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TO EXPLORE THE SOFTWARE APPLICATIONS IN REVENUE MANAGEMENT AND THE IMPACT OF THESE APPLICATIONS[1]: BASED ON A CASE STUDY OF UPSCALE HOTELS IN BOGOTÁ

EXPLORAR LAS APLICACIONES DE *SOFTWARE* DE *REVENUE*

MANAGEMENT DISPONIBLES Y EL IMPACTO DE ESTAS APLICACIONES EN UN ESTUDIO DE HOTELES DE ALTA CATEGORÍA EN BOGOTÁ COLOMBIA

Abstract

The aim of this study is to explore the software applications in revenue management and the impact of these applications based in a case study of upscale hotels in Bogota Colombia. A mixed methodological approach was applied based on semi- structure interviews and questionnaires. Findings show that the concept of RM is now starting to have relevance in Bogota. Nevertheless this area still has a lot to work because there is a lack of knowledge, or misunderstanding of the concept.

Key words: revenue management, information technology, revenue management systems (RMS), upscale hotels Bogota.

Resumen

El objetivo de este estudio es explorar las aplicaciones de *software* en *revenue management* y el impacto de estas a través de un estudio de caso de hoteles de lujo en Bogotá Colombia. El enfoque metodológico utilizado fue mixto a partir de entrevistas semiestructuradas y cuestionarios. Los resultados muestran que el concepto de *revenue management* está empezando a tener relevancia en Bogotá, sin embargo, el área hotelera todavía tiene mucho que trabajar por la falta de conocimiento o por la incorrecta interpretación del concepto.

Palabras clave: *revenue management*, información y tecnología, *revenue management systems* (RMS), hoteles de lujo de Bogotá.

Introduction

Nowadays, the hotel industry is more competitive than in the last century (KIMES, 2009). This is then where the concept of Revenue Management begins to be important in the hotel industry, because the idea of this concept is to ensure get the maximum income for the hotel, based on specific decisions. As a consequence of that, Hotels begin to incorporate this area as a management department (KIMES, 2008, 2010; JONES AND KEWIN, 1997; JONES AND HAMILTON, 1992; LUNG LU AND ING-WU, 2012; MILLA AND SHOEMAKER, 2008).

Where RM decisions are supporting the analysis of different kinds of data, such as historical and forecast information. That requires processing, organizing and interpreting and huge volumes of information, all of that in the least possible time. It is then where the information technology and in detail the Revenue Management Applications or revenue management systems - RMS begin to have a relevance because the process of organizing and processing the data is easy because the parameters are previous configured in the systems (KIMES AND WAGNER, 2001; BURGESS AND BRYANT, 2001; KARADAG AND DUMANO-GLU, 2009; PICCOLI, 2008). These revenue applications allow Revenue Managers to focus more in analysis that in processing the information. This supports the purpose of this study to explore the software applications in revenue management and the impact of these applications based in a case study of upscale Hotels in Bogota Colombia.

Revenue Management has more relevance in Bogota city because the growth of the hotel industry in the last five years has increased by 89 per cent in the number of rooms available. Nevertheless the Revpar of the city in the same period has only increased by 7 per cent while the total occupancy has decreased by 12 per cent, and in 2007 the occupancy in the city was 71.2 per cent and in 2011 was 62.96 per cent

this data was provided by Cotelco (*Asociación Turística y Hotelera de Colombia*). These are consequence of the increased offer of available rooms and the entrance of new hotels. However, the demand of the guest has not increased in the same proportion, as a result of increasing competition. In consequence hotels start to look for different drivers that generate competitive advantages, and some have turned to IT as a way to cope with turbulent environments (SIGALA, 2003). Also the strategies of RM have important role when the environment is competitive (KIMES, S., 2009).

The reason to conduct the research in that field was based on the significance that Revenue Management and Information Technology have nowadays in the hotel industry (BEDWARD AND STREDWICH, 2004; CALLON, 1996; DEVERAJ AND KOHLI, 2003; HA, IP, LEUNG & LAW, 2011; NYHEIM AND CONNOLLY, 2012). Also the relevance of this research is because there is little research that explores RM and even more less research that only focuses in exploring and evaluating the software application of RM (KARADAG AND DUMANOGLU, 2009; EMEKSIZ, GURSOY & ICOZ, 2006; ABDULRAHMAN, 2007; LAW AND JOGARATNAM, 2005) because more research conducted was focused in investigating RM and IT separately way or only evaluated IT as one of the components of RM but did not go in depth in research of RM applications.

In addition, all the research conducted in this field was focused on developed countries such as United States or Europe but there was little research done in that field conducted in developing countries such as Colombia.

The objectives of these study, firstly to identify, which software applications are used in Revenue Management and clarify in which ways upscale hotels in Bogota used them. After the identification of the RM applications characteristics this research assessed the impact of software applications available in the revenue

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management process in terms of efficiency and effectiveness in upscale hotels in Bogota.

Methodology

For achieve the aim of this research the philosophy chosen was pragmatism; the decision to use this philosophy was based on the understanding that this study analyzes a scientific field such as IT in this case RM applications and social field such as hospitality. For the science field it is better to understand the phenomena through positive and objectivism (DESCOMBE, 2010) but also this research requires another perspective because the analysis of revenue management applications involves other variables such as human factors, part of the social aspects where for better understanding the researchers recommend a subjective and interpretive view.

Related to the methodology this study combined qualitative and quantitative across triangulation that creates more accuracy in the findings because it allows the author to corroborate and complement the finding in each of the methods that would be supported in deep methodology part (DESCOMBE, 2010).

The research tools in this study include questionnaires to General Managers and semi-structured interviews for Revenue Managers and IT managers. The sample of the questionnaires was determined using quota sampling that includes sixty-two hotels in Bogota and for the sample of the interviews was convenience sample that include six interviews. The administration of the questionaries' was conducted via email and the interviews were conducted used a call conference. Both conducted during June and July of 2012.

The data analysis of this research was conducted using a triangulation that gives the option of viewing the research from more than one perspective in this case the perspective of the General Managers, the perspective of Revenue Managers and the perspective of IT managers. The analyses of the findings for qualitative and quantitative were integrated in order to complement or corroborate the information. For the quantitative analysis this research used a descriptive statistics using SPSS. 2.0 software and for the qualitative part this research used a content analysis of the interviews transcripts using Atlas Ti 7 software.

TABLE 1. Summary of the research methodology

Category	Selection
Philosophy	Pragmatism.
Ontology	Combine objectivism and subjectivism.
Epistemology	Combine positivism and interpretivism.
Design	Exploratory.
Approach	Combine inductive and deductive.
Strategy	Case Study- Instrumental case study.
Method	Combine qualitative and quantitative
Time horizon	Cross sectional.
Research tools / Instruments	Questionnaires and Interviews.
Population	Bogota hotels.
Sample Frame	Upscale hotels in Bogota.
Sample	Quantitative: Quota sampling: Sixty-two hotels. Qualitative: Convenience sample and purposive sample: Three hotels. Six interviews.
Data analysis	Quantitative: Descriptive statistics SPSS software. Qualitative: Content analysis ATLAS Ti software.

Source: CARDENAS, XAVIER. (2012). To explore the software applications in revenue management and the impact of these applications: based on a case study of upscale hotels in Bogotá. Master Dissertation. Swiss Hotel Management School. Switzerland.

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Population & sample

The population of this study is hotels in Bogota city, the decision to choose this population is based that this city fulfill the factors that influence the propensity to adopt new technologies in hotels. After mention the population of this study it is important to define the sample framing as list of the population elements (GRAY, 2004) In this case the sampling frame is 130 hotels this number was provided by Cotelco (*Asociación Turística y Hotelera de Colombia*). This list was verified to look in search engines like Google if the name of the hotel really exists and after that corroborate in their web page the location of the hotel in Bogota.

In this study the sample is upscale hotels in Bogotá city, this based on upscale hotel have more propensity to invest in ICT applications (Sahadev and Islam 2005). It is important to underline that no official hotel classification exists in Colombia. For the purpose of this research the classification was based on the average daily room ADR. Hotels with a higher ADR than COP$200.000 were classified as upscale hotels. And the rank of stars according to trip advisor this methodology is supported by GUILLET AND LAW (2010). Where the total 62 hotels that achieve the first criteria of ADR of this study, 47 hotels have a star classification in trip advisor this represent 76% of the hotels in the study and of these 47 hotels all of them are classified between 3.5 and 4.5 stars hotels. Nevertheless this analysis and criteria present some weakness because the rating of starts in trip advisor is only base on the comments of reviews of people and not in formal criteria.

This research determines two types of samples, one for the quantitative part and other for the qualitative part, because it is not appropriate establish only one sample where the research have quantitative analysis and qualitative analysis (DESCOMBE, 2010).

The sample in the qualitative part of the research was determined a quota sampling where the research non-randomly selects the hotels from identified strata until the planned of subjects is reached. In this case this research stratified according to hotels stars and ADR. It was determined that the sample of upscale hotels in Bogota was sixty-two hotels. For that the sample ratio (JENNINGS, 2010) of the research is 47%, which indicates a higher validity of the research. Because, this implies that this study at least cover 50% of the total population of hotels in Bogotá. However this research is focus only in upscale hotels in the Bogotá the sample ratio is 100%.

The approach to determine the sample in the qualitative part was based on a convenience sampling and purposive sampling (JENNINGS, 2010). Where the convenience sampling refers to the selection of participants for a study based on their proximity to the research and the ease which the research can access the participants. Purposive sampling is also referred to as judgmental sampling since it involves the researcher making a decision about whom or what study units will be involved in the study (JENNINGS, 2010). In this study the convenience sample was determined as based on the access to hotels when the researcher already has access and contacts. The consequence of this meant that hotels are more open to collaborate in the research.

The sample determined was three units meaning three different hotels. This included two interviews in each hotel, with IT managers and the person responsible of the RM that mean six interviews. This number of units illustrates with clarity the interest in the study. The interviews can select purposively, based in selected a large hotel, a medium hotel and a franchise hotel. That provides an overview of the different points of view of different hotels.

This study was supported from different types of validity defined by GRAY (2010). The fist

one is the external validity is the extent it is possible to generalize from data to a larger population or setting (GRAY, 2010). In this case the sample was determined by the use of all of the upscale hotels in Bogota, members of Cotelco. Nevertheless, the generalizations from this study argue that its results are relevant only to its particular setting in this case Bogota hotels. Another possible weakness of the research is that the population made up from the hotels that are members of Cotelco association in Bogota. Nevertheless it is possible than others hotels in Bogota exit and are not part of that association but this is not a great difficulty because according to Cotelco the number of hotels that are not part of the association is below that 1% and more of this hotels operate without operation license approved by the local governments for that are considered illegal hotels and also these are in the segment below 3 stars for that the sample of the hotels of this research represents the 100% of the population.

It is the extent to which it is possible to generalize from data to other cases or situations. Since sampling in qualitative research tends to purposive rather than random, and data gathered from a limited number of cases (GRAY, 2010) In this case the data came from six interviews. To create a generalization in the research the selection of the interviewees was based in different sizes of hotels and types of properties. With the purpose of creating transferability that refers to the degree to which the results of qualitative research can be generalized or transferred to other context or setting but only with similar characteristics like Bogotá (KU-MAR, 2011). The justification to generalize the findings is based on the fact that the interviews were selected from different types of hotels in terms of size, operator and if was part of international operator. On the other hand, the findings or the interviews in this research are not presented isolation but a complement or corroboration or the findings in the questionnaire for that the generalization is valid.

Theories and models in rm applications

There are different models that explain RM and the role of IT in one of their variables or components. This section explains these models and how there is used in this study.

The first model to analyze is the model proposed by GRIFFIN (1997) named Lodging Yield Management System (LYMS) that explains the critical successful factor for Yield management. These factors are hardware design, quality, data management, maintenance, computer to computer interface, functions, objectives, control, information quality, user computer interface, training, attitude, commitment, understanding, competence, decision making latitude, reservation support, existing information systems, supplier support, customer behavior, middle agent behavior, and environmental benevolence. These factors are classifying in five categories: system, user education, user traits, external environment and organizational support.

This model provides a perfect overview of the variables that affect RM. This research goes in deep more in variables concerned to the technological issues. Nevertheless, it not possible to conduct this research only evaluates the RM applications, because these factors should not be considered in isolation of each other. Griffin proposes that specific issues relating to each factor might be analyzing independently at first. But the conclusions should be tempered and modified with respect to other factors (GRIFFIN, 1997). Though this research doesn't adopt this suggestion, because this research analyze the RM applications in interaction to other factors such as users education and training, organizational support, external environment and user traits. Nevertheless this research moves in deep in the system factor variables that are more relate with the research aim.

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The second model analyze is the model propose by GUADIX, CORTÉS, ONIEVA, MUÑUZURI (2008). This model is named Technology Revenue Management System TRM. One of the reasons to include this model in this research is because this provides the option to analyze RM in three different management levels such as strategic level, tactical level and operational level. For that this research collect data in two of the levels in this case information provide by General Managers for the strategic level, and information provide by IT managers and Revenue Managers for tactical level. One limitations of this research is that not address the operational level. Nevertheless, this doesn't affect the findings of the research because more of the hotels analyze are middle hotels and don't have operational level for RM and operational level also is cover from the tactical level in this case IT managers and Revenue Managers. The simulation engine mentioned in this model that corresponds to the research aim of RM applications is addressed in this research not only from tactical and operational level but also from the strategic level.

The TRM system module includes four steps: demand forecasting, optimal room distribution, room inventory control and real assignment including in a system process flow. However, this model does not include other important steps in the Revenue Management like market composition so this research complements this model to other variables of RM.

The third, model analyzed in this research is the model purpose by QUEENAN, FERGUSONB & STRATMAN (2009). This model describes the revenue management performance drivers in two categories, technical performance drivers and social performance drivers where IT aspect is included as one of the technical drivers. This research analyzes the technical drivers such as capacity allocation, forecasting, pricing, market segmentation like a features of the RM applications and not follow exactly the model that analyze the drivers separate.

This decision was taken after the previous analysis of the RM applications where this research identified that these drivers are features of the RM applications.

The fourth model analyzed related to RM was purpose by EMEKSIZ, GURSOY, ICOZ (2006). This model covers all aspects related to the implementation process of computerized RM applications. This research is supported in the five stages because it extracts some parts of each stage, for example in the preparation stage this research analyzes the training of the employees but only focuses on the training related to RM applications, in the second stage this research analyzes the demand analysis, reservation features, market segmentation, arranging capacity allocations, market segments and determination of conditions for discount rates but only since perspective of RM applications features align with the research objective to identify the features of RM applications. The third stage relates to implementation of RM strategies and it is analysis is only of RM applications. Stage four relates to evaluation activities, this research address this stage trough RM applications perspective and human perspective. And the last stage relates to monitoring and revision of RM strategy and analyses only RM application perspective because this research does not evaluate the general RM strategy of hotels.

After mentioning the models of RM and how they relate with RM applications, this research also presents a brief description how RM and IT have since the beginnings, been related. The 1990s saw the wide implementation of sophisticated RM systems in the hospitality industry, made possible by the development of computer technology (KIMES AND WAGNER, 2001). As a result of an increased competitive environment, hotel executives are frequently turning to technology as an aid to room's revenue maximization. And RM computers capable of controlling the rates allocated by reservation staff have now been developed

(VICAR AND RODGER, 1996). Also appropriate technology, when used in conjunction with revenue management principals, helps hotels to increase revenue and profit (KIMES, 2010).

Different research underlines the importance and relationship between IT and RM, for example Later, Schwartz and COHEN (2003) found from a study of 57 experienced Revenue Managers that the interaction between a revenue managers and a computer screen offering revenue management data is influencing by certain attributes of the computer interface.

RM solutions start to appear in recent years and provide useful and valuable support to revenue management practices in hotels (EL GAYAR, SALEH, ATIYA, A. EL-SHISHINY, FAYEZ & AZIZ, 2011). Also other research finds the relevance of RM application such as in interviews with General Managers of hotels, where 80 per cent of respondents say RM is the most critical technology in their hotel (QUESTEX MEDIA GROUP, 2010). Another study related to RM managers, mentioned that technology would play a strong role in future developments within RM as the second most common response with 24.6 per cent (KIMES AND WAGNER, 1992).

Also a survey of 487 professionals found the future was going to be much more strategic in nature and would be even more strongly driven by technology, in which function space will be the new frontier. As technology evolves, analytical pricing models, and social networking and mobile technology are going to have major impact on the future (KIMES, 2010). Also in the KIMES research one question asked was what is the change driver in RM, the answer found was that technology was the most common change with 37 per cent. In the same research the participants mentioned if given an unlimited amount of money to spend on an RM initiatives, respondents were most likely to invest 47,1per cent in technology. Other common themes that emerged were investments into system inte-

gration. Also the respondents mentioned that they see technology playing a major role in this transformation because of the complexity and number of decisions that must made. The proper use of technology can also help free revenue managers from more mundane analysis and allow them to focus their attention on the strategic implications.

One of the key issues when addressing the use of RM decisions is the need for suitable information and its availability from modern computer systems (BURGESS AND BRYANT, 2001). Hotels review both qualitative and quantitative data, and that is only practical with sophisticated systems. And without sophisticated technological systems, it is impossible to accurately identify the cost relevant to each market segment. Improved technology will result in improved financial information, which will in turn facilitate RM decisions to optimize profit from all customers (BURGESS AND BRYANT, 2001).

It is generally accepted that a structured RM system will significantly alter the traditional approach to accommodation management. This includes any restructuring within the organization and the implementation of policy, procedural and marketing support system (DONOGAHY, MAHON-BEATTIE, McDOWELL, 1997). The RM setting of rules and applying them is only made possible by the new technology. IT and RM systems are able to handle and manipulate data in the new ways so that forecasting and decision-making are greatly improved (SIGALA, LOCKWOOD & JONES, 2001). Also, while the management of revenue from sale of rooms has always been an obvious and important function of accommodations managers, it was the advent of computers which enabled and facilitated the storage and analysis of the vast amounts of historical data necessary for accurate demand forecasting, the monitoring of actual demand in relation to the forecast and the communication of rate availability and restrictions to reservation staff. In other words IT is a tool, which has en-

abled RM to be effectively practiced within the hotel sector (JAUNCEY, MITCHELL & SLAMET, 1995). To complement that, the principle drivers identified in the technical aspect and the most relevant, is the forecasting that has significantly influenced performance in RM because it determined the optimal capacity to allocate for high value customers (QUEENAN, FERGUSONB & STRATMAN, 2009). And the forecasting procedures used by hotels may be part of the overall RM software package.

All of the models presented and the findings of different researches support the relevance of analyzing the RM applications and support the aim of this research to explore the software applications in revenue management and the impact of these applications based in a case study of upstart Hotels in Bogota Colombia.

Development

The questionnaires were administered via on-line to sixty-two General Managers of upscale hotels in Bogota. The rate of response was 38.7% that represents 24 questionnaires answered. This represents a reliable number for the analysis and represents an accurate results and more validity of this research because this represents more than 25% of the sample. The data collection was conducted between 1 of June 2012 and 15 of July 2012 in collaboration

with Cotelco (*Asociación Turística y Hotelera de Colombia*), who acted as gatekeeper.

The hotel participants' represented a variety in terms of the number of rooms and the type of hotel because it is a mixed between national brands and international brands. The range of average daily room of the hotels was higher than 200.000 \$COP criteria defined by the researcher with the purpose to determine if the hotels were upscale.

The diversity in terms of type of property, provided accurate and more validity to this research because it includes interviews at chain level and at property level

Findings

It is clear that more upscale hotel in Bogotá has a formal Revenue position that confirmed the previous research that mentioned RM as a department in the hotel (GUADIX, CORTÉS, ONIEVA & MUÑUZURI, 2008; SANCHEZ AND SATIR, 2005; KIMES, S. 2008, 2009, 2010; UPCHURCH, ELLIS & SEO, 2002; QUEENAN, FERGUSONB, STRATMAN, EMEKSIZ,GURSOY & ICOZ, 2006; CHOI, S., 2006; ENZ, CANINA, & NOONE, 2012). That was supported in the first question in the questionnaire was does your hotel have a formal position of Revenue management? The results are presented in the table 1

TABLE 2. Revenue Management Position

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	75.0	75.0	75.0
	No	6	25.0	25.0	100.0
	Total	24	100.0	100.0	

Source: CARDENAS, XAVIER. (2012). To explore the software applications in revenue management and the impact of these applications: based on a case study of upscale hotels in Bogotá. Master Dissertation. Swiss Hotel Management School. Switzerland.

Also this research validated that the trend of RM based customer centric mentioned by previous research (CROSS, HIGBIE & CROSS,

2009; NOONE, MCGUIRE & ROHFS, 2011). Related to the fucntions of RM this research found that the General Mamagers recognize

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the functions of RM mentioned by previous authors (KIMES, S., 2010; UPCHURCH, ELLIS & SEO, 2002; MILLA AND SHOEMAKER, 2008; CROSS, HIGBIE & CROSS, 2009; BROTHER-THON AND MOONEY, 1992; DONOGAHY, MAC-MAHON-BEATTIE & MCDOWELL, D., 1997) but there are some functions that them appear more frequently such as future and demand predictions and only appear a few times func-tios such as groups and consortions and that contradict the importance that others author give to group revenue management (CHOI, S., 2006). The findings are presented in the table 2 and 3. One corresponds to answers in the questionnaires and the other to the content analysis after coding the interviews:

TABLE 3. Functions of RM

		Responses		Percent of Cases
		N	Percent	
	Historical Demand analysis	18	11.4%	75.0%
	Future demand predictions	20	12.7%	83.3%
	Reservations inventory	19	12.0%	79.2%
	Actual versus forecast sales	19	12.0%	79.2%
	Market composition	19	12.0%	79.2%
RM Functionˢ	Non-Arrival and cancelation analysis	12	7.6%	50.0%
	Advice on rates and restrictions	17	10.8%	70.8%
	Groups and consortiums	11	7.0%	45.8%
	Analysis and reports	19	12.0%	79.2%
	None	2	1.3%	8.3%
	Other	2	1.3%	8.3%
Total		158	100.0%	658.3%

a. Dichotomy group tabulated at value 1.

Source: CARDENAS, XAVIER. (2012). To explore the software applications in revenue management and the impact of these applications: based on a case study of upscale hotels in Bogotá. Master Dissertation. Swiss Hotel Management School. Switzerland.

TABLE 4. Frequency of RM functions

Topic	n	%
Historical Demand analysis.	2	4.3
Future demand predictions.	5	10.6
Reservations inventory.	5	10.6
Actual versus forecast sales.	2	4.3
Market composition.	10	21.3
Non-Arrival and cancelation analysis.	2	4.3
Advice on rates and restrictions.	14	29.8
Groups and consortiums	5	10.6
Analysis and reports	2	4.3
Total	47	

Source: CARDENAS, XAVIER. (2012). To explore the software applications in revenue management and the impact of these applications: based on a case study of upscale hotels in Bogotá. Master Dissertation. Swiss Hotel Management School. Switzerland.

To complement that this research validated that the RM is more focus in accommodations than in other areas KIMES, S. (2008). Also this research determine that in upscale hotels in Bogota the concept of RM used in other areas such as spas, banqueting was null mentioned by previous research (BURGESS AND BRYANT, 2001; KIMES, S., 2008, 2009, 2010; CROSS, HIGBIE & CROSS, 2009; LICATA AND TIGER, 2010) Like is show in the table 4

TABLE 5. RM Activities

|		Responses		Percent of Cases
		N	Percent	
RM_Areas[a]	Accommodations	23	76.7%	95.8%
	Food and beverage	2	6.7%	8.3%
	Spa	1	3.3%	4.2%
	Banqueting	3	10.0%	12.5%
	None	1	3.3%	4.2%
Total		30	100.0%	125.0%

a. Dichotomy group tabulated at value 1.
Source: CARDENAS, XAVIER. (2012). To explore the software applications in revenue management and the impact of these applications: based on a case study of upscale hotels in Bogotá. Master Dissertation. Swiss Hotel Management School. Switzerland.

This research validated since perspective of General Managers and Revenue Managers that RM play an important role in the strategy for that this research support the previous research (RANNOU AND MELLI, 2003; CROSS, HIGBIE & CROSS, 2009; KIMES, S., 2010) that validated the strategy role of RM in the hotels. Like is show in the figure 1

FIGURE 1. Bar chart strategy role of RM
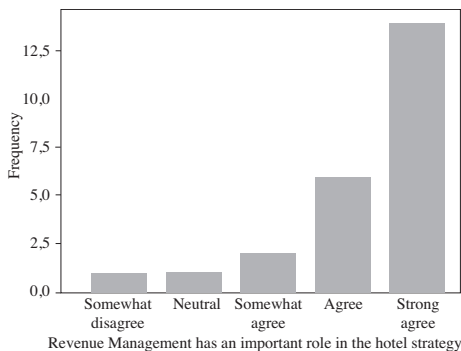
Revenue Management has an important role in the hotel strategy

Source: CARDENAS, XAVIER. (2012). To explore the software applications in revenue management and the impact of these applications: based on a case study of upscale hotels in Bogotá. Master Dissertation. Swiss Hotel Management School. Switzerland.

This research found and validate the new skills requires for Revenue Manager (MAC VICAR AND RODGER, 1996; KIMES, S., 2008, 2010; PICCOLI, 2008; BROTHERTHON AND MOONEY, 1992; CROSS, HIGBIE & CROSS, 2009; EMEKSIZ, GURSOY & ICOZ, 2006; GRIFFIN, 1997) that were more base in analytical skills than in operational skills such as rooms background.

After analyzed the findings of this research related if the upscale hotels in Bogota have a RM applications this research argument that in the case of this research the RM applications in not a necessary component of RM like previous authors mentioned in previous investigations (QUEENAN, FERGUSONB & STRATMAN, 2009; EMEKSIZ, GURSOY & ICOZ, 2006; DONOGAHY, MACMAHON-BEATTIE & MCDOWELL, 1997). To complement that this research found that more of the hotels in Bogota use a Microsoft excel to manage for that this research determine that RM in upscale hotels in Bogotá have some limitation because doesn't cover one of the critical

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success factors or RM management related to system variables (GRIFFIN, 1997) Also this research argue that another limitation of RM in upscale hotel in Bogota was that don't have one of the characteristic require to implement yield management related to information processing and software (DO-

NOGAHY, MACMAHON-BEATTIE & MCDOW-ELL, 1997). Also this research determine based on the findings that the RM in upscale hotels in Bogota have absence or the technical driver or RM mentioned by (QUEENAN, FERGUSONB & STRATMAN, 2009) Like is show in the table 5

TABLE 6. Type of RM applications

		Responses		Percent of Cases
		N	Percent	
RM Software[a]	Property Management system	6	17.1%	26.1%
	Excel	12	34.3%	52.2%
	Manual	6	17.1%	26.1%
	None	7	20.0%	30.4%
	Other applications	4	11.4%	17.4%
Total		35	100.0%	152.2%

a. Dichotomy group tabulated at value 1.
Source: CARDENAS, XAVIER. (2012). To explore the software applications in revenue management and the impact of these applications: based on a case study of upscale hotels in Bogotá. Master Dissertation. Swiss Hotel Management School. Switzerland.

Other of the major findings in that research was that more RM applications in upscale hotels in Bogota was developed in house and only few hotels have applications developed by external supplier such as IDeaS V5i, raimmaker group, Pros software, EasyRMS. This is illustrate in the figure 2 and table 6

FIGURE 2. Bar chart developer of RM application
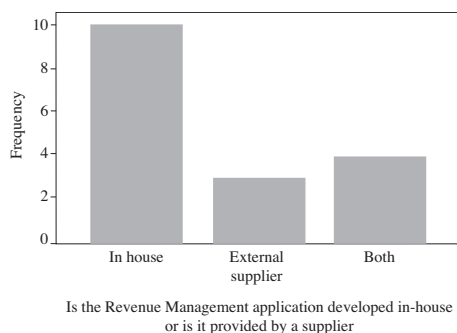
Is the Revenue Management application developed in-house or is it provided by a supplier

Source: CARDENAS, XAVIER. (2012). To explore the software applications in revenue management and the impact of these applications: based on a case study of upscale hotels in Bogotá. Master Dissertation. Swiss Hotel Management School. Switzerland.

TABLE 7. Brand of RM application

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	EasyRMS and Optism	1	4.2	5.9	5.9
	None	15	62.5	88.2	94.1
	Other	1	4.2	5.9	100.0
	Total	17	70.8	100.0	
Missing	0	7	29.2		
Total		24	100.0		

Source: CARDENAS, XAVIER. (2012). To explore the software applications in revenue management and the impact of these applications: based on a case study of upscale hotels in Bogotá. Master Dissertation. Swiss Hotel Management School. Switzerland.

Other of the findings that do this research was related to the features included in the RM applications where that research establish

that the RM applications available in Bogota don't have or General Manager and Revenue Managers don't recognize some of the features that the application in the market have (EASYRMS, 2012; INTEGRATED DECISIONS & SYSTEMS, INC, 2012; RAINMAKER, 2012; REVPARGURU, 2011) or the application that should have the application according to previous research of RM applications (IP, LEUNG & LAW, 2011; EMEKSIZ, GURSOY & ICOZ, 2006). This is illustrate in the table 7 and 8

TABLE 8. RM functions Frequencies

		Responses		Percent of Cases
		N	Percent	
RM_functions[a]	Princing/Best Available Rate	4	11.1%	50.0%
	Channel Management	4	11.1%	50.0%
	Multiple Property View	3	8.3%	37.5%
	Group Management	2	5.6%	25.0%
	Budgeting	5	13.9%	62.5%
	Competitive Set Analysis	3	8.3%	37.5%
	Forecast	7	19.4%	87.5%
	Professional Guidance or Recommendation Module	3	8.3%	37.5%
	Page Position	1	2.8%	12.5%
	Customer Relation Management	4	11.1%	50.0%
Total		36	100.0%	450.0%

[a] Dichotomy group tabulated at value 1.
Source: CARDENAS, XAVIER. (2012). To explore the software applications in revenue management and the impact of these applications: based on a case study of upscale hotels in Bogotá. Master Dissertation. Swiss Hotel Management School. Switzerland.

TABLE 9. Frequency of RM functions

Topic	n	%
Budgeting	0	0
Channel management	3	18.75
Competitive set	2	12.5
CRM Customer Relation Management	0	0
Forecast	4	25
Group management	1	6.25
Multiproperty	1	6.25
Page position	0	0
Pricing best available rate	2	12.5
Professional guidance	3	18.75
Total	16	100

Source: CARDENAS, XAVIER. (2012). To explore the software applications in revenue management and the impact of these applications: based on a case study of upscale hotels in Bogotá. Master Dissertation. Swiss Hotel Management School. Switzerland.

For that research was difficult to determine for how long the RM application have been used in Bogota because the discrepancy in the answer is big and there are not central tendency for a specific period of time This is illustrate in the table 9

TABLE 10. How long has this applications been used in your hotel

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below six months	2	8.3	28.6	28.6
	Between six months to one year	2	8.3	28.6	57.1
	Between one year to three year	1	4.2	14.3	71.4
	More than three years	2	8.3	28.6	100.0
	Total	7	29.2	100.0	
Missing	0	17	70.8		
Total		24	100.0		

Source: CARDENAS, XAVIER. (2012). To explore the software applications in revenue management and the impact of these applications: based on a case study of upscale hotels in Bogotá. Master Dissertation. Swiss Hotel Management School. Switzerland.

Results suggest was that the RM applications available in upscale hotels in Bogotá don't have interface with other systems of software in the hotels and more of the case it had integration with the central reservation systems and the PMS- Property Management System. That finding doesn't supported the new trends supported by other authors (MILLA AND SHOEMAKER, 2008; PICCOLI, 2008; DONOGAHY, MACMAHON-BEATTIE & MCDOWELL, 1997; LAW AND JOGARATNAM, 2005; KIMES, S., 2010) about the importance to generate interface with other application such as CRM-Customer Relation Management or sales and catering systems. Like is show in the table 10

TABLE 11. RM applications Interfaces

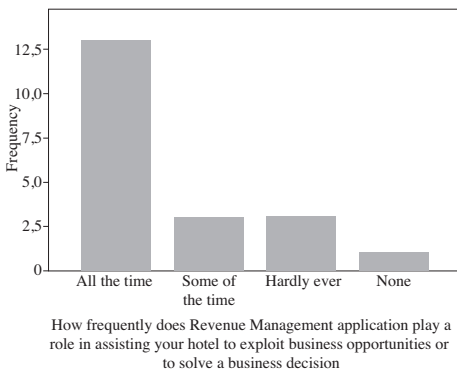|		Responses		Percent of Cases
		N	Percent	
RM Interface[a]	Property management systems	5	16.7%	55.6%
	Central reservation and distribution systems	7	23.3%	77.8%
	Sales and catering systems	3	10.0%	33.3%
	Rate shopping engines and rate distribution	5	16.7%	55.6%
	Customer Relation Management CRM	2	6.7%	22.2%
	Hotel website	6	20.0%	66.7%
	None	2	6.7%	22.2%
Total		30	100.0%	333.3%

a. Dichotomy group tabulated at value 1.

Source: CARDENAS, XAVIER. (2012). To explore the software applications in revenue management and the impact of these applications: based on a case study of upscale hotels in Bogotá. Master Dissertation. Swiss Hotel Management School. Switzerland.

Results indicate the recognition by General Managers and Revenue managers about the impact that have the RM application in assisting the hotel in exploit business opportunities or to solve a business decision that supported the previous research (BURGESS AND BRYANT, 2001) that found the relevance of RM application also this research conclude that General Managers and Revenue Managers identified the benefits of the RM applications in terms of revenues and competitive advantages but don't recognize the other benefits mentioned by other research (BURGESS AND BRYANT, 2001; KARADAG AND DUMANOGLU, 2009; PICCOLI, 2008) such as focus not only in the profit but also in the cost, gross profit and in the improvements of operations. Like is show in the figure 3 and 4 and table 11

FIGURE 3. How frequently does Revenue Management application play a role in assisting your hotel to exploit bussines opportunities or to solve a business decision

How frequently does Revenue Management application play a role in assisting your hotel to exploit business opportunities or to solve a business decision

Source: CARDENAS, XAVIER. (2012). To explore the software applications in revenue management and the impact of these applications: based on a case study of upscale hotels in Bogotá. Master Dissertation. Swiss Hotel Management School. Switzerland.

FIGURE 4. Does Renueve Management applications have an immportant role in the effectiveness and efficiency of the Revenue Management in your hotel

Does Revenue Management applications have an important role in effectiveness and efficiency of the Revenue Management in your hotel
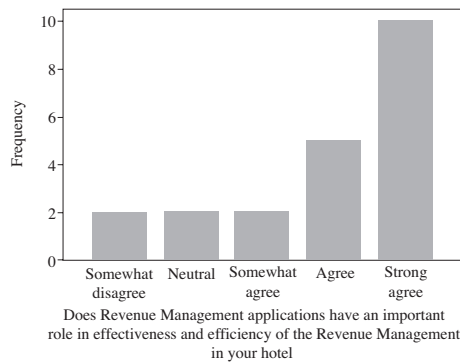
Source: CARDENAS, XAVIER. (2012). To explore the software applications in revenue management and the impact of these applications: based on a case study of upscale hotels in Bogotá. Master Dissertation. Swiss Hotel Management School. Switzerland.

TABLE 12. Impact of RM application

RM_Impact Frequencies

		Responses		Percent of Cases
		N	*Percent*	
RM_Impact[a]	Increase revenues	18	45.0%	81.8%
	Improving Operations	6	15.0%	27.3%
	Minimize Cost	3	7.5%	13.6%
	Competitive advantage	12	30.0%	54.5%
	None	1	2.5%	4.5%
Total		40	100.0%	181.8%

Dichotomy group tabulated at value 1.

Source: CARDENAS, XAVIER. (2012). To explore the software applications in revenue management and the impact of these applications: based on a case study of upscale hotels in Bogotá. Master Dissertation. Swiss Hotel Management School. Switzerland.

Conclusions

This research concludes that all of the analysis conducted in RM with reference to generalization in the findings are addressed to RM in specific areas of the hotel industry such as SPA, Golf course, restaurants but there is not research conducted that addressed particular situation in terms of countries. This research found that some of the concepts and models are not applicable to all of the situations for example this research found the concepts available in the literature review were not applicable in upscale hotels in Bogota. The RM area is now beginning to be relevant in the Hospitality Industry, and so merits more precise investigation. Also this research concludes that most of the literature review was based on research conducted in regions such as North America, Europe, Middle East and Asia where the concept of RM was well developed but none in developing areas like Latin America where most of the findings in the previous research were not replicable to the region because the concept is just beginning to have relevance and start to be mentioned in the hotel industry.

Although, the study of the RM in general was not part of this research, this research concludes some general aspects of RM in the context of upscale hotel in Bogota because this would give a better understanding when the research offers conclusions regarding RM applications. One of the main conclusions was that upscale hotels in Bogotá have a formal RM position, confirming previous researches that recognize RM as a function in the hotel. (GUADIX, CORTÉS, ONIEVA & MUÑUZURI, 2008; SÁNCHEZ AND SATIR, 2005; KIMES, 2008, 2009, 2010; UPCHURCH, ELLIS & SEO, 2002; QUEENAN, FERGUSONB, STRATMAN, EMEKSIZ, GURSOY & ICOZ, 2006; CHOI, S., 2006; ENZ, CANINA & NOONE, 2012). The structure and definition who is in charge of RM remains unclear in upscale hotels in Bogota because RM is a new area in many of the

hotels and the person responsible vary depend of the hotel.

Another of the conclusions that this research reached was to validate the trend of RM as customer centric, mentioned by previous research (CROSS, HIGBIE & CROSS, 2009; NOONE, MCGUIRE & ROHFS, 2011) that was validated in the findings by showing that RM depends in some cases on the marketing department and the meetings of RM involved marketing for RM decisions.

This research also determines that General Managers and Revenue Managers recognized the RM functions mentioned by previous authors (KIMES, S., 2010; UPCHURCH, ELLIS & SEO, 2002; MILLA AND SHOEMAKER, 2008; CROSS, HIGBIE & CROSS, D., 2009; BROTHERTHON AND MOONEY, 1992; DONOGAHY, MACMAHON-BEATTIE & MCDOWELL, D.,1997) but there are some functions that appear more frequently such as future and demand predictions, and some that only appear a few times, functions like groups and consortions that contradicts the importance that other authors give to Group Revenue Management CHOI, S. (2006).

This research concludes that RM is more focused on accommodations than in other areas validating the research conducted by other author (KIMES, S. 2008). Because this research determines that the concept of RM in other areas such as spas, banqueting statement by previous researches was null in upscale hotels in Bogota (BURGESS AND BRYANT, 2001; KIMES, S., 2008, 2010; CROSS, HIGBIE & CROSS, 2009; LICATA AND TIGER, 2010; KIMES AND SINGH, 2009). A possible cause of this was that in Bogota the accommodation area represents more than 80% of the total revenue.

This research validated from the perspective of General Managers and Revenue Managers, that RM plays an important role in the strategy.

This research concludes and confirmed previous research that mentioned the strategy role of RM in the hotels (Rannou and Melli, D., 2003; Cross, Higbie & Cross, 2009; Kimes, S., 2010).

Continuing with the conclusions of general characteristics of RM. This research corroborates and validates the new skills required for Revenue Manager that earlier author mentioned (Mac Vicar and Rodger, 1996; Kimes, S., 2008, 2010; Piccoli, 2008; Brotherthon and Mooney, 1992; Cross, Higbie & Cross, 2009; Emeksiz, Gursoy & Icoz 2006; Griffin, 1997). Where these skills were more focused on analytical skills than in operational skills such as rooms background .

Other conclusion is that only half of the participants mentioned that the hotel had a RM applications and the other half of hotels managed the RM using other software such as Microsoft Excel or manual operations. As a result of this this research concluded that RM applications in upscale hotels in Bogota was not a necessary component of RM, as previous authors had mentioned (Queenan, Fergusonb & Stratman, 2009; Emeksiz, Gursoy & Icoz, 2006; Donogahy, Mac-Mahon-Beattie & McDowell, D., 1997). Also this research concludes that RM in upscale hotels in Bogotá has some limitation it because does not cover one of the critical success factors or RM management, related to system variables (Griffin, 1997) Also this research concludes that other limitations of RM in upscale hotel in Bogota do not have one of the characteristics required to implement yield management related to information processing and software (Donogahy, MacMahon-Beattie & McDowell, 1997). Also this research concludes based on the findings that the RM in upscale hotels in Bogota have an absence of the technical driver or RM mentioned by (Queenan, Fergusonb & Stratman, 2009).

In addition this research concludes that the hotels that have RM applications do not use the total of features available in the market for these applications. Where a possible consequence of that found in this research was that RM starts so far to have relevance for hotels in Bogota. Also other of the major conclusions in this research was that more of the RM applications in upscale hotels in Bogota were developed in house, and only a few hotels have applications developed by an external supplier such as Ideas V5i, raim-maker group, Pros software, EasyRMS or Revpark guru. As a consequence of that, the RM applications have an absence of many of the features available for RM applications such as Easyrms (2012), Integrated Decisions & Systems, Inc. (2012), Rainmaker (2012), Revparguru (2011).

Another of the conclusions of this research was that RM applications available in upscale hotels in Bogotá do not have an interface with other systems or software in the hotel. In some of the cases this integration was with central reservation systems and the PMS- Property Management System. These findings do not support the new trends mentioned by other authors (Milla and Shoemaker, 2008; Piccoli, 2008; Donogahy ,MacMahon-Beattie & McDowell, 1997; Law and Jogaratnam, 2005; Kimes, 2010) about the importance of RM management to generate an interface with other application such as CRM-Customer Relation Management or sales and catering systems.

This research concludes, based on the opinion of General Managers, Revenue Managers and IT Managers that they recognized the importance that an RM application has in terms of efficiency and effectiveness in their hotels and also they identified the need for an RM application in future to generate better results in the hotels in terms of RM. This research concludes that the major impacts of the RM applications was reflected in terms of efficiency because the application helps to

organize the data and so the Revenue Managers do not need to spend to much time in processing data and they stay more focused on the analysis. This research also concludes that the RM applications have some impact in terms of effectiveness because the decisions related to rates and RM functions were based on facts and it reduced risk in the decision process. All these are mentioned in previous chapter of findings and analysis.

Other of the main conclusions was the recognition by General Managers and Revenue managers about the impact that the RM application has in assisting the hotel to exploit business opportunities or to solve a business decision that supported the previous affirmation made by other authors (BURGESS AND BRYANT, 2001). Also this research concludes that General Managers and Revenue Managers identified the benefits of the RM applications in terms of revenues and competitive advantages but do not recognize the other benefits mentioned by other research (BURGESS AND BRYANT, 2001; KARADAG AND DUMANOGLU, 2009; PICCOLI, 2008). Because hotels stay focused in RM for accommodation only and are not focused on the gross profit and in the improvements of operations.

This research offers a conclusion related to the training of RM application where it found that only a few hotels have scheduled training in Revenue Management and it would affect the lack of knowledge of the users, that is one of the principal challenge of RM mentioned by KIMES (2010).

Based on the findings the first recommendation for upscale hotels in Bogota is to start including only one permanent position in charge of RM functions which would have the same status of other head of departments that report direct to the General Managers. In the case of chain office this research recommends that RM position needs to have autonomy from other areas such as operation or marketing

department. That recommendation was based on previous research that mentioned the importance or RM area as a specific function in the hotel (RANNOU AND MELLI, D., 2003; CROSS, HIGBIE & CROSS, 2009; KIMES, S., 2010). Because it does not make sense to establish committees of RM where the Revenue Managers do not have the same status as other managers in the decision process.

Another of the recommendations that this research makes based on the findings is related to the functions of Revenue Management. This research recommends hotels to define clearly the functions and scope of responsibilities of Revenue Managers because although the General Managers understand the functions of RM they don't really apply them. Also this research advises to upscale hotels in Bogota to work in functions such as Groups and consortiums because according to previous author (CHOI, S., 2006) the impact of these would be to generate better results for the hotels. To achieve that this research recommends establishing specific policies and strategies to accept or reject groups, based on the principals of Group Revenue Management.

The focus of RM in upscale hotels in Bogotá is more concentrated in the accommodation area. This research recommends using the concepts of RM in other areas such as food and beverage and banqueting. That advice is supported in the new trends of Revenue management mentioned by previous authors (BURGESS AND BRYANT, 2001; KIMES, S., 2008, 2010; CROSS, HIGBIE & CROSS, 2009; LICATA AND TIGER, 2010; KIMES, S. AND SINGH, 2009). For example this research recommends established measurements to complement the RevPar such as Gopark and Spa RM and SquarePar that helps Revenue Managers to control other aspects of the hotel, other than different accommodations.

Another recommendation of this research is that hotels while recognizing that the princi-

pal skills of Revenue Managers is analytical skills. They need to facilitate to Revenue Managers to developed this skill, and it is advisable to optimize some of the operational activities so this research recommends the implementation of RM applications because that facilitates that Revenue Managers to not spent too much time in processing the information, and spend more time in analysis. This advices is based on previous research that validated the use of RM application improve the decision process of Revenue Managers (MAC VICAR AND RODGER, 1996; KIMES, S., 2008, 2010; PICCOLI, 2008; BROTHERTHON AND MOONEY, 1992; CROSS, HIGBIE & CROSS, 2009; KIMES, S., 2008; EMEKSIZ, GURSOY & ICOZ 2006; GRIFFIN, 1997).

Having mentioned the recommendations related to the RM characteristics in general. This part presents the recommendations related to the RM applications for upscale hotels in Bogota. The first recommendation based on the findings is that although half of the hotels mentioned have RM applications this research recommends to the hotels that do not have RM applications acquire one and the hotels that have a RM application validate the features that it has. That advice is based on the benefits that RM applications offers mentioned by previous authors and also that this research found. Another of advice from this research is to upscale hotels in Bogota not to use Microsoft Excel as a tool to manage all of the functions of Revenue Management because the operation requires processing a huge volumes of data that sometimes Microsoft excel cannot. Also the use of Microsoft Excel requires a high level of knowledge in SQL to create specific rules of formulas to manage of the functions and for instance that creates that Revenue Managers stay more focus in processing and creating parameters to ordain and classify the information, rather than in analyzing the data. Another of the disadvantages of excel is that this is not integrated with the PMS- Property Management System and other

systems in the hotels so the information must first be exported by the system and after that processed. As consequence the information in not in real time, which is one of the principal characteristics required for RM.

Another of the advice that this research offer is based on the findings, regardless of whether the application is developed in house or externally, is that it would need to integrate all of the functions of RM because that facilitated the user friendliness because they do not need to interact with others applications. Other of the recommendations that this research makes is before deciding why type of RM application the hotel should use. Hotels need to consider the options or applications available in the market such as Ideas, EasyRms and evaluate the advantages that these applications have.

The findings of this research related to how long the hotels in Bogota have had the application, showed that the hotels have a big discrepancy of time of application use. Nevertheless this research would advise hotels to implement the RM applications because that creates a competitive advantage for the hotels (CROSS, HIGBIE & CROSS, 2009; KIMES, S., 2010) and the sooner they install the RM applications, they will have an advantage over competition. This research found that the hotels that have RM applications do not have all of the features available in the market for RM applications so this research recommends upscale hotels in Bogota to look for RM application that have more of the features requires to manage RM.

Also this research found that RM applications in Bogota do not have features related to CRM-Customer Relation Management so this research would advise looking for applications that have features of CRM because the new trend of RM is customer centric (MILLA AND SHOEMAKER, 2008; PICCOLI, 2008; DONOGA-HY, MACMAHON-BEATTIE & MCDOWELL, 1997; LAW AND JOGARATNAM, 2005; KIMES,

S., 2010). So this research recommends creating an interface between the RM application and the CRM application. This research also recommends that RM application should have interface with other systems, such as hotel website, sales and catering systems, central reservation and distribution systems because the less time the user has to leave the application the better time he will spend in analysis.

The recommendations related to addressing the third research objective to assess the impact of software applications available in the revenue management process in terms of efficiency and effectiveness in upscale hotels in Bogota. This research found that General Managers and Revenue Managers recognize the importance of RM applications in assisting the hotel to exploit business opportunities and to solve a business decision. Nevertheless only a few hotels offer a formal training for RM applications. Based on that this research recommends for upscale hotel in Bogota to schedule more training in RM application because previous author KIMES (2010) mentions that one of the principal's challenges of RM is the lacks of knowledge in how use the RM application.

The last recommendation that this research offers related to RM application is that the participants agreed to the statement of the important role in the effectiveness and efficiency of the RM applications in the hotel. This research underline that the RM application is only one of the components of RM. The implementation or not of RM application is not a guarantee of the success of RM so this research recommends that before the hotels decide to invest or implement an RM application, they should contemplate the other aspects of RM such as training of the Revenue Managers, importance and relevance of the position and the other important aspect is to create a culture in the hotel that understands the value of RM.

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