM in terms of profit improvement, assessing e.g. the *a priori* estimation of profit improvement and

⁷ Source: Interview conducted during the exploratory research.

⁸ This was reported to me personally by more than 100 top executives of corporations of different industries and sizes that we met during my last 10 years of project work both in Europe and North America as well as during the exploratory research that will be presented in the next sections.

⁹ E.g.: See Kolisch, R. and Zatta, D. in **I.** (2006). Revenue-Management in der Sachgüterproduktion. *Marketing Journal*, 12: 38–41. **II.** (2006). Revenue Management: Kapazität und Preis richtig managen. *Produktion*. 36: 15. **III.** (2011). Implementation of revenue management in the process industry of North America and Europe. *Journal of Pricing*, 4: 12–21. **IV.** (2013a). Spatz oder Taube. *Absatzwirtschaft*, 4: 40–41. **V.** (2013). Revenue Management: Die Große Chance. *Verkaufen*, 6: 8–11. **VI.** Revenue management in der Industrie. *Bilanz*. Online publication 19 May 2014: <http://www.bilanz-magazin.de/aktuelles/revenue-management-der-industrie/>. **VII.** (2014). Revenue management nel settore industriale. *L'Impresa*. Online publication 8 May 2014: <http://limesonline.net/articolo.php?id=20744&t=Revenue%20Management%20nel%20settore%20industriale&a=Rainer%20Kolisch>.

the *a posteriori* realized profit improvement and examine the reasons why the companies which are not employing RM decided not to use it.

To achieve these objectives, three separate exploratory studies, followed by a quantitative empirical research, were conducted sequentially. All three studies have previously been published in academic journals and will be presented in the next chapters. The first study appeared in the *Zeitschrift für Planung & Unternehmenssteuerung* (Kolisch and Zatta 2009). The second and third studies were published in the *Journal of Revenue and Pricing Management* (Kolisch and Zatta 2012, 2014).

The intention of the underlying book is also to trigger further thoughts around implementing RM in manufacturing and stimulate further implementations beyond the services industry, by highlighting the potential of RM and indicating what worked vis-à-vis what hinders a successful RM introduction.

1.4 Structure

An introduction to the background, motivation and objectives of the book can be found in this chapter. Chapter 2 contains a review of key concepts both applications prerequisites and impacts of RM introduction. More specifically the following aspects are explored: the concepts of RM and PI; the origins of RM; its application in the manufacturing industry; similarities and differences between RM prerequisites in the service and process industries; price and capacity management; profit impact of RM and finally the notion of fairness in RM. Chapter 3 presents the outcomes of the first study conducted in Germany to verify the state of the art and perspectives of RM in the PI. In Chap. 4 the geographic scope of the first study is extended to Europe and North America, assessing the state of the art and perspectives of RM in the PI. Chapter 5 discusses the third study, exploring the profit impact of RM on the PI. The research ends with Chap. 6 providing conclusions and an outlook for possible directions for future research.

In what follows we give a more detailed summary of the three core chapters of this research, highlighting some of the key outcomes.

1.4.1 Chapter 2: Concepts and Application

Chapter 2 contains a series of key elements, starting with the definitions of RM and PI. It then sheds light on demand-management decision and on the innovative elements of RM. The origins of RM in the service industry are then presented, followed by a review of its application in the manufacturing industry.

A review of nine application prerequisites is discussed, assessing both the validity for the service and manufacturing industry. Price and capacity management

concepts are illustrated and the profit impact of RM is discussed. Finally the concept of fairness in RM is reviewed.

1.4.2 Chapter 3: State of the Art and Perspectives of RM in the PI

While traditional RM literature discusses its application in the service industries, RM in manufacturing has received less academic attention (Chiang et al. 2007). Chapter 3 contributes to closing this gap. It summarizes several aspects related to use, focus, introduction, characteristics as well as point of views from the players of the PI interviewed about their perspectives on RM.

An exploratory qualitative study with 15 companies is summarized in the second part of the chapter and leads to formulations of hypotheses. These hypotheses are verified in an empirical quantitative research among 124 firms. The research, described in the third section, involved companies of the PI based in Germany and was conducted between July 2004 and February 2005. Further data were then collected between November 2007 and May 2008.

The results of the empirical quantitative research are presented in the fourth section of the chapter, where topics like focus, implementation, introduction, importance, types, use of RMS are discussed. Then trends and perspectives with regard to barriers, benefits, risks or alternatives are presented in the fifth section. Chapter 3 concludes with an illustration of the principal results and a discussion of limitations and outlook. This chapter is based on Kolisch and Zatta (2009).

1.4.3 Chapter 4: Application of RM in Europe and North America

The research discussed in Chap. 3 contributed to further closing the gap between the extensive available research on the application of RM in the service industry versus the manufacturing industry. However, it had a number of limitations, like the fact that it involved only companies based in Germany (Kolisch and Zatta 2009).

To overcome this geographic limitation, as indicated in the first section of Chap. 4, a new study was conducted in Europe and North America and the results are presented in Chap. 4. As in the first study here, too, aspects related to use, focus, introduction, characteristics as well as points of view of the players of the PI interviewed about their perspectives on RM are assessed. However the scope is extended to twelve countries, namely Canada, France, Germany, Holland, Ireland, Italy, Norway, Spain, Sweden, Switzerland, United Kingdom and the United States.

An exploratory qualitative study with 22 companies is summarized in the second part of the chapter and leads to the formulation of hypotheses, which are verified in

an empirical quantitative research of 479 firms. The research, described in the third section, involved companies of the PI based in these countries and was conducted between June 2008 and July 2009.

The results of the empirical quantitative research are presented in the fourth section of the chapter, where topics like focus, implementation, introduction, importance, types, use of RMS are discussed and comparisons between the two regions are made. Then trends and perspectives on barriers, benefits, risks or alternatives are presented in the fifth section. Chapter 4 concludes with an illustration of the principal results and a discussion of limitations and outlook. This chapter is based on Kolisch and Zatta (2012).

1.4.4 Chapter 5: Profit Impact of RM in the PI

A step towards extending and further completing the research on the application of RM in the PI, as illustrated in Chap. 4 is the research discussed in the next chapter. One of the limitations of previous research is namely the lack of an *a priori* profit estimation of profit improvement and the *a posteriori* evaluation of realized profit through RM, comparing performances of companies in different countries and regions.

To close this gap, as indicated in the first section of Chap. 5, a new study was conducted in Europe and North America and the results are illustrated in Chap. 5. Aspects related to profit impact evaluation, years of utilization, introduction, use, *a priori* and *a posteriori* profit improvement assessment are discussed.

An exploratory qualitative study with 38 companies is summarized in the second part of the chapter and leads to the formulation of a research concept. Empirical quantitative research of 603 firms is then conducted. The research, described in the third section, involved companies of the PI based in 16 countries, 2 in the North American cluster and 14 in the European cluster, and was conducted between July 2012 and May 2013.

The results of the empirical quantitative research are presented in the fourth section of the chapter, where topics like *a priori* and *a posteriori* profit impact, influence of time or reasons for not implementing RMS are discussed and comparisons between the two regions are made. Chapter 5 concludes with an illustration of the principal results and a discussion of limitations and outlook. This chapter is based on Kolisch and Zatta (2014).