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Considerations for Implementing a Hotel Revenue Management System

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CONSIDERATIONS FOR IMPLEMENTING A HOTEL REVENUE MANAGEMENT SYSTEM

by

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Abstract

To fully understand and implement a revenue management system, hotel managers will need to research all aspects of a system, its requirements, and the hotel's requirements to ensure that they are implementing a system that will work best for their property. This kind of research requires finding information in literature that is scattered in many locations. An owner or manager of a small to midsize hotel would need to invest a lot of time and energy into this process. Unlike giant companies like Marriott or Hilton, small to midsize independent hotels do not have the manpower to research and implement these systems without some help.

What needs to be known before implementing a RMS? This paper will seek to answer questions and concerns hotel owners and managers have about the implementation of revenue management systems. What should managers expect to achieve by implementing a RMS and what could potentially hinder the RMS from achieving its full potential? What types of features are available in RMS and what are its benefits? What does management need to do to guarantee successful operation of an RMS? These questions will be answered by consolidating the scattered literature on revenue management systems and taking the experiences and insights from hotel technology vendors and combining it into a comprehensive guide that will bring to light information that should be known before implementing a RMS.

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Part One

Introduction

Revenue management is a fast growing field of interest for many hotel businesses. It has evolved from a small idea to become a strategic imperative for maximizing hotel profitability (Starfleet, 2014). Before it reached the hotel industry, it was first introduced in the airline industry as a way to increase revenue (Anderson & Xie, 2010). In the hotel industry, it has begun to be adopted by many corporations, large and small. Marriott is considered to be one of the first to implement yield management, a precursor to revenue management (Haley & Inge, 2005). Currently, most hotels independent and branded, have in some way adopted revenue management practices, which include looking at ways to generate the most amount of revenue through price manipulation and capacity management (Burns, 2008). Nowadays, these practices have become harder to manage due to the plethora of distribution channels that now permeate the hotel industry and many hotels still do not have new, sophisticated technology that can streamline and expedite the process (Avinal, E. A., 2005).

Due to the expansion of new technology, it has become easier for hotels to manage large amounts of data through revenue management systems (RMS) (Shores, 2013). These sophisticated systems increase revenue by maximizing rate and occupancy for each day of the week (Starfleet 2014). The systems also have many new features that make a revenue manager's job easier. Though RMS has been seen as a beneficial and important part of large hotel's operations, there are many small to mid-size hotels that do not have a RMS. One study found that less than 20% of hotels in North America use a RMS (Cuddeford-Jones, M., 2013). This could be because of a variety of factors. Costs to upgrade, misconceptions about revenue

management software, and low importance to management can all be factors that could cause RMS to be entirely absent from these hotels.

Purpose

The purpose of this paper is to inform hotel owners and managers on all aspects of revenue management system implementation. This paper will look at the expectations and misconceptions of RMS as well as the costs and benefits. An understanding of this information along with a review of RM features and current software can be applied to implement the correct system for each business. Managers will be able to apply the information to determine how practical an upgrade to an RMS is and will be able to implement a system that has a high chance to be successful.

Problem Statement

What needs to be known before implementing a RMS? This paper will seek to answer questions and concerns hotel owners and managers have about the implementation of revenue management systems. What should managers expect to achieve by implementing a RMS and what could potentially hinder the RMS from achieving its full potential? What types of features are available in RMS and what are its benefits? What does management need to do to guarantee successful operation of an RMS? These questions will be answered by consolidating the scattered literature on revenue management systems and taking the insights from hotel technology vendors and combining it into a comprehensive guide that will bring to light information that should be known before implementing a RMS.

Justification

To fully understand and implement a revenue management system, hotel owners and managers will need to research all aspects of the system, its requirements, and the hotel's

requirements to ensure that they are implementing a system that will work best for their property. This kind of research requires finding information in literature that is scattered in many locations. An owner or manager of a small to midsize hotel would need to invest a lot of time and energy into this process. Unlike a giant company like Marriott or Hilton, small to midsize independent and branded hotels do not have the manpower to research and implement these systems without some help. A study that surveyed hotel executives found that RMS is not fully utilized in properties that have it (Erdem, M., Cobanoglu, C., Nusair, K., & Schrier, T., 2012). Not only is there a need for proper documentation on implementing a RMS, but there is also a need for information on maximizing utilization from existing RMS.

Limitations

One limitation for this paper will be the inability to evaluate the different revenue management systems in real life situations. All of the benefits of the system will be assessed based on the literature, interviews, and the stated abilities from the software companies without any testing or experiments to prove if the systems do in fact derive any benefit for the hotels.

Part Two

Introduction

Part two of this professional paper will cover the literature review which is split into two parts. The first half is an overview of the theories and concepts that have relevance to revenue management systems including technology acceptance, system selection, business intelligence, and performance metrics. The second part of the literature review will go over the information needed to make an informed decision on purchasing and implementing a revenue management system.

Information Technology (IT) Systems

The hotel industry has become addicted to information. Whether it is customer profile data, reservation information, occupancy rates, or price forecasts, data gathering and analysis has become an important part of a hotel's operations. To efficiently manage all of this data, hotel managers need updated information technology systems. Information technology systems are the computers, telecommunications equipment, and software that are used to store, transmit, receive, and manipulate data, in the context of a business (Daintith, 2009). Though, according to prior studies, hotels do not always take the lead in implementing these kinds of new technology (Inge, 2014). The reason why could be because of a lack of IT training and knowledge; another reason could be a reluctance to accept new technologies because of fear that the technology will affect the hotel's ability to satisfy hotel guests (Law & Jogaratnam, 2005). Inge (2014) found that there remains a significant installed base of older technology that is unreliable, vulnerable, and incompatible with other systems, but functions just well enough for managers to see little incentive to replace it. Which leads to Connolly & Moore (1998) who note that due to hotel manager's low IT competence, they are skeptical about the value of investing in IT. Law and

Lau (2000) comment that low IT competence of hotel managers and the prevalence of IT-assisted hotel operations can translate into the hotel industry remaining at a high risk of having IT problems. They also comment that it is important for managers to realize that these issues with antiquated IT systems are not IT problems, but a business challenge that they must solve for the long term success of the business.

Business Intelligence

Business intelligence (BI) can be defined as the process of turning data into information and then into knowledge (Golfarelli, Rizzi, & Cella, 2004). Cindi Howson (2008) called BI a set of technologies and processes allowing people at all levels of an organization to access and analyze data. Software like customer relationship management (CRM), enterprise resource planning, decision support systems, and revenue management systems (RMS) are all products that can be labelled as business intelligence. Pareek (2007) notes that business intelligence gives enterprises the capability to discover and utilize data they already own, and turn it into the knowledge that directly affects corporate performance.

Caesars's Entertainment investment in business intelligence has been extremely successful, resulting in a significant increase in revenue and high return on investment (Đekic & Mladenovic-Ranisavljevic, 2010). They equipped the Harrah's Hotel and Casino in Las Vegas with the newest revenue management software that utilized business intelligence. Golfarelli, Rizzi, & Cella (2004) developed an updated version of business intelligence called Business Performance Management that is defined as a set of processes that help enterprises optimize business performance by encouraging process effectiveness. Business Performance Management uses tools like online analytical processing (OLAP) and data mining to provide real time data to managers. The main result of these developments and innovations were absorbed by vendors to

form an extensive set of on-the-shelf software solutions (Golfarelli, Rizzi, & Cella, 2004). The figure below notes the progress in business intelligence since its inception.

Figure 1. Progress Through the Decades

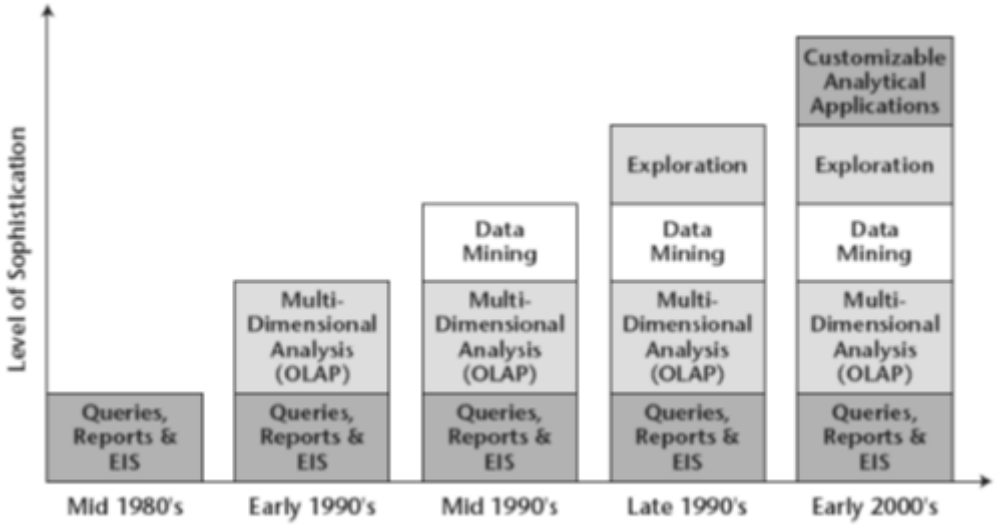

Figure 1.
Adapted from "Mastering Data Warehouse Design: Relational and Dimensional Techniques", by C. Imhoff, N. Galemmo, J. Geiger. Copyright 2003 by Wiley Publishing Inc.

System Selection

While this paper seeks to deliver knowledge to managers about implementing a RMS solution, it would be prudent to begin by first talking about system selection. Systems are generally selected using an objective approach, such as minimizing a negative effect or maximizing profits (Yang, Chiang, Huang, & Lin, 2013). This approach would be a starting point, where afterwards managers should become aware of the different criteria for system selection.

Chen (2002) states that return on investment, investment cost, probability of technology success, and management support must be considered in system selection. Each of these criteria must be taken into consideration as part of the selection process, though this is just a partial list of criteria. Nanayakkara (2013) reviewed fifteen additional criteria that should be used in the selection process that are broken down into three categories: Vendor-related, User-related, and Technology-related. The columns below list each criteria arranged in the aforementioned categories.

Vendor-related	**User-related**	**Technology-related**
• Maintenance	• Customization	• Real time changes
• Vendor credentials	• Cost	• Flexibility
• Financing option	• User friendliness	• System requirements
• After sales support and training	• Ease of implementation	• Internet integration
		• Back-up system
		• Reporting and analysis features
		• Integration with other software

Once managers have a grasp of what to look for in terms of criteria for their system, they need to decide upon an avenue for which they will make a selection decision. Yang et al., (2013) review expert opinions, manager focus group opinions, management decision models, and mathematical programming as four different ways in which selection decisions can be made on information systems. Each of these methods can be used to select a RMS for a property, though management decision models were found to be the most effective way to select a system of which the following theories for system selection conform.

Liang and Li (2008) create a decision model that considered the benefits, opportunities, costs, and risks for project selection. This model can help management to critically analyze which system would be optimal for them by comparing different vendors based on the four

categories previously mentioned. Wei, Liang, & Wang (2007) create framework made up of three main phases of project selection, starting with strategic objective analysis, system analysis, and group decision-making. This framework would be beneficial to managers because it would foster critical thinking about the objective and strategy behind implementing a RMS. Finally, Yang et al., (2013) create a hybrid information system selection model that considers quantitative factors, qualitative factors, and critical factors to reflect actual business operations. This model incorporates all of the criteria that were discussed earlier and in doing so looks to be the most comprehensive model for system selection.

Technology Adoption and Acceptance

Technology Acceptance Model (TAM)

As part of the selection process, managers need to know that the information systems they choose will be accepted by the people in the business that it is will support. Lam, Cho, & Qu (2007) found that an effective use of information technology depends on positive intention towards adoption of information technology. Davis (1989) developed the technology acceptance model (TAM) to predict and explain consumers' willingness to adopt new technologies. This model was based on the expectancy-value theory by Fishbein & Ajzen (1975) and the theory of reasoned action (Ajzen & Fishbein, 1980).

The technology acceptance model uses two variables, perceived ease of use and perceived usefulness to trace the impact of external factors on internal attitudes, beliefs, and intentions (Davis, Bagozzi, & Warshaw, 1989). This model has been cited and used in more than 10,000 articles and has covered information systems like hospital systems, decision support systems, computerized models, expert support systems, and office systems (Bradley, 2012).

Wang & Qualls (2006) adapted TAM to capture the adoption behavior in the hospitality industry by integrating organization level constructs from both internal and external forces that shape the technology adoption process.

DeLone and McLean IS Success Model

DeLone & McLean (1992) proposed a model of information system success based on previous research by Mason (1978) and Shannon & Weaver (1949). This model, called the DeLone and McLean IS Success Model (D&M IS Success Model) identified six factors that can be used to measure the level of success of a system (Jang, Kim, & Hwang 2008). These six factors are:

- System quality
- Information quality
- Use
- User satisfaction
- Individual impact
- Organizational impact

DeLone and McLean (2003) further developed their model by narrowing the factors down to three, which were system quality, information quality, and service quality that influence users' intention to use, actual use, and their satisfaction. Jang, Kim, & Hwang (2008) apply the D&M IS Success Model to understand the influence of hotel information system quality on the intention to use the system. They found that the characteristic of support from information service providers to have a significant positive influence on users' intention to use a hotel information system which shows that when deciding upon a system to implement, it would be wise to pick the system that has the best support from the vendor.

Resistance Theories

Resistance to change is one challenge for technology adoption and acceptance. Markus (1983) shows that if a user thinks a system will support their position of power, the user will be inclined to use the system. Marakas & Hornik (1996) base their model of passive resistance misuse on passive-aggressive theory and postulate that the introduction of information technology exposes the inflexibility of a user toward the new system and change and, when united with feelings of stress and fear leads to resistance behaviors. Lapointe & Rivard (2005) propose the multilevel model of resistance to information technology implementation where resistance behaviors occur after perceived threats result from the interaction between the status quo and a given object. Finally, Bhattacherjee & Hikmet (2007) incorporate resistance to change literature into models of technology acceptance to understand why users resist using new technology.

Characteristics of Hotels Adopting Revenue Management

Jarvis, Lindh, & Jones (1998) found several characteristics associated with a higher probability of a hotel adopting RM. The characteristics are:

- ownership
- number of market segments the hotel identifies
- degree of seasonality

The researchers used a survey of hotels in the U.K. and found that ownership has a significant effect on whether a hotel had adopted RM; it found that chaiTns tended to be adopters and independent hotels were less likely to be adopters. The number of market segments the hotel identifies with was identified as the factor that appeared to be the most influential among hotels

in the survey; hotels that identified with more than six market segments were very likely to be adopters. Finally, the degree of seasonality or type of demand was also a significant characteristic; steady demand for a hotel throughout the year indicates that there is a higher chance that the hotel is an adopter, indicating that non-seasonal hotels are more likely to be adopters of RM.

Technology Performance and Success

Organizational Culture

Rhee (2004) reviewed recent literature and found that factors contributing to information technology success include not only technical factors, but also human and organizational factors. Previous studies have focused on organizational characteristics like supervision and training, but there are also employees' psychological states that can influence information technology success. Organizational culture is now considered an important factor in successful information technology implementation (Bradley, 1993). Gorla & Lin (2010) found that organizational factors influence software quality in projects more than technical factors. Demeester (1999) states that organizational culture sets the norms and values that lead to the decision making process and it has a strong effect on technology success. Serafeimidis & Smithson (1999) review evidence that show organizational culture is the key factor in determining a company's capability to mobilize its information technology resources to improve firm performance. Lastly, Đekic & Mladenovic-Ranisavljevic (2010) state that the use of analytics and information should be part of an organization's culture and senior management should believe in and drive use of information technology.

Performance Metrics

Avinal (2005) found that there is value in measuring performance. In the context of a hotel and a RMS, the key performance metrics that need to be understood are:

- Occupancy rate
- Average daily rate (ADR)
- Revenue per available room (RevPAR)
- Gross operating profit per available room (GopPAR)

Each of these metrics provides a way for a manager to understand what it going on in terms of revenue and occupancy. The traditionally used metrics used to be just occupancy and ADR, but now a hotel looking at its business from a revenue management perspective should be more interested in revenue per available room RevPAR (Haley & Inge, 2005). Though recently there has been a newer metric gross operating profit per available room (GopPAR), which is seen as a better metric to use than RevPAR (Starfleet, 2014). GopPAR looks not only at revenue, but also operational costs to give a more accurate accounting of revenue.

Revenue Management

The remaining half of this literature review will go over all of the important issues that need to be addressed when implementing a revenue management system. It is setup as a guide for managers or anyone in the hotel industry who would like to know more about RMS.

Revenue management is defined as a sophisticated form of supply and demand management that helps a firm maximize revenue by balancing pricing and inventory controls (Wirtz, Kimes, Pheng, & Patterson, 2003). It has also been defined in regards to the hotel industry as the sale of the right room to the right customer at the right time (Haley & Inge, 2005).

Fact-based forecasting and optimization are the core functions of revenue management that set it apart from other business applications (Chase, 1999). Much of the research and application of revenue management focuses on optimization and there has been less published work on forecasting issues (Chen & Kachani, 2007). Forecasting in hotel revenue management attempts to estimate future demand using current reservation activity and historical data (Neamat Farouk, Saleh, Atiya, El-Shishiny, Athanasius, & Aziz 2011).

Lee (1990) notes that forecasting methods can be divided into three types: historical models, advance models, and combined forecast models. Chen & Kachani (2007) states that hotel revenue management consultants should have a wide range of forecasting models at their disposal, and should use different ones for different seasons and micro-markets. Weatherford & Kimes (2003) found from their research that exponential smoothing, pickup method, and moving average models provide the most robust forecasts and the same research showed that if actual demand is higher than forecasted demand, revenue losses could be as high as 1.3%. According to Weatherford & Belobaba (2002), underestimating demand by 12.5% to 25% can result in a loss of revenue from 1% to 3%, which is significant. Willie (2011) notes that quality forecasting must be pursued in order to maximize revenue potential.

The optimization of demand is the key to any revenue management system, automated or manual (Mehrotra & Ruttley, 2006). After a forecast is generated, price and inventory control policies are created through optimization techniques. The early work in inventory control policy is based on expected marginal seat revenue model (Chen, 2000). Relihan (1989) introduced the use of threshold curves or booking curves as a method to determine availability of different rate classes. This allows rooms to be allocated among different rate classes or discount levels to maximize total expected revenue. An example of this would be a hotel with 30 rooms who know

they will be sold out for a date in the future. The hotel can arrange their rates in tiers where only a select number of rooms will be sold at a discount and the remaining will be higher prices.

Weatherford (1995) proposed the nested by deterministic model shadow prices method. This method creates a model to find the number of rooms to reserve for each type of guest. Weatherford (1995) also found that by incorporating length of stay into hotel room allocation decisions increased expected revenue by 2.94%. The research by Weatherford (1995) has allowed hotel managers to incorporate "length of stay" and "type of room" to the characteristics that can be manipulated to increase revenue. Without the benefit of some form of automated revenue management system, it may be difficult for a revenue manager to directly apply the principles discussed to the day-to day management process (Mehrotra & Ruttley, 2006).

Revenue Management Relevancy

Revenue management is relevant to the service industry when five conditions, each specifically adapted for hotels, are satisfied (Guadix, Cortés, Onieva, & Muñuzuri, 2010, Kimes, 1989). These five conditions are:

- Perishable inventory
- Volatile demand
- Limited capacity
- Market segmentation
- Low variable to fixed cost ratio

Though Schwartz (1998) shows that a low variable to fixed cost ratio is not necessary in order for revenue management to be successfully implemented, Gaudix et al. (2010) replaces this characteristic with "an appropriate cost and pricing structure". Wirtz et al. (2003) adds a sixth characteristic, services that can be sold in advance, to the conditions for revenue management

relevancy in the service industry. With these characteristics, a hotel manager can take a quick look at their property and see if conditions are suitable for implementation of a revenue management system, but although these characteristics are common to hotels, relevancy is not restrictive to just these conditions and should be used as a crude measurement.

Revenue Management System (RMS)

Revenue management systems are computer applications used for revenue management science (Avinal, 2005). As the techniques to manage revenue have become more sophisticated, revenue managers can no longer intuitively price rooms when there are so many channels for distribution and against competition that is using technology to gain an advantage (Emeksiz, Gursoy, & Icoz, 2006). This is where revenue management systems (RMS) come in to help hotel managers by giving suggestions on inventory control, pricing, and channel management (Ivanov & Zhechev, 2011).

Types of Systems

Revenue management functions can be found within other hotel systems like property management systems (PMS) and in software solutions that are focused solely on revenue management. This guide will focus on software solutions whose entire focus is on revenue management.

There are two main types of RMS. The first is a property-based system that has been around for many years. The property based system holds all hardware and software on the premises that the system is serving and is owned and managed by the hotel. These systems have their drawbacks because the property is responsible for maintaining the hardware and providing support and data security for the software (Starfleet Media, 2014). These types of systems used

to be the norm, but recently due to the advances in technology there are new types of RMS that use the cloud and are gaining in popularity.

A platform is an operating system or database where application programs can be designed to run (Dictionary.com). Software as a Service (SaaS) is a cloud computing platform where information technology resources, like data storage, computing power, software applications, and technical infrastructure, are delivered to clients through a network (Ma & Kauffman, 2014). The new generation of RMS now uses Software as a Service to deliver their software straight to the client without any need for the client to buy any type of equipment other than a standard computer and internet connection. Another type of RMS uses Application Service Provider systems (ASP) which rent the right to use the vendor's software and hardware on a monthly or annual subscription (Haley & Inge, 2005).

The difference between Software as a Service and Application Service Provider is that Application Service Provider delivers traditional client-server applications, where software is installed onto the client's PC (Erel, 2014). Software as a Service, on the other hand, uses the internet and can be accessed through a web browser. Also, Application Service Provider tends to be used with older software and is harder to scale compared to Software as a Service; SaaS is considered superior to ASP (Murphy, 2009). Software as a Service is not without its disadvantages; it must always have an active internet connection for use, security of company data, and finally the performance is not as fast or smooth as its competitors, though this can be fixed with a fast and reliable internet connection (McLellan, 2013).

Decision vs Recommendation

Another difference in the types of RMS that needs to be understood is a recommendation system as opposed to a decision system. A recommendation system will go through data

gathering, forecasting, optimizing, but will only recommend pricing and inventory controls that must be implemented by a user. This option requires more expertise, time, and attention from the user, usually a revenue manager, to decide upon and implement the recommendations from the system (Haley & Inge, 2005).

On the other hand, a decision system goes through all of the stages of a RMS and will automatically deploy appropriate pricing and inventory controls without any intervention from a user (Mehrotra & Ruttley, 2006). These systems tend to need a more robust interface to a central reservation system or property management system than a recommendation system (Haley & Inge, 2005). Though recommendation systems do need more attention and input from a user, decision systems require some input from a user. There is also a hybrid RMS system that combines elements from a decision and recommendation system. These hybrid systems allow hotels to establish constraints defining the recommendations that are reviewed by a user versus those that can be implemented automatically (Haley & Inge, 2005). Each type of system has its pros and cons, which this paper will look at in Part Three, and it is up to the hotel and managers to decide upon a choice that best matches their needs.

Features of RMS

The different brands of RMS software available today have many features that have been used in revenue management for many years. Figure 2.1 on the next page shows the flow of information within a hotel as the different parts come together to become a system. The items in the grey box represent all the pieces that can be described as part of a RMS.

Figure 2. Revenue Management System flow chart

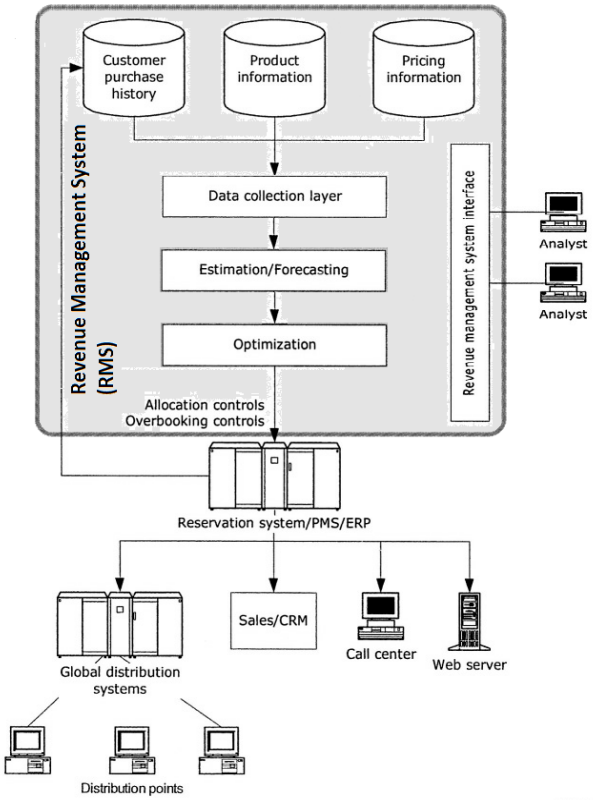

Figure 2.
Adapted from "The theory and practice of revenue management" by K. Talluri, and G. Ryzin, 2004, *68*. Copyright 2004 by Kluwer Academic.

The advantage that RMS has over revenue managers is the features that gather and store data. RMS can extract data from a property management system or central reservation system on a real-time basis (Haley & Inge, 2005). This data contains historical and future data that can be used in the calculations that provide forecasting, inventory controls, and pricing decisions. An example of historical data would be the previous year's data on occupancy for a hotel while future data would be the amount of reservations on hand for a date in the future. RMS software analyses enormous amounts of historical and future data to provide useful forecasts and pricing recommendations (Ivanov & Zhechev, 2011).

All RMS features can be categorized into four stages which are forecasting, optimizing, controlling, and monitoring (Mehrotra & Ruttley, 2006). Figure 3 shows the stages and key features of a RMS.

Figure 3. Stages and Features of a RMS

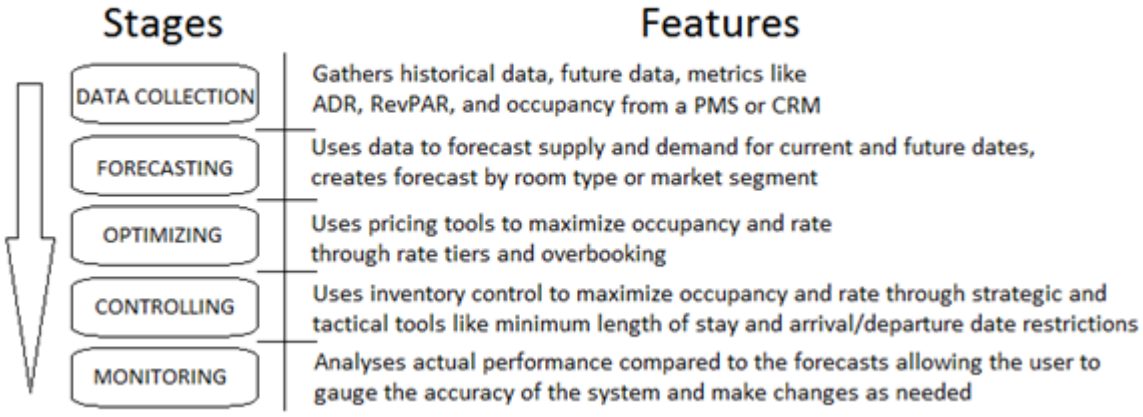

Figure 3.
Adapted from "Revenue Management: A Technology Primer," by R. Mehrotra, and J. Ruttley, 2006. Copyright by the American Hotel and Lodging Association.

Implementation Benefits

There are many reasons why a hotel would want to implement a RMS, but the reason most often given is to maximize overall profit and RevPAR (Mehrotra & Ruttley, 2006). Haley & Inge (2005) state that implementing revenue management can increase revenues 3-6%, or more. While this may be the most obvious reason, it does not persuade a hotel manager to implement a RMS because there are no assurances that a RMS will work accurately.

According to O'Neill and Carlbäck (2011), the main benefit to implement a RMS is to maintain occupancy at an acceptable level, especially when demand is low. Though by itself this reason could be hard to accept for a manager, a study by Ortega (2014) found that the main way an RMS leads to improvements in hotel performance is by achieving higher occupancy rates, specifically in the low season. Increasing occupancy during the slow season has always been a challenge for hotel owners, but with an RMS this could change.

Another reason why hotels should implement a RMS is to gain a strategic advantage over their competition. If a hotel is situated in a market with many competitors, it would be wise to develop some kind of advantage to get ahead of the competition (Willie, 2011). Mathews (2000) identified three factors that allow a hotel to compete effectively against competitors; these factors were market segment, price, and location. As shown in the previous section, a RMS includes features that forecast and optimize price and market segment, which therefore will give the hotel the tools needed to outperform its peers and gain a strategic advantage over the competition (Willie, 2011). Another facet of gaining a strategic advantage is being able to generate competitive intelligence and market insight (Starfleet Media, 2014).

Although most features of an RMS can be seen as benefits for implementation, one of the most influential features from the previous section is the ability for a RMS to gather and manage large amount of data from different sources. The processing of large databases is impossible without appropriate software (Guadix et al., 2010). Integration of a RMS with a hotel's property management system or central reservation system can help revenue managers by freeing up their time to work on making decisions instead of doing time-consuming tasks like updating pricing channels (Haley & Inge, 2005).

An interview in Hospitality Upgrade (2004) with representatives from Carlson Hotels Worldwide and Omni Hotels & Resorts found a few key fringe benefits associated with RMS implementation.

- Forecasting improves significantly.
- Overbooking performance improves.
- Changes in the marketplace are seen much faster.
- Easy to examine performance of promotions for future decision making.

Each of these benefits can help to make a revenue manager's job easier and more effective. Better forecasting allows a revenue manager to accurately prepare for periods of high and low demand while overbooking headaches can be minimized with highly accurate forecasts. By being able to see changes in the marketplace faster, revenue managers can respond quicker with the appropriate adjustments. Lastly, by being able to track performance of promotions easily, revenue managers and executives can track and make decisions based on these reports in an efficient manner.

Figure 4 below shows the four biggest benefits of RMS implementation as found by a 2014 survey on hospitality revenue management. These benefits from the study mirror what previous research found and can be seen as an accurate measure of benefits for implementing a RMS.

Figure 4. Benefits of RMS Implementation

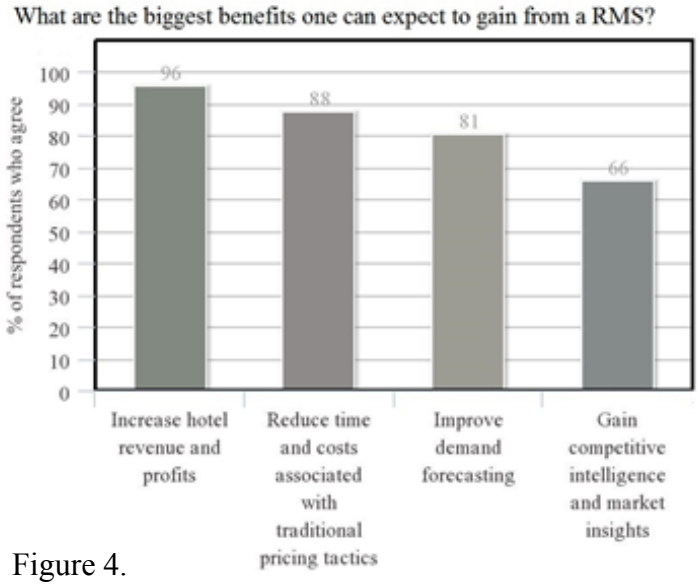

Figure 4.
Adapted from "Smart Decision Guide to Hospitality Revenue Management" 2014. Copyright 2014 by Starfleet Media.

Implementation Challenges

A RMS is not a simple thing to implement for a hotel that is brand new or that has been operating for many years. Implementation involves more than hardware and software; it requires training employees properly, changing business processes to support the hotel's revenue management objectives, and aligning incentives and organizational structures (Talluri & Ryzin, 2004). Metters, Queenan, Ferguson, Harrison, Higbie, & Ward (2008) found that challenges to implementation can be categorized into three categories: business processes, people, and data quality and timeliness. Each of these categories must be addressed to smoothly implement a system that will function properly and effectively. First, a hotel must plan out the steps it will take to have an RMS fit within the organizational structure of the business. Second, it must look at how an RMS will coexist with the employees of the business. Finally, the hotel should understand the technical aspects of the RMS.

Business Processes

There are many business processes that exist in a functioning hotel. For a property that has been running for some time, implementing a RMS will be more work than starting fresh at a brand new property. According to Metters et al., (2008), there will usually be minor to major changes to present business practices, depending on the property. These changes could be seen in marketing and promotion processes, reservation or booking processes, and group rate management.

One area where there can be some emotion and conflict is where to place control of the revenue management function (Haley & Inge, 2005). Some properties place the inventory controls in the rooms division, while others put it in the sales and marketing division. Since RMS

implementation cuts across multiple departments, it requires significant cross-functional coordination (Talluri & Ryzin, 2004).

A challenge for an organization that owns or manages more than one hotel would be to decide upon centralized or decentralized control of revenue management. Centralizing control can be beneficial for an organization by yielding multiple properties in concert, sharing the cost of a dedicated revenue manager, and because different segments can be directed to properties with availability (Haley & Inge, 2005); though the downside to centralizing control is that there can be conflict between departments and risk in removing revenue control from the property.

People

A RMS must be embraced by a hotel's employees for it to be implemented correctly. Kimes (2008) stressed that the most important issues facing implementation are related to human resources; RMS success can be fulfilled with motivated staff. There are many people in a business whose day to day activities are affected by a new system. A sales manager must be taught that revenue management is about increasing revenue even by decreasing sales volume, which could cut into their commission (Talluri & Ryzin, 2004). Revenue managers in charge of pricing will need to trust the recommendations of the RMS. To do this they will need to believe that the data being fed into the system is accurate. These managers must have proper training programs to overcome the fear and intimidation that comes with implementing a new system (Metters et al., 2008).

Data

Gathering data from systems within the hotel that are in real-time and of high quality is critical for successful implementation. The systems that most often interface with a RMS are property management systems, customer management systems, global distribution systems, and

web servers (Metters et al., 2008). Obtaining historical data from these systems might be challenging and could require building separate databases for information that is not traditionally stored in these systems like booking pace demand and lost business statistics (Haley & Inge, 2005). Also, there needs to be a reliable connection with global distributions systems and web servers to be able to control inventory and pricing with third party vendors. Another challenge for a new businesses and for existing businesses with poor data collection is that most RMS requires a full year of historical data to generate accurate forecasts (Haley & Inge, 2005). While some forecasts of a RMS can be generated with less data, the reliability of these forecasts will be low until more data history is entered.

RMS Cost

Nowadays, most of the major RMS vendors have transformed their products into a subscription model. Hotels only need to pay a monthly or annual cost to use the software and all of its features. No longer do hotels need to invest in expensive hardware like servers and databases where they would incur high amounts of costs and liability for the hardware (Haley & Inge, 2005). A monthly or annual fee each month grants a hotel access to the software and use of servers and other hardware that is needed, but the vendor owns and maintains it. This change has made it possible for most if not all hotels to be able to afford to implement a RMS.

RMS Training

As talked about in the challenges of implementing an RMS, training for employees is crucial for the success of a system. A RMS is only efficient when the managers and employees who use the system understand how and when data inputs should be adjusted (Avinal, 2005). RMS vendors understand this and have programs in place to assist a hotel's employees who would want training in the use of a RMS. Most of the major vendors like Duetto, IdeaS, and

Rainmaker host workshops which go over using the system and instill revenue management discipline in the managers and employees who attend (Metters et al., 2008).

Performance Measurement

Once a RMS is decided upon and implemented, there are needs to be a way to measure if a RMS is successfully operating and producing results that are accurate. Avinal (2005) found that performance measurements are important for management staff to be able to estimate the impact of their decisions. "When performance is measured, performance improves; when performance is measured and reported back, the rate of improvement accelerates" (Monson, 1985). Also, by measuring if a RMS is providing accurate forecasts and performing its tasks, a business will be able to see is if the RMS is contributing to the success of the business rather than just looking at revenue as a performance measurement, which could be increasing or decreasing because of other factors (Avinal, 2005). In this way a manager can adjust the data being fed into the RMS until its performance improves.

Impact on Hotel Decisions

Implementing a RMS changes the way some business processes in a hotel are conducted. By allowing the RMS to supply recommendations or decisions for the business, managers need to know upfront what type of impact these systems will have on the hotel performance, clientele, and on the managers themselves. Ivanov & Zhechev (2011) note that this area of research needs more attention because there is a dearth of information on RMS's role in the impact on final decisions.

Accuracy leads to Performance

Managers need to understand that the accuracy of the recommendations and decisions comes from the data that they input into the RMS. If the data is not clean, the recommendations

and decisions will be inaccurate, which will lead to poor performance. Data that is used from a PMS like customer files can be inaccurate due to the front desk staff rushing through the check-in process while data from location-based services or historical purchase activity can be inaccurate for many reasons outside of the hotel's control (Jones, 2013). Managers need to look at the data that is being fed into the system and find these flaws so that they can take corrective measures so that a RMS system can produce accurate information.

User Interface influences Managers

The brand of RMS software that is used can not only be important due to the features and reliability of the system, but also because of the user interface. A study by Schwartz & Cohen (2004) found that the user interface influenced the way managers adjusted a RMSs' forecasts. The study gave each manager the same prediction in a different user interface and found that managers would change the recommendation of the RMS just because of the way the interface displayed the information to the manager. The study found that the longer a RMS took to generate the forecast, the more changes were made to the forecast by the manager, indicating that time spent calculating a forecast has an inverse relationship with trust. This is important for a manager to remember because it shows how a bias of a slow computer being ineffective can lead to low trust in a RMS.

Decisions affect Valued Clientele

A RMS is just software, without feeling or outside knowledge, which can make decisions that can affect people in different ways. A RMS could suggest booking group A over group B based on the information it has, but it can't measure long term benefits like knowing that group B will continue to book with a hotel year after year, while group A will only be coming for one year (Mayock, 2010). A manager will need to understand these dynamics that the system does

not take into account. These kinds of decisions are why a hotel manager still needs to pay attention to the recommendations that a RMS makes and correct as necessary.

Despite its positive impact on revenue, revenue management practices like overbooking and price discrimination have received a large amount of criticism (Ivanov and Zhechev, 2011). Kimes (2002) goes over the practices that customers find acceptable and unacceptable. He finds the following:

- Acceptable revenue management practices
    - Deep discounts in booking rates in exchange for stricter cancellation conditions.
    - Different prices for products perceived by customers as different like weekend and weekday prices.
    - Giving customers all the information available about prices and booking conditions.
- Unacceptable revenue management practices
    - Changes in booking terms without telling the customer
    - Trivial price discounts in exchange for stricter cancellation conditions.

Vendors

Recently, there have been a surge of RMS startups, such as iRates, Pricematch, and Duetto (ONeill, 2015). These new companies are entering a market that has many well-known players like IdeaS, Infor, and Rainmaker. These well-known and startup vendors offer products that are designed to solely deliver revenue management functions that integrates with a hotel's systems. These vendors have many common features, but each is also different in their own way.

In part three, there will be a discussion comparing four of these vendors that will help managers determine which system could be the best fit for their property.

Conclusion

In this section we reviewed concepts that pertain to system selection and technology adoption and acceptance. These concepts helped to frame the topic of revenue management system implementation so that managers can understand the process of selecting a system and plan for its adoption and successful performance. Next, we looked at what a revenue management system is and all of the important aspects of implementing a system like costs, benefits, training, and its impact. With this guide as a resource, managers should be able to successfully implement a RMS that can help to generate more revenue. In the next section, there will be a synthesis of the information presented here which will result in a checklist that managers can use to compare the different types of RMS vendors.

Part Three

Introduction

Hotel owners and managers have to handle a lot of different and time sensitive tasks on a daily basis, especially in hotels that have few management personnel. While technology advancement marches on, these people have limited amounts of time to research and implement systems that will propel their business to continued profitability (Aziz, Khairil, & Zaiton, 2012). This study has researched the scattered literature on revenue management systems and system implementation that a hotel owner/manager would find useful and organized it into a comprehensive guide. This next section will take the information that was found and give an analysis that will be broken into three parts. The first part will review the currently available RMS software, the second part will look at some conclusions that can be drawn from the researched information, and the third part will give recommendations for hotel owners and managers about selecting a RMS system.

RMS Vendor Review

Each RMS vendor that will be discussed provides their clients with a revenue management solution for hotels. All of the information found about these vendors comes from publicly available information and statements from the vendors themselves. Though this review will only cover four vendors, there are many others on the market that could be used. This paper will look at three established players in the market, which are Infor, Rainmaker, and IdeaS, as well as a startup called Duetto.

The rationale for picking these vendors is based on a few factors like reputation, business longevity, and the number of clients. Infor provides software for more than 70,000 customers and has been in business for over 30 years. Rainmaker's clientele includes many successful

casinos like Wynn Las Vegas, Caesars Entertainment, and MGM Resorts International and has a reputation for being the best total revenue management solution. IdeaS has been around for over 25 years while gaining over 5000 clients of which 95% are still working with them. Finally, Duetto is a startup that has generated a lot of buzz about its software and has been featured in articles about its dynamic pricing models.

All of the vendor have a different product strategy to gain the business of the many types of hotels. A limited-service hotel will not need all of the same RMS features as a full-service hotel or casino-hotel. This is why Infor and Duetto have different levels of products available. Infor has a core package called EzRMS and add-on modules that allow a property to pay only for features that are useful to it. Duetto offers three levels of products depending on the type of property. Rainmaker provides only one version of their software, but it is geared toward larger hotels and integrated resorts. Table 1 below summarizes the products available from each vendor and the type of property it supports.

Table 1. Vendor and product comparison.

Vendor	Limited-service	Full-service	Casino-hotel	Add-on Modules
Infor	EzLITE	EzRMS	EzRMS	EzREGION, EzBUDGET, EzCOMPETE, EzQUOTE, EzCONTRACT
Duetto	Insight	Edge	GameChanger	None
Rainmaker	GuestREV	GuestREV	GuestREV	GroupREV
IdeaS	RMS	RMS	RMS	None

Note. Each vendor has a different product strategy mix.

The similarities between the vendor's products include features like forecasting, optimizing by market segment, group management, and competitive set analysis. The differences between the products are not major, but one product might be better suited for a property than another. A representative from Rainmaker states that the difference between her product and her

competitors is that GuestREV marginalizes room and ancillary revenue. This is important because it factors in not only revenues, but also costs into its forecasts.

A representative from Duetto talked about the difference between his software called Edge and his competitors; he says that his product is the only one to measure regrets from a hotel's website as part of the measure for total demand. This feature allows Duetto's Edge to have a more accurate picture of unconstrained demand for a property than other systems. This would in turn lead to more accurate forecasts for the hotel, which would result in more revenue. Another difference that he talks about was the concept of open pricing. A hotel normally operates by setting a "best available rate" (BAR) and all other pricing decisions are based off of that. Duetto's product moves away from this practice and allows the rate to be "free floating" so that the RMS can better capture demand and revenue on any given day. Table 2 on the next page compares the four vendors based on the factors that were introduced by Nanayakkara (2013).

Table 2. Full-service product comparison.

	Duetto Edge	Infor EzRMS	Rainmaker GuestREV	IdeaS RMS
Cost	monthly subscription based on # of rooms	annual subscription	monthly subscription	annual subscription based on # of rooms
Training	4 hours of training, E-learning, on-site training, webinars	3 days of On-site training	2 days of On-site training, E-learning	E-learning, on-site training, webinars
Support	24x7 support, client manager, software updates	24x7 support, revenue knowledge team, software updates	24x7 support, consultants, software updates	24x7 support, client manager, software updates
Integration	PMS, GDS, Internet reservation channels	PMS, CRS, GDS, Internet reservation channels	PMS, GDS, Internet reservation channels	PMS, CRS, Sales and Catering Systems, GDS, Internet reservation channels
Platform	SaaS	SaaS	SaaS or client hosting	SaaS
Accessibility	computer, tablet	computer, tablet	computer, tablet, mobile device	computer, tablet, mobile device
Customization	home page	reports, home page	tailored to property	reports
Features:				
Multi-property management	No	No	Yes	Yes
Group management	Yes	Yes	Yes	Yes
Non-room revenue management	No	Yes	Yes	Yes
Online reputation management	No	No	Yes	Yes
Competitive set analysis	Yes	Yes	Yes	Yes

Note: This table can be used as a template for anyone looking to further review any other vendor or product.

Conclusions

Table 2 shows us that there are many factors to look at when deciding on an RMS solution. While a lot of the vendors offer the same or comparable features, finding out which system works best within this framework is crucial to selecting a RMS that fits the property. Another key takeaway from this is for management to understand the needs of the property before they start looking at products. An operator needs to know if non-room revenue management is something they would like to have in a RMS or if group sales is a big part of their business and they would like to have that functionality in their software. These characteristics that make up a hotel are important to discover, so that a property will have the essential functions it needs from an RMS.

There are a few key conclusions that can be found from analyzing the literature on RMS and system implementation. Two of these conclusions coincide with the characteristics that Jarvis, Lindh, & Jones (1998) found that relate to a higher probability of a hotel adopting revenue management. First, ownership is a key factor in the adoption of revenue management. Whether a property is independent or branded, the study found it makes a big difference in adoption and acceptance of a RMS. Branded hotels have the luxury of a corporate team that gives recommendations and decisions that can boost revenue and generally have an organizational structure that supports revenue management implementation.

Rhee (2004) found that human and organizational factors contribute to the success of IT. If there is no commitment from top management, it is hard for a hotel to implement an RMS. Independent and branded hotels need their owners and managers to understand the importance of revenue management if they want to grow their revenue. Another option for an independent hotel

is to convert their property into a branded hotel to leverage the strength and systems of a franchise.

Second, there are characteristics of a hotel like the degree of seasonality and the number of market segments that a hotel identifies, that according to Jarvis, Lindh, & Jones (1998) correlate with a higher probability of a hotel adopting revenue management. The study found that non-seasonal properties tend to have higher adoption of revenue management and attributed this finding to the fact that since there was more business at these properties, the revenue managers were very busy and needed help in pricing management. What needs to be understood by seasonal properties is that though helping to decrease the load on a manager is one of the benefits, the main benefit of implementing a RMS is higher occupancy rates, especially in the low season (Ortega 2014). By understanding this, seasonal properties should be more attracted to the idea of implementing an RMS.

Recommendations

Deciding upon a RMS can be a difficult task for managers with little IT knowledge. This paper has tried to impart all the necessary knowledge to make an informed decision on RMS selection. By using the information here along with Wei et al., (2007) framework of system selection, a hotel's management can begin the process of selecting the correct RMS for the property.

Figure 5. Steps for System Selection

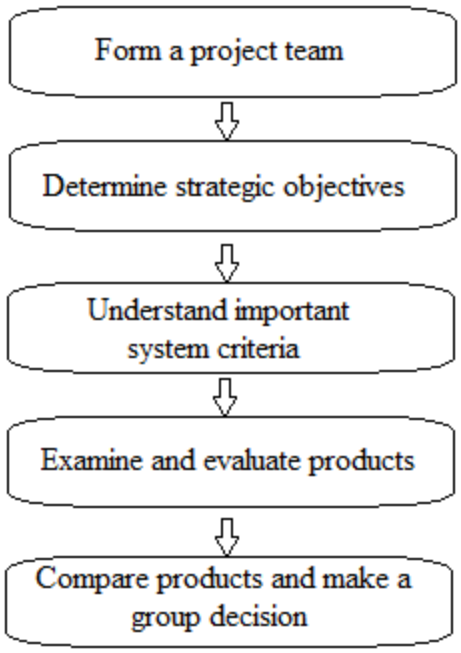

Figure 5.
Adapted from "A Comprehensive Suppy Chain Project Selection Framework under Fuzzy Environment" by C. Wei, G. Liang, and M. Wang, 2007, International Journal of Project Management, 6, p. 627.

This process begins with all relevant personnel at a property forming a project team and coming to agreement on the strategic objective for implementing an RMS. The relevant departments that should have input in the decision making process are marketing, operations, and executive management.

Next comes system analysis which can be done by understanding the criteria that Nanayakkara (2013) listed about system selection. Hotel owners and managers should then analyze which criteria is the most important to the property. In table 2, this paper outlined four of the products currently available. It highlights the critical pieces of information that should be asked to a vendor.

These topics are:

- Cost
- Training
- Support
- Integration
- Platform
- Accessibility
- Customization
- Features

Finally, a group decision should be made based upon the information. Management and employees should be on the same page about the new changes to business processes to successfully implement an RMS. Managers who would like to compare any additional RMS products can use table 2 as a template for additional products.

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