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REVENUE MANAGEMENT: PROGRESS, CHALLENGES, AND RESEARCH PROSPECTS

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Cindy Yoonjoung Heo  
Zvi Schwartz  
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ABSTRACT. This paper evaluates the main developments of revenue management (RM) over the past decade and discusses RM challenges and research prospects. It examines nine notable emerging themes: total hotel RM, big data analytics, distribution, rate integrity, RM and marketing strategies alignment, social media impacts on RM, RM system, applications of RM in non-traditional service sectors, and RM education and training. We argue that these developments have far-reaching implications for real-world RM practice and anticipate that the topic areas will continue to be popular for hospitality and tourism research in the foreseeable future.

KEYWORDS. Total revenue management, big data analytics, distribution, revenue integrity, customer relationship management, social media, revenue management system, education and training

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INTRODUCTION

Revenue management (RM) is considered to be a mature field of study in operations management research (Dana, 2008). Different streams of research have emerged over the past decade to address the challenges faced by RM practitioners in the ever-changing marketplace, and these continue to improve our understanding of RM and its implications for other aspects of management. This paper has three main objectives: firstly, to provide an overview of the current state of knowledge in the area of RM research with a focus on the main developments achieved after the previous special issue was published in the Journal of Travel and Tourism Management (JTTM) in 2004 (Legohérel & Schwartz, 2004); secondly, to better understand how recent RM developments have informed us about new trends of RM practice and future research perspectives; and thirdly, to engage and to initiate further discussions with RM practitioners about the future of RM and its implications for hospitality and tourism marketing management, which in turn should make a progressive contribution to advance RM theory and practice. The next section presents the nine RM themes observed in the past 10 years. Each of these is critically evaluated and the themes’ implications for RM practice and future research direction is also discussed.

TOTAL HOTEL REVENUE MANAGEMENT: WHAT IT IS, WHAT IT IS NOT, WHO GETS IT RIGHT?

An important issue facing hotel RM is the concept of Total Hotel Revenue Management (THRM). It relates to capturing the mostly untapped revenue and profit potential associated with the non-room revenue-generating centers of the hotel, or, in the words of Bonnie Buckheister (2013), president and chief executive officer (CEO) of Buckheister Management, THRM is “managing every revenue source at every guest touch point to its maximum profitability for the entire hotel or resort asset”. While the topic is discussed extensively by practitioners, it has received very little attention in the hospitality management literature in recent years. Four years ago, Kimes (2011) reported that, in her survey of industry professionals, the most common response regarding the future of RM suggests that RM would become more strategic in nature, and that it would encompass all revenue streams within the hotel. Function space, restaurants, spas, and retail were listed as the most likely non-room revenue centers to be included in RM. This industry sentiment is not reflected in our literature as little is published in hospitality and tourism academic journals on the topic. Among the noteworthy relevant works are those of Licata and Tiger (2010) and Rasekh and Li (2011) on golf courses, Kimes and Singh (2008) on spas, Hendler and Hendler (2004) on casinos, and Kimes and McGuire (2001) on function space. However, even these few studies seem to miss the point of “Total”. These studies demonstrate a “local” approach to optimization within the non-room revenue center, as opposed to viewing the “big picture” where the concept of optimization considers the hotel in its totality. In other words, our academic discussion so far ignores the notion that these revenue centers are part of the hotels, and consequently their performance impacts, and is impacted by, the other revenue centers. As such, it does not fully address the interrelatedness of the non-room revenue centers with the rooms’ and the other centers’ functions. This “computational isolationism” is likely to result in suboptimal outcomes regardless of how effective the employed isolated optimization methods are.

Meanwhile, as noted above, the industry seems to embrace the concept of THRM and at the same time acknowledge a gap and a need for better tools. There is a divide between the volume of discussion and “buzz” around the concept of THRM generated by the industry and the actual level of effective implementation. For several years now, industry leaders and hotel companies have regarded THRM as one of the most desirable advancements in the field. While there seems to be an industry-wide consensus about the necessity to switch to THRM, little is known at this time...
about how that could be done correctly. Consider for example the following thread of industry quotes, demonstrating the realization that something is “missing”.

An early (Hospitality Sales and Marketing Association International [HSMAI], 2010) blog on the topic by the HSMAI’s Revenue Management Advisory Board states the following:

Many companies are now realizing that there is a strong need to adopt a more holistic approach to revenue management across the enterprise. This involves two distinct components. First, there is a need to capture and track all revenue associated with hotel guests in order to segment customers more discretely based on their value – this can come from food and beverage, spa, event venues or, in the case of a casino/hotel, gaming. Second, and equally important, operators need to begin to apply the same principles of revenue management employed at the hotel to each discrete revenue source – there has been a strong push for revenue management in restaurants, spas, event venues and even on the casino floor.

Three years later a member of the same advisory board seems to distance herself from the second point above. According to Farley (2013), the President of “Rainkamer”, a market leader in profit optimization solutions for the gaming and hospitality industries:

...hotels employ astute controllers and support staff thoroughly capable of calculating the marginal value of, say, sleeping room profitability vs. restaurant profitability vs. lounge profitability ... It is one thing to know that restaurant profitability is, on average, x%, but quite another to connect that understanding to behaviors characteristic of identifiable categories of guests. Total hotel revenue management is a most worthy objective, one that surely will be achieved in stages, but one that also will require a more disciplined, connected set of operational and analytical practices.

Interestingly, it seems that the industry might indeed be ahead of academia in understanding the nature and challenge of true THRMR. Here is an even clearer example. Origin World Lab (2014) states that THRMR is not about the application of RM concepts to revenue streams other than rooms, such as food and beverage (F&B), spa and golf, among others (that make up the total hotel revenue) but rather it is “when the interconnected relationships across revenue streams are considered simultaneously in order to create a bundle of prices that optimizes the hotel’s total bottom line”.

Similarly, in conjunction with the announcement of their new function space-optimizing module, IDeaS (2014b) states in a recently released white paper:

... considering overall profit, predicting group demand, and pricing with demand in mind, your organization will realize several benefits. First, you’ll fill your function space better, which will increase revenues and profit. Your team will better understand the contributions of various revenue streams and when to make a trade-off between streams, such as food and beverage versus meeting room rental. If your sellers can convince a group to pay for meeting room rental, they understand that goes directly to the bottom line and will help the hotel in the long run ...
work is needed. Some additional interesting THRM research topics include the question of profit versus revenue orientation, time horizon, and big data analytics.

The realization that one should optimize the entire hotel rather than rooms only underscores the need to re-examine the current heavy reliance on revenue optimization. A recent study by Schwartz, Altin, and Singal (2014) provided initial evidence that the assumptions regarding optimal revenue being sufficient to ensure near profit maximization is most probably less likely to hold true when more revenue centers beyond rooms are added to the mix. This issue is relevant to both the control-setting phase where most algorithms are revenue-based, and the monitoring phase of the RM cycle where there is an industry-wide convention of almost sole reliance on revenue-based measures such as revenue per available room (RevPAR) instead of profit-based measures.

All three RM cycle phases (forecasting, control setting, and monitoring) are of concern when it comes to the planning time horizon. That is, the move to THRM is associated with a paradigm shift from the tactical/short-term mindset to a strategic/long-term view. This shift implies that we need to modify the forecasting methods we use, so that they effectively handle longer forecasting horizons, adjust optimization methods to ones that could incorporate longer term elements, and, of course, adopt outcome measures that are more suitable for long-term evaluation. In the case of the control-setting phase in particular, as articulated by some RM solution providers, the move to THRM means that optimization methods should be considering global rather than local maxima in the sense that much more is involved in the output functions as we add revenue centers to the mix. Since the production of the various revenue-generating departments is often interdependent, it follows that simply optimizing each department independently is most likely to generate suboptimal outcomes. The proper approach would be to optimize simultaneously while taking all departments and their interdependency into consideration or, in other words, to consider the customer’s total value across the hotel’s various revenue-generating centers.

**BIG DATA ANALYTICS**

There is a new, exciting area of big data analytics. Simply stated, the term “big data” refers to the fast-growing availability of structured and unstructured data, characterized by large volume, velocity, and variety. Big data can contribute in improving all three phases of the RM cycle – consider, for example, how much more accurate demand forecast could be if clickstream information were entered into the models and how the hotel’s competitive set could be constructed to reflect consumer perspectives rather than the current approach of similarity of hotel characteristics. At the same time big data analytics presents an unprecedented opportunity for a paradigm shift in the practice RM. Current RM systems contrast rooms’ inventory with predicted demand by segment. The predicted demand and assessed probability determine decisions such as how the inventory (rooms) are allocated to rate fences, distribution channels, and how many rooms to overbook. As noted by Coleman (2013), big data has the potential to support instantaneous decisions (e.g. on whether to accept or deny a booking request) based on “live information about the guest, the hotel, the city and millions of other data points where available”. In economic theory terms, what the industry is so excited about is that big data will support a move away from the less efficient, third-degree, price discrimination model as currently practiced by the industry towards the first-degree, perfect, price discrimination model where the vast majority of the consumer surplus could be extracted by the hotel. A big-data-based system will have immediate and dynamic access to information about each customer. Such information comprises online activity directly or indirectly related to the reservation including search patterns, booking and post-purchase evaluations, rates paid in the past for hotel rooms and other products, guest profile, consumer/psychological profile, time of travel, loyalty patterns, time of booking, the mode of transportation, the customer’s response to various marketing efforts in the past, and weather at the point of origin and destination among others.
When this real-time big data information is combined with similar information about other potential future guests' reservation requests, it could be used to individually tailor the product and price combination, that is, the room and room rate quote. With the ability to best assess the individual guest’s needs, wants, and willingness to pay, the goal of true, most efficient optimization might be within our reach. Academia can and should play a major role in advancing our understanding of these issues and suggesting and testing proper solutions.

**RM AND DISTRIBUTION**

Distribution channels expansion is a mandatory step to develop business growth in the tourism and travel industry: it means dealing with new technologies, worldwide complexity, and powerful partners. According to Vinod (2004), the arrival of the Internet and its online supermarkets has led academicians and researchers to revisit the merchant model and to fit with demand generation via e-distribution channel. Forgacs (2010) reminds us that the strategic objective of distribution channel management is three-fold: revenue producer, cost effective, and easy to control. As specified by Vinod (2009), RM and product distribution are inextricably linked, distribution being the storefront that displays products according to RM recommendations. This section focuses on the distributors, the so-called indirect channels, because it raises additional revenue optimization challenges we intend to develop.

Distributors can provide pure hosting services (for instance the global distribution system) billed as a fee, act as a travel agency selling the products within their own processes and systems against a commission, or repackaging the product into broader packages including a mark-up as a tour operator or through third-party websites (Toh, Raven, & DeKay, 2011). Distributors have to generate an incremental demand in order to offset the commission and distribution fees. Otherwise this would result in just cannibalizing the existing goodwill.

For Mauri (2013), channel management has arisen as a crucial component of RM. However, whether to differentiate inventory access between direct channel and trade is highly debatable. For the sake of partnering principles and to facilitate the sales dialog, inventory access should be strictly the same. However, in terms of revenue, the service producer should offer a wider availability of access to its own direct customers in order to reduce the volume of commissions and distributor fees. RM decisions are usually based on maximizing expected net contribution, and incremental costs are to be incorporated in the inventory control model (Phillips, 2005). Inventory access will be managed differently for direct and indirect channels when fees and costs are integrated in the revenue contribution. Then more availability opportunities will be assigned to the direct channel especially during the constrained periods and when there are few remaining unities to sell. On the other hand, the revenue contribution is calculated in gross revenue when the availability management policy is non-differentiation.

Securing availability access to partners during the most constrained periods is a major consideration. The yearly agreements could include some dedicated allocations to protect capacity for the partners instead of managing it through free sale only. These allocated capacities are managed by the RM team and the contracted capacity allocation is the result of intensive sessions between the RM and the sales division acting as a spokesperson for the partners. Introducing an allotment policy into the reservation inventory is a considerable responsibility and brings with it a weighty additional workload because it implies daily monitoring to comply with the agreed contracts while applying special sales conditions. RM performs the proper analysis to allocate the right level of capacity to trade partners by first assessing the direct channels potential as a basis and then by identifying the forecast remaining capacities to be proposed for the partner’s allocation.

In the case of a high-discount campaign run with a specific partner, the RM function is to steer and limit the demand over the weakest periods. As mentioned in Noone (2003), RM strategy can be adjusted with some partnering efforts including availability guarantees and...
dedicated pricing or promotions to support “true
friends” partners, according to customer seg-
mentation proposed by Reinartz and Kumar
(2002), over a long-term profitability vision
that outweighs any short-term rate dilution.

Channels management implies the capabil-
ity to build mutual agreements based on the
appropriate trade-offs on a yearly basis, and
the capacity for the RM to perform two-tier
performance measurement: traditional RM per-
formance for the direct channel, and a second
one including Lifetime Value for trade. The
long-term risk is not negligible because the
cycle of tough negotiations with major partners
tends to result in the transfer of significant
margins from the services producer to its dis-
tributors, and business-to-business (B2B) rela-
tionships could turn the service producer into a
simple subcontractor providing raw products
with a limited margin. RM plays the role of
counterbalancing the pressure by providing
revenue and profitability insights, and should
be associated more with strategic decisions
related to channels management. According to
Venkat (2009), this could be through a move
from the traditional RM to profit optimization
by integrating RM, marketing, pricing, and
distribution toward consistent data, synchro-
nized analysis, and coordinated actions in
response to corporate requirements.

Channels management is finding the right
compromise between demand generation and
revenue leakage over a long-term horizon.
Taking back control over product distribution
is becoming a priority and efforts are made to
modernize the direct channels devices: web por-
tal designing, smart media development, search
optimization engine, and call center streamlin-
ing. Improvements may focus on processes and
analytical tools for reinforcing the RM role,
thus leveraging different fare and availability
policies depending on the channel in use.

**REVENUE INTEGRITY: PRACTICAL
CHALLENGES AND RESEARCH
OPPORTUNITIES**

Ten years ago reports from industry referred
to new principles aiming to stem revenue
leakage and to yield more revenue improve-
ments and cost reductions. Rose (2007) pub-
lished one of the first academic papers
focusing on revenue integrity (RI) which was
described at the time as “an ignored practice in
the area of revenue management” (Rose, 2007,
p. 71). Holloway (2008) indicated that RI efforts
are to ensure as far as possible that the
revenue anticipated when a reservation is
accepted does actually materialize. Most pio-
neer authors were from airlines but, surpris-
ingly, industries, including telecommunications
and healthcare, have first taken advantage of RI
in order to minimize costs and maximize rev-
ue. RI approaches were developed later in
airlines, and then were also implemented in
other companies in different sectors (including
hospitality and theme park).

Ten years on RI is now fully considered by
the industry as an option to improve companies’
efficiency. Information technology (IT) busi-
esses have developed solutions for services
companies to implement RI processes; for
instance, Amadeus Revenue Integrity Platform,
Sabre Air Vision Revenue Integrity, and others
offer airlines solutions to implement RI pro-
cesses and improve global RM approaches.
Literature also clearly refers to RI and considers
that the RI concept and processes should be
developed along with global RM in order to
reduce cost, stem revenue leakage, and increase
benefit (Legohérel, Poutier, & Fyall, 2013).
Nowadays, some employment advertisements
even refer to a specific RI profile and RI skills.

**Revenue Integrity Objectives and Research
Perspectives**

Niffoi (as cited in Legohérel, Poutier, & Fyall, 2013) indicates that the goal of RI is to
ensure the integrity of revenue, that is, the con-
sistency of the entire commercial chain from
price definition through price charging in book-
ing systems, proper application of price condi-
tions, and respect of yield-determined sales
recommendations to final invoice clearance. In
most services companies, though, failures occur
both in the marketing and the sales operations.
These weaknesses fall into four categories:
technical problems, procedure problems, communication problems, and operational/behavioral problems. All weaknesses must be identified and corrected. Then the expected gain ranges from 1% to 3% in additional revenue.

What about research? Despite the recent “real” development of RI over the last few years, academics have not fully considered this promising and exciting area of research. Some papers have referred to RI, but without focusing on this concept (Wishlinski, 2006). RI lies at the intersection between several disciplines, including marketing, financial and cost control issues, management (of sales teams, procedures, etc.), IT and systems management, data tracking, human resources (HR) skills, and sales, among others. A more global view of revenue and benefit improvement has emerged, and more research is needed to investigate and improve integrated/global RM approaches. Some papers have recently considered this issue (see for example Steinhardt & Gönsch, 2012). As many practitioners agree on solutions developed and implemented in order to strengthen the robustness and efficiency of RI in the context of a more global/integrated approach of revenue/benefit management, there is a need for academics to contribute to this relatively new area of research.

ALIGNMENT OF MARKETING STRATEGIES AND RM

One of the most noticeable RM movements in the past decade is the alignment of RM and marketing strategies, with a common goal, in a more integrated manner. Major progress in a number of areas including RM and customer relationship management (CRM) integration, exploiting opportunities offered by social media, and – more recently – reputation-led pricing strategies, have all positively influenced RM decision-making capability through a better understanding of customer behavior, customer value, and customer relationships. These improvements in turn pose new challenges for RM practitioners and require further research. Each of these areas is discussed in the following.

RM and CRM Integration

One of the notable developments in RM in the past 10 years is the conceptual development of the RM and CRM interface. Understanding customer perception of RM has been greatly enhanced and the notion of integrating RM and CRM has led the hospitality and tourism industry into “a new era” (Mainzer, 2004, p. 285) but not without difficulties. Although RM and CRM should be two complementary practices (Wang, 2012), previous literature offers insufficient guidance on how to integrate CRM with RM at the strategic level (Mathies & Gudergan, 2007; Milla & Shoemaker, 2008; Von Martens & Hilbert, 2011). A significant number of studies have been carried out in recent years advocating the need for more research into this area and seeking a possible solution. For instance, based on a wide range of interviews conducted with industry leaders worldwide, Milla and Shoemaker’s (2008, p. 110) study identifies RM and CRM integration as one of the four major areas of “having the greatest growth potential in hotel RM’ and the authors suggest that the customer will become the driver of RM in the future. Pricing, market segmentation, group RM and organizational structure changes to optimize RM potential are key areas that require management attention. Echoing this view, Vinod (2008) suggests that customer-centric RM is a new paradigm for RM.

Customer-value based RM is also proposed to overcome the limitation of transaction-based RM by both utilizing capacity efficiently and establishing profitable customer relationships (Von Martens & Hilbert, 2011). However, in practice, findings from the hotel industry reveal several causes of potential management conflicts that could become an obstacle for RM and CRM integration if not addressed (Wang, 2012; Wang & Bowie, 2009). These include management goals, management timescales, perceived business assets, performance indicators, and managers’ approaches to achieving
individual set goals. In a B2B context, the key account management and RM integration framework developed by Wang and Brennan (2014) is one of the first to amalgamate account management and RM through comprehensive analysis of the relationship and revenue value of an account that helps managers to make strategic RM decisions that aim for long-term profit yield.

The importance of recognizing customer value in the RM decision-making process has also been widely recognized by RM professionals. A number of opinion leaders and senior RM practitioners from one of the leading RM professional networks, Revenue Management and Pricing International (formerly Revenue Management Society) in the United Kingdom (UK) suggest that the ability to comprehend RM implications for online and offline marketing strategies and vice versa, is pivotal for the new generation of RM decision-makers especially in today’s fast changing marketplace. Considering that RM evolved from its originally tactical inventory management to assuming a more extensive role across the company and at a more strategic level, action research addressing relevant issues surrounding this topic area is expected to grow.

**RM AND SOCIAL MEDIA**

How to capitalize on opportunities offered by the rapid development of social digital marketing strategies such as social media to improve RM is another area of research that has attracted much attention in recent years. The effectiveness of using social networking sites, such as Facebook, Twitter, TripAdvisor, and YouTube, as a means to reach prospective customers, understand customer behavior, establish and maintain customer relationships, and influence customers’ value perceptions has become a popular area for research. The fast growth of the use of social media (SM) inevitably expands the spectrum of reputation risks and has boosted the risk dynamics (Aula, 2010; Eccless, Newquist, & Schatz, 2007), thereby posing new challenges for RM practitioners. The framework for evaluating SM-related RM opportunities developed by Noone, McGuire, and Rohlfś (2011) has undoubtedly made progressive contribution to this relatively new stream of RM research. More sophisticated views of how consumers engage with brands have been identified in the hospitality and tourism marketing literature, which will have far-reaching implications for RM. For example, Hudson and Thal (2013) argue that SM have fundamentally changed the consumer decision process. They illustrate how SM make the “evaluate” and “advocate” stages of today’s “consumer decision journey” increasingly relevant based on the four stages of the consumer decision journey: consider; evaluate; buy; and enjoy, advocate, and bond (Court, Elzinga, Mulder, & Vetvik, 2009).

The link between SM and RM has been substantiated in recent years, which shows that SM has impacted on revenue performance and reputation matters (Anderson, 2012) although research in this area remains limited. In a first attempt to establish return on investment (ROI) for SM efforts, Anderson’s (2012, p. 5) report reveals a number of significant findings. Firstly, the number of reviews that consumers read prior to making their hotel choice has steadily increased over time. Secondly, a hotel can increase its rate by 11.2% and still maintain the same occupancy or market share if their review scores increase by one point on a five-point scale. Thirdly, hotel pricing power has been influenced by user reviews; a 1% reputation improvement could lead up to a 1.42% increase in RevPAR.

Industry leaders such as Patrick Landman, the CEO of the Xotels Group, an international hotel management company specializing in RM, predicts that a focus on corporate reputation is expected of the RM perspective in the future, as it is vital for companies to have a positive reputation and online review score in order to enhance their revenue performance. One of the leading RM system providers, IDeaS Revenue Solutions, launched its Advanced RM system – IDeaS G3 RMS, in July 2014, which claims to be the first to allow hotels to use their current online reputation as a criterion for making pricing decisions. It is therefore fair to assume that in addition to more traditional pricing factors such as location and demand, future RM pricing decisions are likely to also be based on a hotel’s reputation.
More studies in this particular area are needed to explore contemporary issues such as how RM could embrace the opportunities offered by SM, and to comprehensively examine the effects of SM, customer reviews, and their implications for a company’s reputation and, subsequently, revenue performance.

**REVENUE MANAGEMENT SYSTEM (RMS)**

RMS has its origins in the success story of the SABRE system at American Airline as described in Smith, Leimkuhler, and Darrow (1992) and in Rothstein and Stone (1967). RMS are two embedded strategic information systems (ISs), a reactive loop with highly detailed data for tactics, and a slower loop with aggregated information for supporting the strategy. For Queenan, Ferguson, and Stratman (2011), IT is to be considered as a RM performance driver.

Talluri and Van Rysin (2005) consider RM as a computationally intensive process with large amounts of data, forecasts, and a massive optimization produced on a daily basis. Hardware requirements are multiple with a large range of RM solutions on the shelf, from the smallest software package for a medium-size hotel to a several million-dollar modules suite proposed by major solution editors. RMS is constructed with data collections from operational systems Operational Research (OR) tools (forecaster, optimizer), the reservation system, and interfaces with the distribution systems. Data exchanges are two-sided with the sending of availability controls (bid price, hurdle rates, booking limits) from the RMS, and current bookings and the remaining availability from the operational systems. Since RMS encompasses at least three distinct inventories (Reservation, Operations, and OR tools) that are to be synchronized around a single image for the data and systems integrity, the criticality of an RMS is high because the lack of control-setting could lead to significant loss of revenue. RM is a mechanical process with most of the routine decisions made supported by the system under the guidance of an analyst inserting adequate overrides, even if some judgment bias related to the User Interface have been observed, as in Schwartz and Cohen (2004a).

The performance measurement of RMS is covered in Rannou and Melli (2003). The system performance is to be assessed including the user actions for influencing the system. As suggested by Lieberman (2003), to increase efficiency, the RM analyst has to compensate for the system limits and this is facilitated when users have a general technical understanding. RMS performance is a human challenge and should become a long-term goal shared with the editors involved.

New prospects for RMS building are user-oriented with, for instance, the user friendliness of web technologies or Agile software development methods that offer the possibility to start from the user decision-making processes for designing screens and monitoring tools. The next generation of RMS should be more customer-centric (Vinod, 2008) with the generalized implementation of hybrid demand models incorporating the customer booking behavior as buy-down when a lower fare is available, outlined in Boyd and Kallesen (2004), Fig, Isler, Hopperstad, and Belobaba (2010), and Walczak, Mardan, and Kallesen (2010), and the integration of customer profiling and tactics-building from tracking systems. Since technologies are ready for this challenge, some additional research is needed to develop analytical methods for exploiting the opportunities offered by the big data and social media in the RM field.

**APPLICATION OF REVENUE MANAGEMENT IN NON-TRADITIONAL SERVICE SECTORS**

RM has grown into a mainstream business practice in a variety of service industries (e.g., hotels, car rentals, restaurants, casinos, and theme parks), and even in some manufacturing industries. Airlines, hotels and car rentals represent three of the major sectors in which RM is applied, and abundant research has been conducted into these traditional applications of RM. However, researchers have proposed that its potential applicability extends to a number of other service industries with similar industry characteristics; in the last 10 years, for instance,
researchers have explored various topics for the non-traditional RM industry. Chiang, Chen, and Xu (2007) in particular presented research publications on the non-traditional RM industry.

Among non-traditional RM industries, restaurant RM is one of the most researched areas of the last 10 years. Kimes (2008b) discussed the role of technology in restaurant RM, Chan and Chan (2008) showed how the lunar-solar calendar-driven festivals affect Chinese restaurant operation and revenue, and a simulation study by Thompson (2009) found that reducing dining duration increases revenue only by about one-quarter of that expected. Thompson and Sohn (2009) found inaccuracies in the existing approaches to calculating revenue per available seat hour (RevPASH), a common metric of restaurant revenue performance, and Thompson (2010) presented a new decision-based framework for restaurant profitability. Heo, Lee, Mattila, and Hu (2013) found the negative effects of price difference on customer’s fairness perceptions in the context of restaurant RM, and Guerriero, Miglionico, and Olivito (2014) proposed a dynamic formulation of the parties mix problem with a linear programming approximation.

Another non-traditional RM sector is the cruise industry. Toh, Rivers, and Ling (2005) discussed room inventory management issues of cruise lines, and Biehn (2006) discussed the differences between cruise line RM, and airline and hotel RM. Ji and Mazzarella (2007) meanwhile adopted nested class allocation and dynamic class allocation inventory control to cruise inventory, and tested the viability and benefits under a simulated reservation process. Sun, Gauri, and Webster (2011) applied 24 forecasting methods to generate forecasts of final bookings for cruises and found that classical methods perform the best, followed by advanced pickup methods and lastly non-pickup methods. Sun, Jiao, and Tian (2011) provide a review of revenue optimization and marketing research prospects for the cruise industry. Finally, researchers have also explored RM application in other sectors such as spas (see for example Heo & Lee, 2009). Although there have been studies on other non-traditional RM industries, most research focuses on how RM principles can be applied across sectors of the hospitality industry and on the application of existing techniques.

So far, RMSs are available only for traditional RM industries, but in the future it is expected that there will be new technologies and RM systems for non-traditional RM industries. While most current RMS for airlines and hotels are system-oriented, service-oriented RMS are to be introduced for non-traditional RM. Initial investment costs for service-oriented RMS should be lower than system-oriented ones and thus small business owners can readily utilize RMS to improve their revenue. The increasing number of smartphone users and the prevalence of Web 2.0 technologies may help non-traditional RM industries to control demand and to enhance revenue better than ever before. For example, mobile platforms and social commerce can be used for restaurant RM as distribution channels in the same way that hotels and airlines use online travel agencies. Also, location service technology will allow organizations to find customers within a defined area. Considerable additional research on non-traditional RM industries, particularly using new technology, may help organizations to maximize the benefits of RM.

**RM EDUCATION AND TRAINING**

RM has been credited with improving revenues in various sectors of the tourism and hospitality industry and many companies have now realized its importance. Companies have invested significant resources, in particular in RM systems, and have elevated its importance within their organizational structure. Consequently, there is an increasing demand for knowledgable revenue managers.

Hospitality schools started to offer RM courses during the past decade, and now most programs include an RM course as a core subject. Several universities provide certificate programs for industry practitioners and even
Masters’ programs specializing in RM. Examples include the University of Angers in France, which runs a Masters’ program in Service Marketing and Revenue Management, and Cornell University in the United States (US), which offers a Master’s certificate in RM. Executive Development programs such as the Frontier in Revenue Management offered by the Winter School of the Hong Kong Polytechnic University, Hong Kong, and the University of West London, UK, and Pricing Analytics offered by the Center for Pricing and Revenue Management of Columbia University in the US are also available. Private institutions have also started to develop their own certificate programs and training courses, such as the Certified Revenue Management Executive from the Hospitality Sales and Marketing Association International (HSMAI). In addition, some business schools have recently started to incorporate pricing and RM into their generic management or marketing courses.

Many companies, however, still experience difficulties when it comes to finding qualified revenue managers. According to Kimes’s (2008a) report, HR problems were found to be the most critical issue facing RM from the hotel RM professional’s perspective. In particular, career path development was found to be the area most in need of improvement. In a large number of companies, revenue managers mostly come from the reservation department, the sales department, or the front desk, and their main role is to forecast demand, set room rates, control room inventory and manage distribution channels. Successful revenue managers should understand how to make the right decisions based on data analysis. It is especially critical that revenue managers know how to utilize available data, because there are more data available now than ever before. However, the role and responsibility of the revenue manager also needs to be extended. Cross, Higbie, and Cross (2009) argued that RM can no longer stand alone as a tactical approach to room management and that the shift from a tactical emphasis to a strategic focus leads to broader responsibilities for RM. Although the major part of the revenue manager’s job is analyzing numbers, an equally large part of their job is communicating with others about those numbers. Kimes (2011) conducted a survey of 487 RM professionals to understand the future of RM from the industry’s perspective. The findings indicated that the competencies required for an effective revenue manager are to be a combination of analytical and communication skills. In addition, once revenue managers assess market conditions and existing demand to adjust pricing decisions using their analytical skills, they should be able to discuss this information in the context of the company’s overall strategy (Farley, 2011). Revenue managers must prepare written reports and oral presentations with performance data and forecasting that can illustrate the company’s direction in a digestible way. They must also propose recommendations for an organization’s profit optimization and prepare to defend those recommendations both verbally and in writing.

Acquiring and retaining a talented revenue manager is one of the industry’s biggest challenges today. It is essential not only to find the right RM professionals but also to train them to think about the big strategic picture of organizations. Retaining and training the right revenue manager are issues closely related to corporate culture and organizational commitment. The success of RM should not be judged by RevPAR alone. Having a common understanding of what is important to the organization, how it is being measured, and how the revenue manager’s performance will be measured in accordance with the organizational goals helps organizations to focus on the key issues that are important to the business as a whole.

Thus far, the focus of research has largely been on operations, the technical sides of RM, and consumers’ perceptions of RM pricing. There has been little academic attention focused on HR, RM training and educational issues. Schwartz and Cohen (2004a) found that the nature of the user interface influenced the way revenue managers adjusted the computers’ forecasts, based on a study of 57 experienced revenue managers. Schwartz and Cohen (2004b) discovered that the uncertainty of estimates depends on the individual’s years of industry experience, as well as on their gender. Noone and Hultberg (2011) conducted a survey of 82
sales and RM executives and suggested that hotels can foster better coordination between RM and sales by educating each group regarding the other group’s responsibilities. Aubke, Wöber, Scott, and Baggio (2014) identified the antecedents and consequences of group cohesion by contrasting the communication networks of 38 RM teams by means of social network analysis. The study findings suggest that the revenue manager plays a more active role as an information broker so as to enhance group decision-making. However, much research still remains to be done on these topics.

CONCLUSION AND MANAGERIAL IMPLICATIONS

Hospitality and tourism marketing have undergone remarkable changes over the past 10 years. One of the major challenges faced by RM practitioners is how to look beyond traditional tactical RM techniques as part of operations management and incorporate RM at the strategic level in order to proactively engage with other management areas across the organization internally and with customers externally. Kimes (2010) rightly suggests that RM will become more strategic in nature and that it will encompass all revenue streams within the hotel. Although various scholars have made commendable efforts in shaping RM practice based on their research findings, our evaluation of recent emerging themes clearly shows that, as RM reaches its mature stage, more multidisciplinary studies are needed to achieve further theory development. In the previous sections, we identified nine major RM advancements since 2004, which also inform us about a range of managerial implications. We categorize them into eight areas of managerial shift where management attention is required to ensure RM success and the shaping of future RM practices. They are presented in Table 1.

In conclusion, this paper has focused on nine emerging themes of RM to expound RM progress in the past 10 years. It also highlights eight areas of possible management shifts, which are likely to influence the future trends in RM practice. It may not be possible to detail all the factors that will directly or indirectly impact RM in the years ahead; technological advancement, distribution via social media, digital and mobile marketing, and progressive business intelligence solutions such as big data are deemed to be the main exciting new opportunities or challenges for RM. Information systems may well remain as a key challenge to improve RM system performance and user satisfaction. However, it must be stressed that RM also raises ethical considerations and the need for compliance with local legal restrictions within which the organization is operating. It is also important to stress that from the HR perspective, educating future leaders in RM and a company’s ability to acquire and retain talented RM professionals are also considered to be crucial for future RM success. It is anticipated that a more holistic approach to RM is needed to identify revenue-generating opportunities and to optimize revenue and profit generation.

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