

Optimizing Inventory Management in Food & Beverage Department Hotel

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Abstract

The application of inventory management in the hotel's Food & Beverage (F&B) division is examined in this article. The F&B division struggles greatly to maintain ideal stock levels while assuring effective operations and lowering costs. The department uses a well-known inventory management model and seeks to balance the price of placing orders with the cost of maintaining inventory. The main ideas of Economic Order Quantity (EOQ) are covered in this article along with its advantages and some useful tips for using it in the F&B department. It is anticipated that the application of EOQ will improve inventory control, decrease stockouts and surplus inventory, and eventually increase profitability and customer satisfaction. This study uses a mixed-method research methodology that combines quantitative analysis and qualitative insights. The result of the study explains the application of Economic Order Quantity (EOQ) in the Food & Beverage (F&B) department of Jayakarta Hotels & Resorts can improve inventory management, reduce costs, and enhance operational efficiency. The department can achieve better inventory control and resource management by accurately forecasting demand, assessing supplier performance, and utilizing inventory management software. Overall, the study suggests that EOQ implementation can significantly affect inventory optimization in the F&B department.

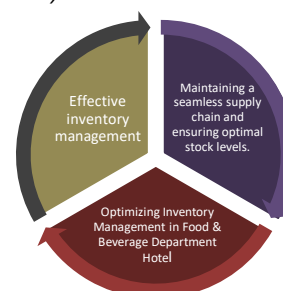
Keywords: Food and beverage department, stock control, Economic Order Quantity (EOQ), inventory management, cost-cutting, and customer satisfaction.

INTRODUCTION

Any organization's ability to manage its inventory effectively is essential to its success, but this is especially true for businesses that deal with perishable commodities and time-sensitive products. Due to the nature of its activities, the hotel's Food & Beverage (F&B) department confronts particular difficulties in controlling its inventory (Rumyantsev & Netessine, 2007). By preserving a fluid supply chain and making sure that stock levels are at their ideal levels, the hotel aims to provide great guest experiences. Since its debut in the first half of the 20th century, a commonly used inventory control model is Economic Order Quantity (EOQ) which has been widely accepted in the field of industrial operations management. Products with short life cycles are one of the topics that have received the most attention. The identification of control models to be used for inventory management and continuous manufacturing, especially for food and beverage items, makes this huge literature very relevant today.

These products are currently crucial from a production management standpoint because of the high demand mandated by societal

necessities and being subjected to time-sensitive public purchasing. Economic Order Quantity (EOQ) adoption has become a guiding principle for inventory management within the F&B department to achieve this goal (Prange & Verdier, 2011). It is shown in the figure below:



Source: Author's interpretation.

Figure 1. Diagram of Optimizing Inventory Management in Food & Beverage Department Hotel.

According to (Mia & Patiar, 2001), the hotel's F&B division operates in a very competitive and dynamic environment. It offers food, drinks, and snacks to a wide variety of visitors through a variety of establishments, including dining establishments, bars, and in-room dining. Timely and effective inventory management is crucial to satisfy consumer

demand, avoid stockouts, and reduce wastage. Effective inventory management can also lower expenses, increase cash flow, and boost profitability (Balakrishnan et al., 2004).

The F&B department has several obstacles in effectively managing its inventory. First, perishable food items must be carefully monitored and consumed as soon as possible to prevent spoiling and waste. Second, it might be difficult to foresee and satisfy client needs when demand patterns change owing to seasonal variations, events, and occupancy levels. Additionally, when managing its inventory, the department must take into account elements like lead time, storage capacity, and supplier dependability.

The use of EOQ as an effective inventory management tool has drawn attention as a solution to the problems the F&B department is facing. The optimal order quantity (EOQ) is determined by a mathematical model that balances the expenses of maintaining inventory and placing fresh stock orders. EOQ seeks to reduce total inventory costs, including carrying costs and order placement costs, by figuring out the appropriate order quantity (Singh & Schmidgall, 2002).

The F&B division of the hotel benefits in several ways from the introduction of EOQ. First off, it offers a structured method for managing inventory, ensuring that stock levels are adjusted to suit consumer demand while avoiding excess stock or stockouts. The department can raise customer satisfaction by lowering stockouts while upholding consistent service standards. By eliminating holding costs related to excess inventory and lowering order placement costs through optimized order quantities, EOQ adoption can also result in cost reductions (Singh & Schmidgall, 2002).

The F&B department must take several variables into account to adopt EOQ successfully. This entails precisely forecasting demand, figuring out lead times, assessing the performance of suppliers, and computing pertinent charges including carrying costs and order costs. The EOQ calculations can be streamlined, and stock levels can be monitored, with the use of sophisticated inventory management systems and software. Additionally, working closely with suppliers may guarantee on-time deliveries and reduce supply chain disruptions.

It is anticipated that the deployment of EOQ in the hotel's F&B department will have major effects. The first improvement will be inventory control, ensuring that stock levels match consumer demand and operating needs. As a result, there will be better resource

management, less waste, and greater operational effectiveness. Second, cost savings are projected by reducing excess inventory and related carrying costs and optimizing order quantities. The resulting cost savings may be transferred to other parts of the company's operations or offered at competitive prices to customers. Finally, the use of EOQ will ensure a steady supply of high-quality F&B items, which will increase consumer satisfaction.

REVIEW of the LITERATURES

The Food & Beverage (F&B) sector is not an exception when it comes to the importance of inventory management for businesses. For businesses to run smoothly, meet customer demand, and cut expenses, effective inventory management is essential. Economic Order Quantity (EOQ) implementation has become a useful strategy for maximizing inventory levels in the context of the F&B department in hotels. This study of the literature intends to investigate the body of knowledge on EOQ and its use in inventory control in the F&B sector, particularly in the context of hotels and resorts (Rumyantsev & Netessine, 2007)

Minimizing expenses associated with carrying inventory while systematically planning and regulating stock levels to satisfy customer demand is the goal of inventory management. To optimize inventory levels and improve operational efficiency, numerous inventory management models and methodologies have been created. One such approach is EOQ, which focuses on figuring out the best order quantity to reduce overall inventory costs. Harris(1990, in Erlenkotter).

Since Harris first presented the EOQ model in 1913, it has become a commonly used approach to inventory management. The fundamental idea underlying EOQ is to identify the order quantity that minimizes the overall costs connected with inventory to strike a balance between holding costs and ordering costs. The ideal order quantity and reorder point are determined by the EOQ formula, which considers variables including demand, ordering costs, carrying costs, and lead time (Andriolo et al., 2014).

Due to perishable food items, erratic demand patterns, and short shelf lives, the F&B business, particularly hotels, and resorts, has special issues in inventory management. The use of EOQ to optimize inventory levels and boost operational effectiveness in the F&B business has been investigated in several studies. These studies have shown how EOQ may improve customer satisfaction by assuring

the timely availability of food and drinks, decreasing stockouts, and minimizing waste (Al-Aomar & Hussain, 2018).

Studies have shown that organizations in the F&B sector can gain a great deal from implementing EOQ in inventory management. These advantages include decreased holding costs due to optimal inventory levels, increased profitability, better order fulfillment rates, fewer stockouts, and improved forecasting accuracy. According to Giuseppe et al., (2014), EOQ also enables better resource allocation and storage space optimization.

Several factors can affect how well EOQ is implemented in Jayakarta Hotels & Resorts' F&B division. The use of cutting-edge inventory management software, the availability of real-time data for decision-making, accurate demand forecasting, dependable supplier performance, good communication and collaboration with suppliers, and all of the aforementioned are examples of such factors (Giuseppe et al., 2014).

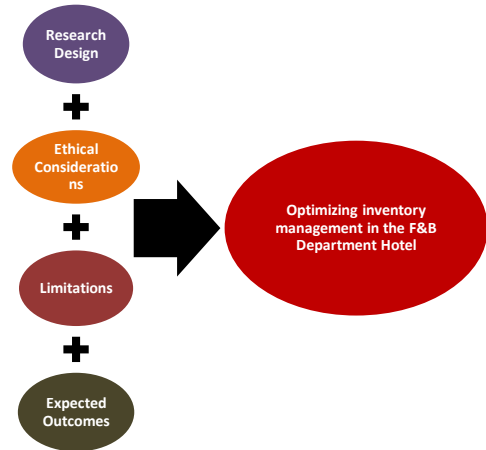
F&B industry case studies and best practices offer insightful information about how to apply EOQ successfully. These illustrations show the difficulties that businesses confront, the solutions used to deal with them, and the beneficial effects of EOQ implementation. Case studies can help the F&B department of Jayakarta Hotels & Resorts efficiently adopt EOQ.

Inventory management techniques have been profoundly impacted by technological advancements like inventory management software, data analytics, and automation. In the F&B sector, integrating technology with EOQ implementation might increase its efficacy even further. To increase inventory accuracy, decrease manual errors, and optimize order quantities, studies have investigated the integration of RFID technology, barcode scanning, and real-time data analytics (Al-Aomar & Hussain, 2018). Despite being a successful model for inventory management, EOQ has some drawbacks, such as the assumption of constant demand and cost parameters, which may not hold in actual situations.

METHODS

To investigate the use of Economic Order Quantity (EOQ) to improve inventory management in the hotel's Food & Beverage (F&B) Department, the research technique was selected. The research process offers a methodical way to obtain information, examine findings, and come to insightful conclusions. To

fully comprehend EOQ implementation in the unique setting of the F&B department, this study uses a mixed-method research methodology that combines quantitative analysis and qualitative insights (Sugiarto, 2022). The flow and research techniques are briefly illustrated in the following figure:



Source: Author's interpretation.

Figure 2. The research method of Optimizing Inventory Management in Food & Beverage Department Hotel.

The primary objective of this study is to evaluate the use of EOQ in the F&B department inventory management optimization at Jayakarta Hotels & Resorts. Bar-Lev et al., (1994), earlier research informs the specific research targets, which are as follows:

- a. Evaluating the department's present inventory management procedures.
- b. Analyzing the inventory management difficulties, the F&B department faces.
- c. Examining the use of EOQ as a paradigm for optimizing inventory.
- d. Examining the advantages and results of the F&B department's EOQ adoption.
- e. Determining variables that affect how well EOQ is implemented.
- f. Making suggestions for bettering inventory management procedures in light of EOQ deployment.

To achieve a thorough analysis, the study design includes both primary and secondary data collection techniques. Principal stakeholders in the F&B department, such as managers, inventory controllers, and employees who work in procurement and operations, are surveyed in an organized manner and interviewed. Quantitative information on inventory levels, order quantities, costs, and performance indicators is collected through the survey. Interviews offer qualitative insights into the difficulties,

viewpoints, and implementation of EOQ experiences. Secondary data consists of:

1. *Review of Existing Literature:* Academic studies and pertinent literature on inventory control, EOQ, and best practices in the F&B sector were examined. The theoretical underpinning and insights into the use of EOQ in improving inventory management were offered by this secondary data.
2. *Internal Reports:* To acquire further information on inventory management procedures, expenses, and performance measures, internal reports and documentation from Jayakarta Hotels & Resorts, including inventory records, financial statements, and operational reports, were analyzed.
3. *Industry Reports:* To get insight into market trends, benchmarks, and best practices in inventory management in the F&B sector, reports and publications from industry associations, market research companies, and hospitality industry sources were consulted.
4. *Inventory Management Software:* To evaluate the results of EOQ implementation, data from the implemented inventory management software, such as stock levels, order histories, and inventory performance metrics, were gathered and examined.

Participants for the surveys and interviews are chosen using a purposive sampling technique. The sample consists of people with knowledge and experience in Jayakarta Hotels & Resorts' F&B inventory management. To guarantee data saturation and representativeness within the F&B department, a sufficient sample size is chosen.

Descriptive statistics, correlation analysis, and regression analysis are among the statistical methods used to examine the quantitative data gathered from surveys. Finding patterns, trends, and connections between variables relating to inventory management and EOQ implementation is the main goal of the analysis. To glean important themes and insights about EOQ implementation, qualitative data from interviews is transcribed, coded, and thematically analyzed.

The research complies with ethical standards by obtaining participants' free, voluntary, and informed consent, upholding participant confidentiality, and safeguarding both individual and organizational privacy. All

information is safely kept and only used for the study.

The study admits several restrictions. The study's primary limitation is that it only examines the F&B division of Jayakarta Hotels & Resorts, limiting the applicability of its findings to other sectors or organizational settings. Second, the study is based on self-reported information, which could contain errors or biases. Through meticulous data collecting and analysis methods, efforts are made to mitigate these constraints.

The methodology research presented above offers a thorough way to investigate the application of EOQ in optimizing inventory management in the F&B department of Jayakarta Hotels & Resorts. The study was able to capture both quantitative data and qualitative insights by using a mixed-method research approach, which allowed it to provide a comprehensive knowledge of EOQ deployment and its effect on inventory optimization.

The research's design ensures that ethical issues are upheld and that it tackles any limits. The anticipated results will provide insightful analysis and practical suggestions for strengthening inventory management procedures and operational effectiveness in the F&B department.

RESULTS and DISCUSSION

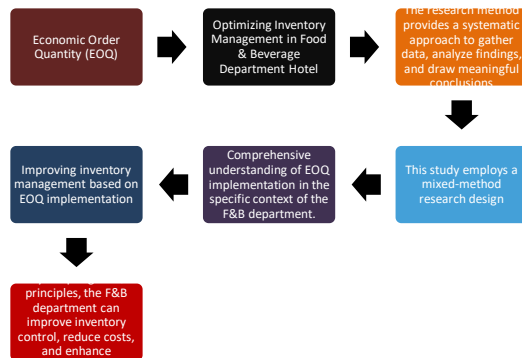
One of the most expensive assets in the company is its inventory, which accounts for 25% of its entire capital. The link between manufacturing and product sales is inventory. To meet the need for inventory to support operations at the lowest possible cost, an accurate inventory management plan is required.

Inventory setting mistakes can be disastrous. Inventory that is too little or large results in high costs, reduces the chance of making a significant profit and raises the likelihood of risk. It is impossible to sell or turn a profit when there is too little or too much inventory.

The study "Optimizing Inventory Management in the Hotel Food & Beverage Department" found some interesting information about how inventory management is currently carried out, the challenges faced, how EOQ is used, and the results of such use, according to earlier research on inventory control (Urban, 2005).

Inventory management aims to keep the right amount of inventory on hand. Inventory management is a part of both production management and operational management.

Achieving good inventory control helps reduce costs. The commentary underlines the consequences of the research findings and offers suggestions for improving inventory control based on the usage of EOQ, as seen in the figure below:



Source: Author's interpretation.

Figure 3. Flow chart of Result Optimizing Inventory Management in Food & Beverage Department Hotel.

According to the study, the F&B department at Jayakarta Hotels & Resorts manages its inventory manually and on an as-needed basis. Intuition and past performance are used to determine stock levels, which can result in overstocking or stockouts. Inefficiencies in the inventory management process are caused by limited visibility into inventory data and a lack of systematic tracking. In the absence of a planned method, carrying costs rise, perishable item waste increases, and potential consumer discontent increases.

The research identifies several inventory management issues that the F&B department must deal with. These difficulties include shifting patterns of demand, the short shelf life of perishable goods, unpredictability in lead times, and variable supplier performance. The difficulties are further exacerbated by the lack of precise methods for demand forecasting and by the poor coordination between procurement and operations. Stockouts, imbalanced inventories, excessive holding costs, and inefficient storage space usage are all caused by these problems.

The EOQ formula commonly used is

$$EOQ = \frac{\sqrt{2(D.S)}}{H}$$

D: Annual requirement
S: Order cost per order
H: Storage cost per unit per year

Source: Author's interpretation.

Figure 4. EOQ formula commonly used.

Model Assumptions for EOQ.

Several presumptions were made to develop the EOQ model, including the following:

- For one time of use, the precise number of raw materials needed can be predicted in advance.
- In one time period, the consumption of raw resources is comparatively stable.
- Over a specific time, frame, the cost of raw resources remains constant.
- The lead time, or the period between placing an order and receiving the products, is fixed.
- There is no stockout (materials shortage).

Re-Order Point (ROP).

ROP is the point/level of inventory at which a reorder must be placed.

$$ROP = \text{usage/day} \times \text{lead time}$$

Source: Author's interpretation.

Figure 5. ROP formula commonly used.

In practice, there are usually policies decided by the company, so the ROP calculation is adjusted to the policy. Policies related to Safety Stock.

SafetyStocks.

Additional inventory held in case of changes in sales levels or delays in production-delivery, then:

$$\begin{aligned} \text{Initial inventory} &= EOQ + \text{Safety stock} \\ \text{Average inventory} &= (EOQ/2) + \text{Safety Stock} \end{aligned}$$

Source: Author's interpretation.

Figure 6. Initial Inventory and Average Inventory formula commonly used.

It takes into account several elements, such as cost delay, conjecture factors, and prior

experience factors, when calculating the number of demands based on Safety Stock.

Example:

15kg of usage each day.

10-day delivery delay.

The safety stock then equals 10 x 15kg, or 150kg.

Therefore, the safety stock weighs 150kg or 10 x 15kg.

The following discussion will cover how to calculate the necessary amount of safety stock, including how much must be used during lead time plus a particular percentage as a safety stock to prevent stockouts.

1 Example:

With a four-day lead time, the Jayakarta Hotels and Resorts need 500 kg of beef ribs per day.

Find the reorder point if the safety requirement is 50% of the daily requirement!

ROP = (4 x 500 kg) + 50% (4 x 500 kg) equals 2,000 kg plus 1,000 kg, which equals 3,000 kg.

In addition, we also need to know how to determine the amount of safety stock usage during the lead time plus the usage during a certain period as safety stock.

Example:

The Jayakarta Hotels and Resorts requires 500 kg of oxtail per day with a lead time of 4 days.

If the safety requirement is set at the amount needed for 3 days, determine the reorder point!

Answer:

ROP = (4 x 500 units) + (3 x 500 units) = 2,000 units + 1,500 units = 3,500 units

As another illustration, rice is one of the primary ingredients needed by The Jayakarta Hotels & Resorts.

The demand for rice is anticipated to be 1,600 kg/week, the ordering cost is Rp 500,000 for a single order, the cost of storage is 25% of the purchase price, and the cost of the purchase is Rp 12,000/kg.

50 kilogram of safety stock with a 4-day delivery window. (52 weeks divided by 12 months).

Do you know how much it would cost to stock up on rice for a year?

To implement the Economic Order Quantity Model, we must first comprehend the following process. The total annual cost is the sum of the purchase cost and variable cost.

- Variable cost is the sum of order cost and storage cost.
- Order cost is calculated as order quantity times order cost per order.

- Orders received are orders that are placed annually:

EOQ - EOQ = ((2 x yearly requirements x ordering costs): (annual storage cost per kilogram)).

- The cost of storage is determined as follows: average inventory times the price per kilogram and the storage cost per kilogram per year.
- EOQ is equivalent to average inventory: 2

According to the information provided, the following values can be deduced:

C (cost)	= 12,000
I (inventory carrying charge)	= 25%
S (setup)	= 500,000
L (lead time)	= 4
D (annual demand)	= 1,600 x 52 = 83,200
H	= 3.000

The calculation steps are as follows:

Calculating EOQ: $\frac{\sqrt{2(D.S)}}{H}$

Calculating Order Cost: $\frac{D}{EOQ} \times S$

Calculating Store Cost: $\frac{EOQ}{2} \times I \times C$

Calculating Variable Costs:

$\frac{(D \times S)}{EOQ} + \frac{EOQ}{2} \times I \times C$

Calculating Total Cost:

$((D \times C) + \frac{(D \times S)}{EOQ} + \frac{(EOQ \times I \times C)}{2})$

1. Calculating EOQ (Q* = Minimum Requirement)

EOQ: $\frac{\sqrt{2(D.S)}}{H}$

EOQ: $\frac{\sqrt{2(83.200 \times 500.000)}}{25\% \times 12.000}$

EOQ: $\frac{\sqrt{83.200.000.000}}{3.000}$

EOQ: 5.266,24

2. Order Cost

Order Quantity x Order Cost/Order

= $\frac{D}{EOQ} \times S$

= $\frac{83.200}{5.266,24} \times 500.000$

= 7.899.374

3. Storage Cost

Average Inventory x Storage Cost/kg/year x price/kg

= $\frac{EOQ}{2} \times H$

= $\frac{5.266,24}{2} \times 3.000$

= 7.899.360

4. Variable Cost

$$\begin{aligned} &= \text{order cost} + \text{storage cost} \\ &= 7.899.374,13 + 7.899.360 \\ &= 15.798.734,13 \end{aligned}$$

5. Total Cost:

$$\begin{aligned} &= \text{purchase cost} + \text{variable cost} \\ &= 998.400.000 + 15.798.734,13 \\ &= 1.014.198.734,13 \end{aligned}$$

So, the total cost required to hold inventory for 1 year is: 1.014.198.734,13

6. Reordering

$$\text{Daily Usage} = (1,600 \text{ kg} \times 52 \text{ weeks}) / 365 \text{ days} = 228 \text{ kg}$$

$$\text{Reorder point} = \text{Delivery time} + \text{safety stock} = (4 \text{ days} \times 228) + 50$$

$$= 912 + 50$$

$$= 962 \text{ kg}$$

So, if the inventory remains 962 kg, then the purchasing department must order from the supplier

7. Order Quantity in one year

$$= \text{order quantity in a year: EOQ}$$

$$= (1.600 \times 52) / 5.266,24$$

$$= 83.200 / 5.266,24$$

$$= 16 \text{ times}$$

This research shows how EOQ is used as a guiding principle for inventory optimization in the F&B department. EOQ offers a methodical approach to inventory replenishment by determining the appropriate order quantity and reorders point based on demand, ordering costs, and carrying costs. Utilizing inventory management software will enable calculations to be automated, stock levels to be tracked, and reorder notifications to be generated.

The F&B department has several benefits as a result of EOQ implementation. Matching stock levels to customer demand and operational needs first improves inventory control. As a result, there is a lower chance of stockouts and more customer satisfaction. By optimizing inventory levels, lowering excess inventory, and minimizing waste associated with perishable commodities, EOQ implementation lowers carrying costs. The profitability of the department is favorably impacted by this cost decrease. The deployment of EOQ also improves operational efficiency, decreases manual errors, and streamlines the inventory management process.

The study reveals several variables that affect the F&B department's ability to successfully adopt EOQ. The success of EOQ

implementation is largely dependent on accurate demand forecasting, dependable supplier performance, good communication, and cooperation between procurement and operations. The incorporation of inventory management software, the availability of real-time data, and staff EOQ training are all essential for a successful implementation.

Several suggestions can be made to improve inventory management procedures in the Jayakarta Hotels & Resorts F&B department in light of the findings. First of all, it is important to promote the use of EOQ as a regular procedure together with the deployment of inventory management software to automate calculations and expedite procedures. To enhance inventory planning and decrease stockouts, the department should also invest in precise demand forecasting methods. Thirdly, improved supply chain reliability can result from greater supplier engagement, which includes performance evaluation and regular communication. Last but not least, consistent training sessions should be held to inform workers about EOQ concepts and the significance of effective inventory management.

The results emphasize the need for a structured approach to inventory management, the difficulties the department faces, and the benefits of EOQ implementation. They also highlight the significance of EOQ implementation in optimizing inventory management within the F&B department of Jayakarta Hotels & Resorts. The F&B department can increase operational efficiency, lower expenses, and improve inventory control by implementing EOQ concepts. The suggested actions offer helpful pointers for putting EOQ into practice and enhancing inventory control procedures in the F&B department and other hospitality-related companies.

CONCLUSION

The adoption of Economic Order Quantity (EOQ) has shown to be a successful method for improving inventory control in the Food & Beverage (F&B) division of Jayakarta Hotels & Resorts. A lack of structure in the department's current inventory management procedures led to inefficiencies, such as stockouts, overstocking, and greater carrying costs, according to the report. However, a lot of progress was seen after EOQ was implemented.

By estimating ideal order quantities and reorder points based on demand, ordering costs, and carrying costs, EOQ implementation

provides a methodical approach to inventory replenishment. Better stock level management, a lower chance of stockouts, and more customer satisfaction were the outcomes of this. Additionally, the use of EOQ resulted in cost savings through enhanced operating efficiency, less waste of perishable goods, and optimal inventory levels.

Accurate demand forecasting, dependable supplier performance, good communication, and the incorporation of inventory management software were some of the elements that contributed to the successful deployment of EOQ. The implementation of EOQ as a normative practice was encouraged, as were investments in precise demand forecasting methods, closer supplier collaboration, and routine staff training programs. These suggestions were made to further improve inventory management processes.

Overall, the F&B department of Jayakarta Hotels & Resorts will gain a lot from the deployment of EOQ, including better inventory control, cost savings, and operational effectiveness. The department may further optimize inventory management and ensure smooth operations by putting the suggestions into practice and utilizing the benefits of EOQ, which will ultimately boost profitability and competitiveness in the hotel sector.

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