

Hotel Reservation System Using Daily Language to Optimize the Hotel Occupancy

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Abstract

Hotel occupancy leveling is one of crucial components in the hotel revenue management. Revenue management is meant to maximize the revenue management from various limited supplies. There has been a trend that the prevailing hotels nowadays have improved the technology aspect to increase the hotel quality and eventually the hotel occupancy. The modeling for hotel occupancy representation is a complex problem because the presentation has linked with the other processes, such as: the arrival reservation, cancelation, length of stay, no-show, group reservation, seasonality, and so on. In fact, the problems rising up recently are not limited on the workers or capital, but more in providing the reservation information. The information should give facility by providing simple method of reservation for the customers. This paper provided brief explanation regarding with the hotel occupancy and then explored the reservation system which implemented Indonesian language called Humane Reservation Assistance (HuResTan). Obvious contribution of this application was the implementation of Indonesian language in the reservation process. Furthermore, it provided the preference to make a reservation for the hotel room after the searching result for targeted room was completed.

Keywords: Daily language, occupancy, reservation.

1. Introduction

Hotel occupancy leveling is one of crucial components in hotel revenue management. Zakhary [6] stated that revenue management is meant to maximize the management revenue from limited supplies. Revenue management system was widely adopted in the hotel industries. The increased number of hotels leads to the significance of technology development in order to improve the hotel occupancy management. Hotel occupancy describes the comparison between occupied rooms and all rooms in a hotel [6]. A modelling as representation of hotel occupancy has been a complicated problem due to its association with other activities such as: the arrival reservation, cancelation, length of stay, no-show, group reservation, seasonality, and etc.

Hotel guest arrival mainly is pushed by two counter processes of reservation and cancelation. A potential hotel guest will make reservation several days or weeks before the due date of arrival. Usually, the level of arrival reservation is higher when the arrival day is closer. A refusal of reservation request will be done by the hotel when there is no room is available for the new guests. On the contrary, reservation can be canceled every time before the guest arrival. The possibility of cancelation will be higher when the due date is closer. Reservation will be closed when the entire rooms are booked. Total booking at the time (τ) before the arrival day (t) is equal to [2][3] and [6] total reservation after cancelations are made at certain arrival day

(the number of reservation minus the number of cancellations at a certain time τ). Zakhary [6] also asserted that arrival is the net number of guests who check-in at a certain time. While room occupancy is the number of rooms are occupied at a certain time. Room occupancy can be measured as percentage of the hotel room capacity. In addition to the reservation and cancelation, there are several variables that affect the determination of hotel occupancy level. Walk-in customers are the customers or hotel guests candidates that check-in without reservation. They arrive to the hotel and ask for room at that time. There are also several potential guest candidates who have room reservation but they do not arrive at the due date, they are called as no-show customer. Each room has been prepared for being utilized for several days. It is called as length of stay/LOS. After the guests arrive, there is also a possibility they check-out earlier before the scheduled date, which is called as understay. Contradictory, their also the possibility the guest stay longer than the scheduled date, or overstay.

In general, the strategy implemented by the hotel to attain the maximum occupancy target is done by implementing over-booking strategy. It means that hotel will give permission for reservation more than the hotel room capacity to anticipate the cancelation of reservation. This strategy is expected to be capable to increase the percentage of hotel occupancy. Nevertheless, in case the entire guest candidates with valid reservation arrive, the hotel will face a problem dealing with the availability of the room for the guest candidates. One of the alternatives solutions is lodging the additional guests to another hotel (“walking the guests”) with a chance for extra budget demanded by that neighbor hotel. In overall, this paper was arranged in several parts. At the beginning, it described several factors that affected the determination of hotel occupancy. Furthermore, it described the vision and motivation to build up framework that was based on smart agent delivered at the next part. The method described the designation of framework that was implemented. Finally, a short conclusion was made about the importance of prevailing framework for integrating the reservation system.

2. Occupancy Determination Factors

There are many factors which are assumed to influence the level of hotel occupancy. The factors include seasonality, reservation, cancelation, and group reservation [4][6].

2.1 Seasonality

Seasonality is one of the main factors that can be assumed to influence the room reservation level. Most hotels have certain visitation periods namely, “high season” where high reservation will reach to full occupancy and “low season” where there will be a lot of empty rooms. Through reservation understanding at high and low session, the price and room allocation can reach up the peak revenue optimally. There are several hotels have another seasonal level, for example, the third seasonal that is called “very low season”. Therefore, concrete seasons of the hotels in general consisted of three categories: high season, low season, and very low season. Seasonal average according to [6] can be represented by using average curve with the equations (1), (2), and (3) as follows:

$$s_{avg}(t) = \frac{1}{N_H} \sum_{t' \in S_H} \frac{s(t')}{Avg(s(\tau))}; t \in S_H \tag{1}$$

$$s_{avg}(t) = \frac{1}{N_L} \sum_{t' \in S_L} \frac{s(t')}{Avg(s(\tau))}; t \in S_L \tag{2}$$

$$s_{avg}(t) = \frac{1}{N_{VL}} \sum_{t' \in S_{VL}} \frac{s(t')}{Avg(s(\tau))}; t \in S_{VL} \tag{3}$$

Where S_H , S_L and S_{VL} are days in a year that included in the high season, low season, and very low season, in which they are determined by the hotel manager. The size is N_H , N_L and N_{VL} . While $s(t)$ is total reservation on the arrival day t (by excluding the cancelations). While $Avg(s(\tau))$ is average $s(t)$ for a year.

2.2 Reservation

Reservation represent the amount of arrival on certain day [4][6]. While according to McTavis and Sankaranarayanan [4], reservation is process of choosing the best hotel that is located in modern and sophisticated area, clean environment, and standard price. This process is usually done based on several certain criteria that have been established by the hotel guests candidates. It generally will involve the rating hotel star, rate per room/night, location, facilities, and *etc.* The reservation is the most challenging component in modeling because of the dependency at two time index, namely: reservation day (the day of room booking) and arrival day (the day for the guest to check-in). It is predicted that $B(i, t)$ as the expected number of arrival from booking/reservation of arrival day t that is booked precise i day before arrival. (meaning $B(0, t)$ as the expected number of the walk-in guest) so $B(i, t)$ can be called as the reservation curve. Because of randomly reservation process, so more or less reservations $B(i, t)$ will really be actualized as from guest candidate will potential for coming and not. So, it can be predicted that the reservation follows a binomial distribution with probability p that can be represented with the equation (4) as follows:

$$B(i, t) = Np \tag{4}$$

Where N is the population measurement for the potential reservation and arrival on certain date, and p is the probability that reservation will be actualized. The above equation is aimed to identify the fact that binomial experiment average should be similar with $B(i, t)$ (because according to B definition (i, t) is expected number based on reservation). The main problem here is to maximize $B(i, t)$ where for each arrival t only has one realization curve $B(-, t)$. But, the existing of variant fluctuation seasonal will not significantly change the form of booking curve until certain limitation. It means that actually the form will change when there is extreme season. For separating the influence from the level, thus, the assumption is made with the equation as follows (5):

$$B(i, t) = s(t)B'(i) \tag{5}$$

Where $B'(i)$ is normal reservation curve (valued 1, mainly $\sum_{i=0}^{\infty} B(i) = 1$ in which represented curve form/condition of booking by ignoring the number). Variable $s(t)$ represented level or the number of booking curve. This is more or less will represent the influence of seasonality affects the level of booking curve, mainly by moving up or down in multiplication. For estimating its quantity, the average on days of booking in sequent seasonality is determined with the equation as follows (6):

$$\hat{B}'_H(i) = \frac{1}{N_H} \sum_{t \in S_H} \frac{R(i,t)}{\sum_{j=1}^{\infty} R(j,t)} \tag{6}$$

By S_H is the number of days in the high season (the measurement is N_H), $R(i,t)$ notified the actual reservation number from arrival day t that is booked i day before arrival. On contrary, at $B(i,t)$ in which is the expected and the unknown quantity, $R(i,t)$ is actual reservation number and investigated quantity. The low and very low season can be estimated by the equation (6). Related to the multiplication level, $s(t)$, it can be estimated with the equation (7):

$$\hat{s}(t) = \sum_{i=0}^{\infty} R(i,t) \tag{7}$$

It can be stated that the multiplication at both sides on equation (4) at index i is obtained.

$\sum_{i=0}^{\infty} B(i,t) = s(t)$ because $\sum_i B'(i) = 1$. When $R(i,t)$ is realization from distribution which has average value $B(i,t)$ so the equation (7) can be considered as an estimation from $s(t)$. At equation (7) $\hat{s}(t)$ was estimated the result of a measurement of rooms' booking in which represented a total number of reservation for arrival day t .

2.3 Cancellation

Reservation can be canceled every time before the arrival days. Level of *cancellation* is variant according to time correlation until arrival. Usually, the cancellation will increase when the arrival day is getting closer. Level of cancellation, $c(i)$, is function until the arrival day. It is defined as the average net booking fraction that can be canceled. For example: at arrival day t , and on the first day before arrival day. It is assumed that on the last day before the arrival is $H(i + 1, t)$ booking/booking in hand for arrival day t . If $c(i) = 5\%$, so the number of expected cancellation from reservation (day i before arrival) is $0.05H(i+1, t)$. In addition, $c(0)$ is no-show average fraction. Of course $c(i)$ only gives an average number. The real number that at last is canceled is a random variabel as binomial.

2.4 Group Reservation

Nowadays, most of tour and travels offer the tour package. It means that the tourist has their schedule that has been planned including the length of duration to stay in hotel. The management of tour and travel can reserve the rooms by block blocking which there is a potential to obtain lower room cost.

3. Hotel Reservation based-on Indonesian Daily Language

The problem emerges in the hotel management domain is not only limited on the skill of workers or capital, it can be related to the information providing by the reservation management. The access on the information should also provide facility in the form that is integrated many information resources through the hotel data link. Nevertheless, there was a recommendation for using Indonesian language in the application which present the reservation data in the hotel reservation system. It was based on the perception, mainly from Public Relations who have an interaction with several assistant computerized, that is known as

Humane Reservation Assistance (HuResTan). HuResTan will support a duty or job function to serve a room searching and booking. Therefore, HuResTa is able to look for and what should be done when they see, who should be informed, like human who is modeling. Besides supporting the conventional human activity, HuResTan also can automate vary duties that for human maybe too expensive or limited, for examples: too slow and often forget so can be viewed that HuResTan as source of cheap worker that can give service like human who dedicate for 24 hours/day by observing available rooms at hotels. This application framework is recommended to fulfil the service:

1. **Information Access**
It should provide facility to access the richness of information source and service that is provided through hotel link/net. In general, data sources should be integrated from many sources to make information presentation in accordance to the individual need of hotel's guest candidate.
2. **Monitoring and Automatically**
It is aimed to get information without complicated tracing process. Users need provided information that can influence them, so they can take an accurate action.
3. **Work Together**
Human and computer should work effectively as a team all the time. Team members should share science and information, and beware towards decision that is potential to be a conflict.
4. **System Integration**
Software package that is developed independently should be easily integrated into an application framework so they it can operate accurately as well as it will be easy to use and maintain it.

4. Research method

The main target of this work was to build up communication intra reservation systems, to establish an automatic service to increase the operational management. A theoretical framework was designed for the reservation activity management. This application framework was called as Humane reservation assistance (HuResTan). The user who interacts directly with the framework will act as the hotel guest candidate. HuResTan consisted of several components, such as: Presentation layer, Processing layer, and Data layer. Presentation layer was prepared as user interface in which the hotel's guest candidate can login for choosing the room category at certain time slot. The application would check all input from different data base to avoid the data crash. When there was a guest who logged-in, HuResTa would make a compilation of all rooms data and subsequently would offer the available rooms at a slot on certain time/day. Data layer consisted of reservation data which were collected by HuResTa.

The rooms which were booked would be "locked", thus, they could not be booked by another hotel guest candidates. On certain cases where there were guest candidates booked a room but all rooms had been booked, the guest candidate should be placed on temporary indent. When there was guest candidate who cancelled the room booking before the arrival day, the room would be plotted on the slot reservation time that had been cancelled.

5. Experiment Result

In this research, a hotel reservation application has been designed. The system consisted of two main stages, i.e. Hotel room searching in Indonesian language and Room booking application. Home menu from the HuResTan application is presented by Figure 1 below. It can

be seen that user (hotel’s guest candidate) can search one preferred hotel room by typing one sentence (statements or questions) then followed by pushing the “*cari* (search) button”. One sentence for example is “*kami butuh kamar standar*” as depicted in Figure 2 below.

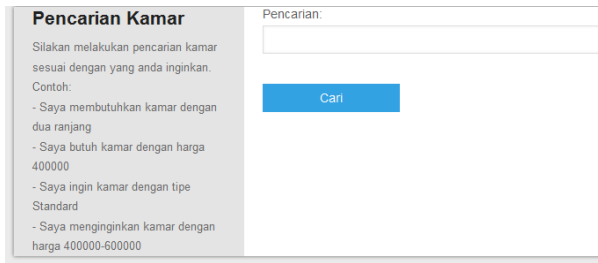


Figure 1. Main menu of HuResTan application.

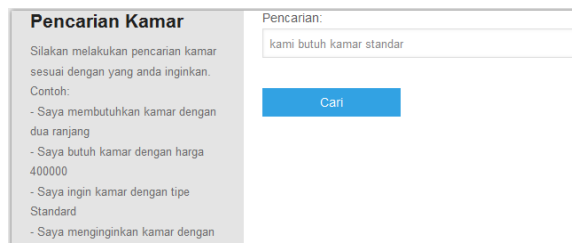


Figure 2. One text input “*kami butuh kamar standar* (search for standard room)”.

After an input was entered, the system will query the input on the data base. Once the keyword matched to one or some words stored in the data base, the searching result would be displayed as presented in Figure 3 below.

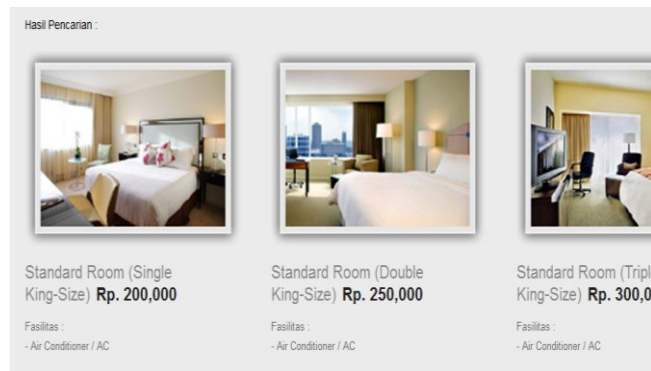


Figure 3. Searching result on one standard room.

The most important factor in this work was how the data base was configured and designed to accommodate every word or sentence as the input, such as how the data base could provide precise data/information from specific query “*tampilkan kamar yang mempunyai harga antara 400000 dan 500000*”. Based on that query, the application would display one result as depicted at Figure 4 below.

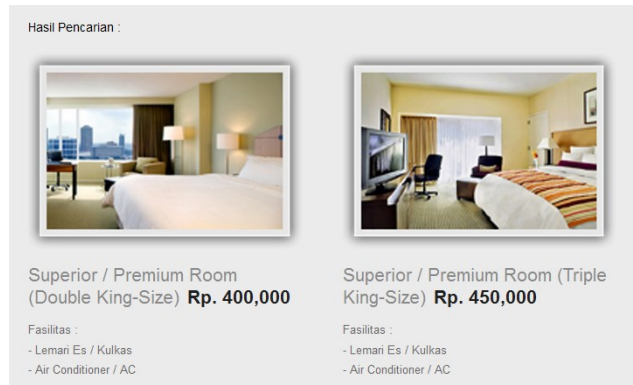


Figure 4. Result from one specific query.

When the room as demanded by the user in room searching was displayed, the booking process was followed-up the preference. Booking process can be done by the step as demonstrated in Figure 5 below.

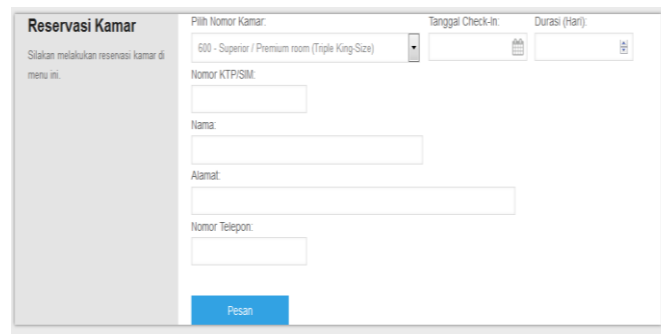


Figure 5. Booking form.

The blank parts should be filled out by the hotel’s guest candidate to complete the reservation. Specific units in this form were “*nomor kamar*(room number)”, “*tanggal chek-in* (check-in date)”, and “*durasi* (length of stay)”. Those information would affect on data base status, mainly on the room availability. However, the booking step was determined by precede room searching step, hence, several tables regarding with room were displayed including: room table (*tblkamar*), reservation table (*tblreservasi*), and hotel’s guest candidate (*tbltamu*). Complete tables configuration was presented at Figure 6 below.

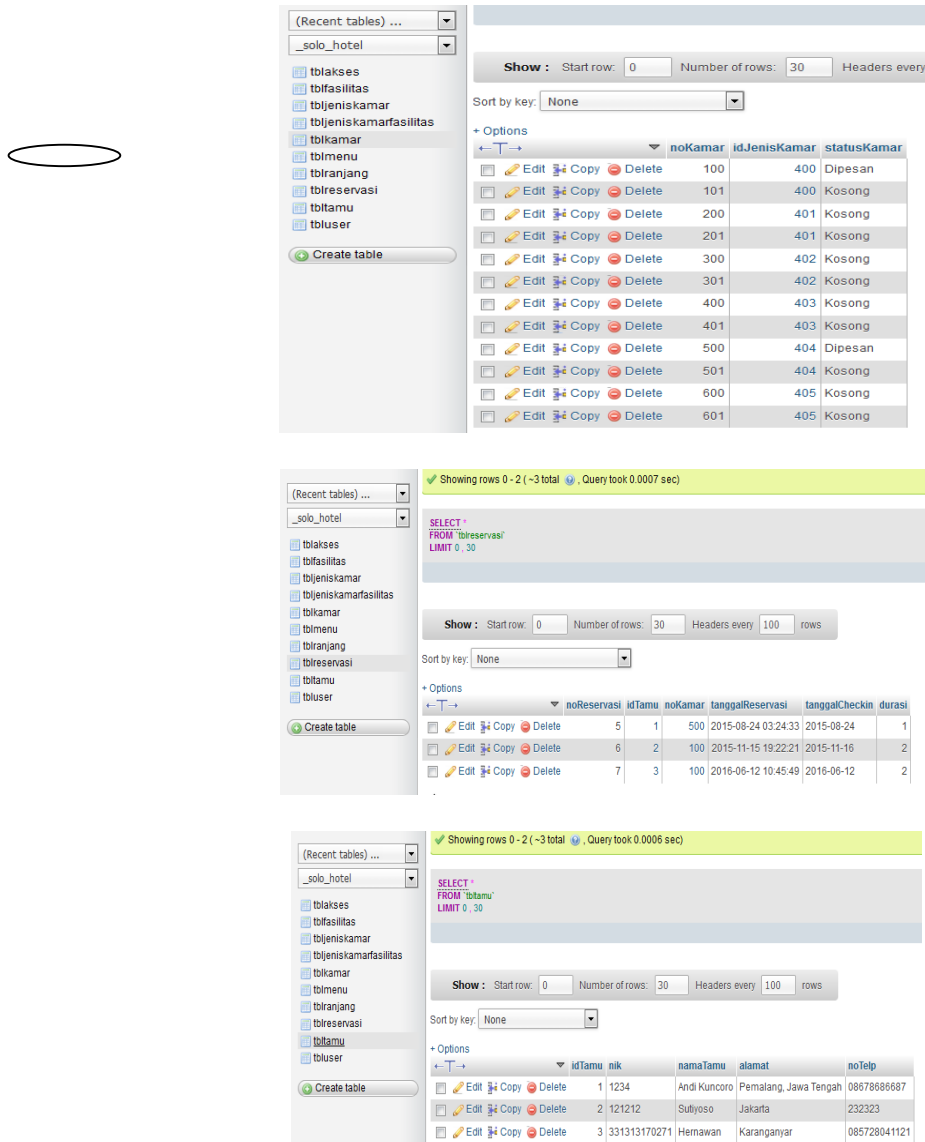


Figure 6. Tables in the booking process.

6. Discussion

This paper represented an application framework on the interaction between human resources and computerized reservation system to facilitate the information flow and decision making in the reality. HuResTan had a role in regulating the hotel guest mechanism which was done by dividing the reservation complex activity into duty groups or major activities. The integrated reservation demanded the additional alternative solution as automation. With this approach, HuresTan operated in fundamental way by making possible several reservations simultaneously and effectively. It was perceived as an integration technology; the approach based on HuResTan model offered more benefits in compared with the traditional ones. The application performance involved: 1) Flexibility, mainly the framework tried to prepare flexible service by permitting the guest candidate to do re-scheduling, room reservation, and changing the slot booking time provided in which it would be identified as a new duty; 2) The usage

facility, mainly to allocate rooms in the slot based on certain time in order to provide convenience for both the guest candidate and hotel management; 3) Sophistication, mainly on recommendation provided by the slot which was made based on the information from the data base, therefore they provided accurate results; 4) Price affectivity, the accurate identification was provided from the room slot which would eventually minimize the cost in reservation process.

7. Conclusion

The implementation of reservation system in Indonesian language required the integration of multi-factors of both the technique and non-technique. A reservation framework was designed with the aim to improve the reservation management process. In allocating the rooms for the guest candidates, the hotel should provide two main components, namely, IA and an integrated reservation system. HuResTan served as the decision maker based on the information provided by the data base. . Making decision in the method to place the guest candidate was a critical process and HuResTan could increase the performance of the prevailing framework. As for theoretical framework, several limitations appeared from the constructed framework. Therefore, further researches will require to provide progressive development from the prevailing framework and the efficiency of the implementation should apply various methods that involve the feedback from the users.

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