ABSTRACT

The digital landscape’s impact on hospitality, driven by new online practices, has heightened the importance of loyalty programs. This essay explores the fusion of e-commerce with hotel management, utilizing cloud-based practices to handle electronic commerce data. Through a review of existing literature and on-site observations, it uncovers evolving managerial techniques and data warehousing for predictive modeling. The manuscript investigates how Revenue Management Artificial Intelligence (RM AI) influences Hospitality Supply Chain Management (SCM) sustainability. Findings reveal a positive impact on sustainability but stress the need for customized AI solutions for each hotel.

Keywords: e-commerce; cloud management; hotel management; revenue management; supply chain management

1. Introduction

1.1. Relevance

Revenue Management (RM), has become one significant sustainability contribution to hotels, and other players, in the Tourism & Hospitality Industry[1–5].

However, RM presents network problems, concerning new forms of distribution channels[6–8], changing management practices and consumer behavior, but also, informatic constraints, namely Deterministic Linear Programming (DLP) and Dynamic Programming (DP), two characteristics still limited by the Machine Learning implications[9].

Concerning the decision-making process, the algorithms used might also lack variables to indicate the path to follow, as the mathematical and autonomy problem solvers are already well developed[10,11], more emphasized by the rising of Artificial Intelligence (AI), and its connection between the decision-maker and the machine[12].

The usage of digital and technological solutions, like big data, Internet of Things (IoT’s), Machine Learning (ML), cloud computing, smart sensors, connectivity, Machine to Machine (M2M), act as enablers to the rise, and development of diversified online sustainable concepts that allow the analysis of e-commerce complexity (such as interoperability, decentralization, virtualization, modularity, real-time capability and service orientation), aiming for a multilevel Adaptive, and Integrated Sustainable Supply Chain Management (AISSCM)[4,13], through this, we may, therefore, endorse the concept of innovative productions and intelligent
services.

Recent theories emphasize the need of following Online Delivery Providers (ODP’s), which could also be known as Online Travel Agents (OTA’s), that represent a growing hospitality sector in terms of data collection and reporting of correspondent analytics, to act in a new challenging period, but a few studies identify the drivers of behind the adoption of this new technology\textsuperscript{[14]}.

1.2. Context

Research question

The growing significance of big data and the integration of specific hotel software and systems are recognized as key facilitators of autonomous management\textsuperscript{[15–18]}. These advancements harness artificial intelligence to provide valuable insights for decision-making\textsuperscript{[1,12,13,19,20]}. However, various theories emphasize that while machine learning is invaluable for evaluation, it may not be equally efficient for direct decision-making and operational development\textsuperscript{[21–24]}.

To address these dynamics, this article’s central inquiry is to comprehensively assess how Revenue Management Artificial Intelligence (RM AI) influences the sustainability of Hospitality Supply Chain Management (SCM). Additionally, it delves into a related sub-question: how do these factors contribute to enhanced sustainability for hotels? Which underscores the importance of online pricing and channel management in the hospitality industry\textsuperscript{[4]}.

By exploring these questions, this article seeks to clarify the underlying motivations and problem background that drive the investigation into the role of RM AI in the sustainability of hospitality SCM.

2. Literature review

2.1. Hotels’ revenue management practices

Hotels’ Revenue Management (HRM) practices are derivative of airlines’ yield management to the hotel industry\textsuperscript{[4,5,25–27]}. Applying the variables associated with maximizing hotels’ revenue due to its services’ limited capacity and basing its demand-based pricing strategy to control for optimal inventory levels and to forecast real-time demand, considering it a form of analyzing this industry’s supply chain\textsuperscript{[28–34]}.

Through the study of Kimes\textsuperscript{[34]}, we can visualize that RM is being considered as a tool for strategic alignment for the hospitality industry—see Figure 1 below.

![Figure 1. What will RM look like five years from now?](image-url)
It is, through this research, clear that RM acts as a primary investment in hotels, restaurants, and the main hotel outlets, nowadays in terms of strategic alignment and especially if we aggregate it with systems integrations\cite{4,24}, the technological usage for qualified Revenue Managers (RMr) with analytical skills for the tangible attributes: 1) consumer behavior; 2) competition; 3) internet; 4) market; 5) economy and 6) technology\cite{34,35}, in which, until the moment of analysis, the RMr would rely on these topics of analysis to forecast future income.

Nowadays, the insight is to use Big Data and AI to use present information to develop the activity shortly\cite{33,35–37}.

According to, there is a need to compete over value rather than room rates, which is called Strategic Revenue Management\cite{26}, stated that the differences found in the impacts of Total Revenue Per Available Room (TRevPAR), can be explained by hotels’ characteristics, management practices, and location\cite{38}.

Besides the technology usage and the analytical know-how of RMr, there is also the need of understanding what Key Performance Indicators (KPIs) to analyze, somehow as describes, with topics to explore over RM, such as 1) pricing strategy; 2) demand and forecasting model of analysis and implementation; 3) business analysis; 4) performance analysis and evaluation; 5) inventory optimization; 6) booking controls; and 7) OTA’s management\cite{39,40}.

RM when well applied on hotels strategy consists on developing a value stream mapping model that drives the corresponding dynamics above, the RMr knowledge + the topics to analyze by the professional user\cite{41}.

Price is still a variable that has a negative impact on hotels’ demand\cite{42}, and that is why\cite{2,38}, hoteliers should be focused on value propositions and then pricing strategy, changing the mindset of pricing against competition set only.

Connecting all literature\cite{4}, mentions Tactical Revenue Management, to emphasize the operational focus on the RM perspective, rather than a strategic initiative that should be part of the business strategy.

2.2. Hotels’ e-commerce & cloud practices

The rise of online hospitality bookings, whether on restaurants, hotels, or similar, has proven that the e-commerce practices are, nowadays, fundamental for the growth and sustainability of an hospitality business\cite{41}, specifically if we focus on demand curves and price elasticity.

Connecting the hotels’ operations with data warehouses that would read, store, and provide analytics for e-commerce purposes, therefore named as Supply Chain Information (SCI), is positively related to the supply chain management performance, and potentially to the firm sustainability on the B2B perspective (supplier) and further in the chain on the B2C perspective (guest)\cite{33}.

Entities should look for internal solutions that centralize data, rather than decentralize information about the logistics stages of the SCM\cite{43}, where cloud management is implemented to bring awareness to every department bringing information altogether, however, information may need the right fit for the institution\cite{44}.

The emerging trends brought by the IoT’s brought several variables to be considered on Revenue Management Strategy and e-commerce management, in the sense that there was the need to understand length of time slot, decision time slot, the sets of mobile IoT devices, and even the wireless communication systems that would communicate and receive the correspondent communications\cite{45}.

We may understand the gaps in e-commerce and cloud management practices, as there has been identified several failures among several online platforms\cite{24}, on which, for the practical example, OTA’s were the actors
considered to identify the gaps, via real-world data as cloud providers[46].

RM interconnects the variables above (data, supply chain information, strategy, IoT’s, e-commerce, cloud management), and for its reference, not only on hotel rooms but hotel restaurants, bars, and other wellness outlets, according to customers’ perceived fairness over services’ value and the reference pricing on the market competition on the corresponding segment[41].

Through the theory of, it is especially relevant to mention the impact of e-commerce on hotels, as how it is stated on the appointed study, it directly affects production, and by considering the relationship that is created between the guest and the hotel[47,48].

Through the OTA’s, it is possible to better understand the value on this statement for the hotel industry, has it is easier to understand some RM KPI’s, as Market Penetration Index, Guest loyalty, Guest pickup, Guest retention, and consequently, the Revenue per guest and new guest, even more on new units, approaching the market, whereas they might evaluate the impacts and effects of their strategy to the clients’ segment followed[47,48].

By following the essay of, we realize that other variable to bear in mind is the business structure that each unit has or needs to get to implement these digital tools, and the firm size which is important to evaluate the number of people that will be associated to possible mutations on management systems and how the cultural environment and human resources inertia to changes[47,48].

2.3. Literature and research values from review findings

It is also important to mention that looking back on the supply chain management, by gathering the reservations and working with a longer booking window, the hotels are better prepared to decrease their price cost with higher negotiation power on their suppliers and increase the management quality on their stocks management and products perishability.

Also, it is important to keep in mind that nowadays, OTA’s should not be considered by hotels and hoteliers as only a path to get clients through rooms, in which, there was the intention to do cross-selling for F&B and other outlets, there is the need to emphasize what can be called “hotel cross-activity”.

Representing an hotel that may use e-commerce like “Uber Eats” for distribution, “The Fork” for reservations and “TripAdvisor” and/or “Zomato” for reviews, and through that it can be associated to the general brand image and the overall hotel image by the restaurants service and food quality (or other attributes of the corresponding outlet).

It may get the client to intend to spend a night at the hotel or use other of the outlets, as for instance, it might be a tool for the hotel to have more walk-in guests on the less used outlets, e.g.: potentiate the wellness center sales on extra hours, meaning that through the e-commerce and the “democratization” of online purchases, the hotel may understand that there is the need to extend the working time, or even change the normal schedule to give a proper value and utilization to the outlet[39].

It is also worth mention that, emphasize the fact that this e-commerce is less effective on micro and small enterprises due to the constraints often found, which in hospitality might also be an opportunity, as if this implies a major help on purchases and stocks management prior to the transformation and production, on smaller units it is even more relevant to help the cost management associated to it, but will, at the same time, due to the impact on guest satisfaction, increase the hotels’ image online[47–50].

Especially online, in e-commerce management strategy, location is a critical variable to mention and emphasize for the guests’ experience[38,51–54].
However, the cloud management connected to e-commerce allows both parties to have updated information about the business in a way that the guest knows upon the reservation period the number of available rooms and the corresponding typology, at the same time, the management can track the guest behavior on the reservation website to personalize the promotions to apply to the directed segment, in a way that, e.g., the hotel may promote a double bedroom and not a twin room to implement an upscale sales technique, instead of promoting the hotel as an all, thriving for higher occupancy on one specific typology.

Very important to mention the clarification from⁴⁵, that states that task scheduling should have on its basis of formulation, IP addresses problems and constraints, but also, the understanding of the mechanisms that influence the ranking, such as utility, conversion rate, clickthrough rate, prices, customer rating, and the Travelocity algorithms⁴².

3. Methodology
3.1. Investigation procedure

The following article has relied a research question that connects the RM theories and new management applications, using Big Data and Artificial Intelligence, to do so, there was a base on a systematic literature review and an articles’ qualitative analysis on published papers, searching over the keywords utilized for the literature revision and the corresponding authors and works retrieved from the Boolean research, upfront described.

Besides this, there was an approach to hotels’ managers, revenue management systems developers, and a multi-unit short-term rental, management company, to contrast the presented literature facing the actual environment of e-commerce applications and cloud management practices, providing both an explanatory and exploratory study.

3.2. Literature selection

To proceed with the bibliometric analysis, the research has relied on the keywords of this article: “Cloud Management” + “Revenue Management” + “Hotel Management” + “E-commerce”, searching index on Web of Science, Google Scholar, Scopus, Emerald, Springer, Taylor and Francis, Sage, IEEE, Inderscience, Informs, and others with fewer publications found, among which, the relevance of the search is implied on the mutation over the Boolean research, whereas the keywords above were changed as if considering keywords by itself or the word used in work titles.

There were found 9088 papers, from books, book chapters, articles, reviews, and others using the keywords in the title search and as keywords and reversing them among each search, as seen on the Table 1 below.

Table 1. Plan and search of keywords and titles.

<table>
<thead>
<tr>
<th>Filter</th>
<th>Google Scholar</th>
<th>Scopus</th>
<th>WoS</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloud management [title], E-commerce</td>
<td>519</td>
<td>32</td>
<td></td>
<td>551</td>
</tr>
<tr>
<td>Cloud management [title], E-commerce; Hotel Management</td>
<td>24</td>
<td>0</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Cloud management [title], E-commerce; Revenue Management</td>
<td>386</td>
<td>1</td>
<td>387</td>
<td></td>
</tr>
<tr>
<td>Cloud management [title], E-commerce; Revenue Management; Hotel Management</td>
<td>22</td>
<td>0</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Cloud management [title], Hotel management</td>
<td>131</td>
<td>2</td>
<td>133</td>
<td></td>
</tr>
<tr>
<td>Cloud Management [title], Hotel Management; Revenue Management</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Cloud management [title], Revenue Management</td>
<td>738</td>
<td>58</td>
<td>796</td>
<td></td>
</tr>
</tbody>
</table>
Table 2. (Continued).

<table>
<thead>
<tr>
<th>Filter</th>
<th>Google Scholar</th>
<th>Scopus</th>
<th>WoS</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloud management [title], Revenue Management; Hotel Management</td>
<td>35</td>
<td>35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-commerce [title], Cloud management</td>
<td>980</td>
<td>72</td>
<td>1052</td>
<td></td>
</tr>
<tr>
<td>E-commerce [title], Cloud management; Hotel Management</td>
<td>418</td>
<td>0</td>
<td>418</td>
<td></td>
</tr>
<tr>
<td>E-commerce [title], Cloud management; Revenue Management</td>
<td>980</td>
<td>3</td>
<td>983</td>
<td></td>
</tr>
<tr>
<td>E-commerce [title], Hotel Management</td>
<td>987</td>
<td>15</td>
<td>1002</td>
<td></td>
</tr>
<tr>
<td>E-commerce [title], Revenue Management</td>
<td>410</td>
<td>60</td>
<td>470</td>
<td></td>
</tr>
<tr>
<td>E-commerce [title], Revenue Management; Hotel Management</td>
<td>210</td>
<td>0</td>
<td>210</td>
<td></td>
</tr>
<tr>
<td>E-commerce [title], Revenue Management; Hotel Management; Cloud management</td>
<td>401</td>
<td>0</td>
<td>401</td>
<td></td>
</tr>
<tr>
<td>Revenue Management [title], Cloud management</td>
<td>159</td>
<td>14</td>
<td>2</td>
<td>175</td>
</tr>
<tr>
<td>Revenue Management [title], Cloud management; E-commerce</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenue Management [title], Cloud management; Hotel Management</td>
<td>88</td>
<td>0</td>
<td>88</td>
<td></td>
</tr>
<tr>
<td>Revenue Management [title], E-commerce</td>
<td>389</td>
<td>16</td>
<td>4</td>
<td>409</td>
</tr>
<tr>
<td>Revenue Management [title], E-commerce; Cloud management</td>
<td>48</td>
<td>0</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>Revenue Management [title], E-commerce; Cloud management; Hotel Management</td>
<td>37</td>
<td>0</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>Revenue Management [title], E-commerce; Hotel Management</td>
<td>295</td>
<td>0</td>
<td>295</td>
<td></td>
</tr>
<tr>
<td>Revenue Management [title], Hotel Management</td>
<td>910</td>
<td>200</td>
<td>1110</td>
<td></td>
</tr>
<tr>
<td>Revenue Management; Hotel Management; Cloud management; E-commerce</td>
<td>440</td>
<td>1</td>
<td>441</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>8607</td>
<td>475</td>
<td>6</td>
<td>9088</td>
</tr>
</tbody>
</table>

Source: Microsoft Excel.

Also removed all files (as seen in Figure 2 below), where DOI has not been found and divided the literature by type, whereas articles remained with 2071 works, including books, conference papers, book chapters, erratum, reviews, and articles.

![Figure 2. Filters chosen to remove duplicates.](source)

Source: Microsoft Excel.

When filtered by, just articles, in the last five years, it has brought only 643 articles to review, providing the emerging relevance of the subject. If we evaluate from the last ten years or last five years, we found an average of >128 articles published per year, as seen as below on Table 2.
Table 3. Bibliometrics of the articles published on these subjects.

<table>
<thead>
<tr>
<th>Rótulos de Linha</th>
<th>Contagem de Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>101</td>
</tr>
<tr>
<td>2019</td>
<td>133</td>
</tr>
<tr>
<td>2020</td>
<td>133</td>
</tr>
<tr>
<td>2021</td>
<td>206</td>
</tr>
<tr>
<td>2022</td>
<td>70</td>
</tr>
<tr>
<td>Total Geral</td>
<td>643</td>
</tr>
</tbody>
</table>

Source: Microsoft Excel.

After the filters were already established, the following step was to understand the number of cites per article to focus on the most important ones, where through the mean of the last five years (Avr. 11,01), we have placed the final filter of only retain articles with 11+ cites, where these lead to 117 articles to review. Although the selection was already made until this stage, only 100 of the 117 articles were found. After using VOS Viewer to correlate the keywords used in each essay to review, it was clear that there is not any relationship between revenue management and cloud or e-commerce. The theory must be, therefore, connected, and explicit in Figure 3 below.

Figure 3. Network visualization of the total keywords used on the articles to review.
Source: VOS viewer.

Through the image above, it is possible to understand the connections between researched keywords, and the ones with higher connection and those with less connection, it is noticed that relations are there to be connected, although they are fragmented, meaning that there are not any studies relatable among the keywords, by using a funnel technique, we have focused on the connections from RM to others rather than Back-to-Back relations. We proceeded to understand the ones that are directly related to “Revenue Management”, on Figure 4 below.
Figure 4. Network visualization of the total keywords connected to Revenue Management.
Source: VOS viewer.

**Literature justification**

The above-described organization and extraction have resulted in referencing several understandings, however, besides the focus on metadata of Quartile, Indexed Journals per database, there was also a focus on main authors, and that, was also possible to identify the ones that have approximately write something about this articles’ subject, as identified below.

A few works prior to 2017 were used just to illustrate longitudinal evolution.

**3.3. Methodology option**

**Sample for qualitative data collection**

Over the retrieved articles, it was gathered the relevant information to analyze the application of both tools, and techniques (cloud and e-commerce management), connected to RM, within which, there was in-field presence of Hotel RM meetings to understand if it is: 1) applicable to hotels in Portugal—according to the Portuguese hospitality culture; 2) If yes, how is it being applied and developed, whereas it was expected to retrieve enough intel to answer the research question proposed. In total there were interviews with 11 top managers, in which 5 were from independent hotels and 6 from the chain of hotels.

After the process of gathering all information on the personal library, and revising it, it was established the research question in which was chosen to get intel to answer through the top managers interviewed.

**3.4. Tools for data analysis**

For the articles’ development, there was the usage of Microsoft Excel, where it was placed all metrics, concerning the data prior presented in Figure 2, which through the pivot table, was possible to summarize it. After, it was possible to extract the articles from the databases described, upload it to Mendeley to review, and use this last program for two purposes: 1) as cite & reference manager; 2) to select all data (after upload) and extract as ris.file, to get the clusters’ information presented on Figures 3 and 4. To get the clusters and corresponding image, it was used the Voice Viewer program, where it was uploaded the prior mentioned ris.file, which was required on the program to “map based on bibliographic data”, to achieve the presented information.

The data extracted from the interviews was passed into a manuscript with the help of the recordings from
Microsoft Teams, which were then written in Microsoft Word, mainly in Portuguese as it was the language of the interviewees. Then, the data was scrutinized, among the transcription of the manuscript, upon review of the answers, there was applied the words localizer and it has shown the number of times in which each word was repeated and therefore was possible to establish patterns.

4. Discussion

Empirical discussion

The literature review indicates that the online presence of hotels has become an integral part of their overall strategy\[39\], It involves the active participation of various managers, such as the General Manager, Revenue Manager, Marketing Manager, and Sales Manager, who contribute to approving suggestions and tactical approaches, complementing data analytics, designing communication and promotional strategies, and determining optimal timing for promotions.

The evolving nature of this strategy poses challenges for systems developers. However, it is noted that managers nowadays exhibit a greater emphasis on data-driven decision-making, prioritizing proactive responses to guest needs over reactive measures.

For systems developers, this evolution brings challenges but according to the CEO of a Revenue Management System, “Managers are nowadays, more data driven”, complemented to the opinion of a multi-unit short-term rental, management company “We are looking to be more active on answering the guests’ needs than to be prompt on reacting to it”.

The same person says that, with the pilot applications developed with hotels’ data and the hotels’ General Managers inputs about the correspondent hotels’ operations, “there have been mutations on the algorithms, for sure we may have a standard to apply techniques and softwares on hotels, however, the assignment needs to be adapted to the needs of the hotel, as the hotel adapts the offer to their clients”.

With this, it is possible to better design a tailor-made proposal to fit the market segment desired for the corresponding hotel segment\[33\], in the sense that, if the hotel uses a data warehouse, to forecast how many potential guests will be at the restaurant, this is, in the first place, useful information for the suppliers as well, to organize stocks and lead-times, and furthermore, to deliver the best experience to the guest without incur in stock breaks upon the service.

A top manager states “We are building our internal data warehouse to easily read informations from all systems to guide us for proper decision-making”, going forward on applications, “it is very difficult for us to manage so many information of so many softwares, so we need a place were we are able to visualize everything in one place, so we are translating everything in a Business Intelligence program”.

According to recent developments, as the topics to explore inside the RM strategy are connected to the business analytics, the data warehouse should be built surrounding all KPIs to be associated with the predictive model\[8,33,35-37,55\].

There is also a clear intention to minimize human error and common mistakes and so, as one manager stated “On the purchase control of the chain, is very important to use the cloud, as we update data and it is available for every unit, just-in-time and every colleague is able to understand the best price, the best supplier and the best lead-time. With this, we are able to better manage our stocks”.

On the field, managers are building Business Intelligence tools over the data warehouse for predictive models, but still, there is a lack of information to be added, as stated by one top decision-making manager of a chain of hotels “we lack the understanding on the value added and the corresponding value retrieved from
the investment on promotions through the “cost per click”, on google ads or facebook ads, and its relation the return that we have on it, in revenue, profit or even, bookings”.

In existing theories proposed by several studies [6,56–58], understanding digital content management, is crucial for capitalizing on opportunities in the hospitality industry. Integrating digital content management with hospitality operations becomes pivotal in creating a knowledgeable roadmap that guides the design of effective predictive models.

Bringing together all insights, there is the need to integrate theoretical background into the systems back-office into the operations front-office, as mentioned by one of the hotel managers “Information is worthless if you do not understand it, systems are there to help you and guide you to the best strategy to implement, but you need to be educated and to educate your team to know how to work with it”.

Worth mentioning that, in terms of cloud and e-commerce implementations it is not an easy procedure, as there are reluctance and inertia to the implementations, as stated by the Head of Strategy of a chain of hotels, “even from top managers that at first impression feel like it is difficult to manage, only when they start retrieving information from the system from themselves, they understand the full potential”.

The input from this Head of Strategy of a chain of hotels was corroborating what was happening in another Portuguese chain of hotels, that gave the input that “the systems updates are not many, the investment was moreover channel manager”, so the hoteliers from several units and chains of hotels are not looking to the potential evolution of Business Intelligence, even when directly pointed to the Revenue Management, the answer was “Yes, we have one, but we are not retrieving the full potential from it, because we lack time”.

The General Managers that were participating on the answers gave a common input to the research, which relies on WWW, the world wide web opens opportunities for hotels, from new openings to hotels developing their market, either to approach new clients of to customize the experience of actual guests.

5. Conclusion

Considering the research question for this essay, according to the data retrieved from the hoteliers, the RM frameworks are fundamental to interact with the online presence of a hospitality business, in the sense that, dynamic pricing, overbooking and cancellation policies, are determinants that will impact the conversion of online bookings. In terms of cloud management, the interaction is seen as extremely relevant as every department can access to in-time real data, for marketing purposes, sales, and other decision-making departments.

To achieve successful integration, theoretical knowledge should be incorporated into both the systems back-office and the operations front-office, connected by the cloud using the hotels’ needs according to their clients’ needs.

This integration ensures that information is not rendered meaningless but instead serves as a valuable tool for formulating and implementing strategies. It is important to note that cloud and e-commerce implementations face challenges due to reluctance and inertia among hoteliers. However, feedback from the Head of Strategy of a hotel chain highlights that once managers begin extracting information from the systems, they recognize the system’s full potential.

Answering the research question on, how RM AI affects the sustainability of hospitality Supply Chain Management (SCM), using all information gathered, it is possible to understand that revenue management artificial intelligence techniques and technologies are affecting positively the sustainability of hospitality supply chain, however, the design of the AI needs to be considered for each hotel individually, as stated by
developers and managers in the field that understand the assignments for each part.

It is also essential, and described by the respondents, to have a well aligned strategy of RM to apply on the hotel.

As Revenue Management develops the maximization of the potential of each department, the artificial intelligence and data implied, should be used nowadays, to generate a data warehouse model for constant updates on the predictive models, which emphasizes the importance of Revenue Management in the aspect of forecasting\[5,33,59,60\].

From the research applied and the given results from the literature review, to answer the success factors, it is possible to understand that besides the emerging cloud management made internally on hotels, there is also the need to develop and implement the API solutions available to reach the final customer, where there are already some techniques being analyzed by hotels to surpass the dependence of OTA’s to get reservations and return on the initial investment.

Also, there is the need of focusing just-in-time data, then looking for historical data, as events are emerging and not in a constant matter, so occasional events will influence historical data, therefore, if just-in-time data is provided, there will be better quality of forecasting and overall management.

Besides tracking data and having systems connections and communications, there is the need to understand tasks management, resources allocation, and corresponding schedules, as the IoTs communications are happening in continuous activity, a room rate update, that is posted at this moment, will be seen only within 6 to 7 hours later in other continents (e.g.: Portugal updating prices for the USA), which can have a negative impact on the market approach, and potentially, a loss on reservations conversion.

6. Further studies

As further studies are concerned, it is still interesting to proceed with the research on the new processes and procedures of e-commerce and revenue management strategies being developed by cluster, contrasting rooms, F&B, and wellness, and how this is being connected to cloud management and interface supply chain to reach the consumer.

7. Impact statement

This research brings new information regarding the applications of cloud management and revenue management on the corresponding hospitality management and a disruptive new era of business intelligence management in hotels.

Conflict of interest

The author declares no conflict of interest.

References