Impact of Technological Application Adoption on Hospitality Organizations' Performance Efficiency: Testing Mediation and Moderation Roles

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Abstract

This study aims to investigate the impact of technological applications on performance efficiency in hotels in Marsa Alam, while examining the mediating and moderating roles. The research relies on analyzing the relationship between the tasks of technological applications and operational efficiency, with a focus on the impact of these applications in improving performance quality, accelerating task execution, and reducing errors. Data was collected from hotel employees in Marsa Alam using questionnaires. However, 20 out of 271 collected questionnaires were excluded due to insufficient responses, resulting in 251 valid questionnaires. These were analyzed using SPSS v22 and SmartPLS v3. The results revealed a statistically significant positive relationship between the use of technological applications and increased operational efficiency, with user-friendly applications having a notable impact on job performance. The study also found that technical challenges and resistance to change may affect user expectations regarding benefits, but they do not significantly influence improvements in operational efficiency. The study recommends improving the design of technological applications and increasing continuous training for employees to ensure maximum benefit and emphasizes the need to foster a culture of technological acceptance among staff to enhance overall performance in hotels.

1. Introduction

Recent developments across various sectors, particularly in the hospitality industry, have been significant. To ensure their survival and remain competitive in an ever-evolving market, hotels are increasingly focusing on improving operational efficiency and providing exceptional services and experiences (Abukhalifeh and Pratt, 2022).

Technological applications have become essential tools for enhancing operational efficiency, streamlining hotel operations, and achieving higher levels of customer satisfaction. To maintain a competitive edge, hotels must adopt innovative solutions that ensure sustained advantages (Gonzalez *et al*., 2019).

Among the various technologies implemented in hotels, Property Management Systems (PMS) and mobile applications are key examples. These applications are used to enhance customer service, improve operational processes, increase guest satisfaction, and overall hotel performance (Supartini *et al*., 2018). These technological solutions bring substantial benefits, including increased productivity, reduced costs, enhanced guest satisfaction, and better overall guest experiences. However, the effectiveness of these applications is often influenced by several factors, such as their perceived ease of use and the benefits they offer to hotel staff and other users (Kuo *et al*., 2017). Understanding the relationship between technological functionalities, ease of use, and benefits is critical for assessing the success of these applications in the hospitality industry(Geminarqi & Purnomo, 2023).

This study aims to explore the impact of technological tasks on operational efficiency through the mediating roles of Ease of use and benefits. These mediators play a crucial role in improving the link between technological applications' functionalities and the operational efficiency of hotels. Furthermore, the moderating role of challenges—such as system complexity, staff resistance to technological adoption, and insufficient staff training—may influence the effectiveness of these technologies in improving operational efficiency.

Despite the considerable advancements in technological applications within the hospitality industry, there is a lack of research examining the specific impact of these technologies on the operational efficiency of hotels, particularly in the context of Marsa Alam. This study aims to address this gap by focusing on how the adoption of technological applications, including PMS and mobile applications, influences operational performance in a growing tourist destination. Additionally, it will explore how mediating factors such as usefulness and moderating factors like implementation challenges shape the outcomes of technology adoption in hotels.

2.Review of Literature and Hypothesis Formulation

2.1 The relationship between the tasks of technological applications and operational efficiency

Technological applications in hotels are widely used to enhance the competitive advantage of hotels, improve guest experiences, and increase operational efficiency (Gretzel and Stankov, 2021). Property Management Systems (PMS), booking platforms, POS systems, mobile applications, and other technologies all play a crucial role in a hotel's performance (Gretzel *et al*., 2015; Malkawi, 2016). By automating repetitive tasks and providing real-time data, these technological applications streamline processes and reduce human errors, thus enhancing efficiency and minimizing reliance on human involvement in operations that require consistency (Abdelwahab *et al*., 2022). Moreover, technological applications offer personalized services that cater to guests' specific needs, leading to higher satisfaction and a stronger sense of connection to the hotel. These technologies continue to transform the hotel industry, making operations more accessible and efficient overall (Abukhalifeh & Pratt, 2022).

Operational efficiency in hotels involves increasing output while minimizing costs and resource usage (El Nemar *et al*., 2022; Dsouza *et al*., 2023). This includes optimizing employee performance, reducing downtime, and improving resource management (Hayes and Ninemeier, 2017).Technological applications enhance efficiency by automating operations, streamlining

procedures, and providing valuable insights into performance metrics (Caddeo & Pinna, 2021). Efficient operations help reduce costs, provide quicker service, and improve customer satisfaction, enabling hotels to maintain high service quality and profitability (Hayes & Ninemeier, 2017).

The relationship between technological applications and operational efficiency in hotels is crucial, as technology enhances efficiency by automating processes and providing data for optimal management. For instance, property management systems streamline bookings, check-ins, check-outs, and billing, reducing manual work and improving accuracy (De Jorge & Suárez, 2014). Additionally, mobile apps and self-service kiosks allow guests to handle their own needs, freeing up staff to focus on more complex tasks. Therefore, the effective use of technology boosts operational efficiency, leading to enhanced performance and service delivery (Abdelwahab *et al*., 2022).

Hence, the following can be proposed:

H1. *There is a statistically significant effect between tasks and operating efficiency*

2.2 The relationship between the tasks of technological applications and the ease of use

Ease of use refers to users' perception that using a particular technology will be easy (Davis, 1989). It is a key factor in the acceptance of technological solutions, especially in industries like hospitality, where user experience is crucial (Mezhuyev *et al*., 2019).

Users are more likely to adopt technology that is perceived as easy to use, leading to higher engagement and satisfaction. In hotels, for instance, both guests and employees expect seamless interactions with technological tools, such as mobile apps for check-ins, room service requests, and even smart room controls (AH&LA, 2022). When these solutions are simple, intuitive, and require minimal training, they enhance efficiency and improve the overall guest experience (Mao & Hovick, 2022).

The relationship between technological application tasks and usability is essential for successful implementation. Complex or difficult tasks may lead to user resistance, whereas simple systems that require minimal effort are perceived as easy to use, thereby promoting adoption and increasing efficiency. For example, hotel management systems that streamline booking and check-in processes improve service speed and customer satisfaction. Therefore, the design of technological applications has a direct impact on both usability and the overall success of technology adoption (Sintala, 2019; Sredojević & Njeguš, 2024).

Based on this, the following hypotheses are proposed:

H2. *There is a statistically significant effect between tasks and ease of use.*

2.3 The relationship between the tasks of technological applications and the benefits

The benefits of technological applications lie in accomplishing the tasks that users expect to achieve, such as improving operational efficiency, reducing errors that lead to significant costs, and enhancing decision-making, ultimately saving time (Davis, 1989).

The functions of technological applications are closely linked to the benefits they provide, which is crucial in demonstrating the impact of their adoption. The tasks performed by technology directly contribute to these benefits (Supartini *et al*., 2018). Similarly, data collection and analysis support more informed decision-making, improving customer service, and optimize resource management, resulting in cost savings and enhanced guest experiences. Therefore, aligning activities with expected benefits is essential for the successful adoption of technology (Conrad *et al*., 2022).

Based on this, the following hypotheses are proposed:

H3. *There is a statistically significant effect between tasks and benefit.*

2.4 The relationship between the ease of use and operational efficiency

The relationship between perceived ease of use and operational efficiency is crucial for the successful adoption of technological applications. When technology is user-friendly, it reduces the time and effort required, enabling both staff and guests to interact with the system more effectively. In the hospitality industry, operational efficiency improves when employees can easily access property management systems or check in guests using technological tools. This ease-of-use streamlines tasks such as check-ins, bookings, and customer support, reducing wait times and enhancing service quality. Additionally, it minimizes errors and reduces training requirements, leading to smoother and more efficient hotel operations (Ivanov & Berezina, 2016).

Based on this, the following hypotheses are proposed:

H4. *There is a statistically significant effect between ease of use and operating efficiency.*

2.5 The relationship between the benefits and operational efficiency

There is a clear correlation between the benefits of technological applications and operational efficiency. The advantages of these applications, such as improving operational performance in the hospitality industry, are evident in processes like automated booking systems. Whether new or updated, these systems reduce manual tasks in booking and check-in, save time, minimize errors, and enable faster service, ultimately enhancing efficiency. Therefore, the benefits of technological applications are closely tied to improving the hotel's overall operational efficiency. (Betrand & Onyema, 2023; Ezzaouia &Gidumal, 2023).

Based on this, the following hypotheses are proposed:

H5. *There is a statistically significant effect between benefit and operating efficiency.*

2.6 Ease of use mediates the relationship between the tasks of technological applications and operational efficiency

Ease of use plays a crucial intermediate role between the functions performed by technological applications and operational efficiency. When technology is intuitive and easy to use, it reduces the time and effort required from users to complete their tasks. In the hospitality industry, for example, user-friendly property management systems or self-service kiosks help employees perform tasks such as check-ins and bookings more efficiently (Ahmed et al., 2023). Ease of use enhances operational efficiency by minimizing the training time needed for staff to effectively carry out tasks and reducing errors. Conversely, difficult-to-use technology can hinder efficiency, which makes ease of use a critical factor in determining the effectiveness of technology in improving operational efficiency (Betrand & Onyema, 2023)

Based on this, the following hypotheses are proposed:

H6. *There is a statistically significant indirect effect between tasks and operating efficiency through ease of use*

2.7 The benefits mediate the relationship between the tasks of technological applications and operational efficiency

The benefits mediate the relationship between technological tasks and operational efficiency by offering several advantages that influence task execution effectiveness and outcomes. When technology is designed to perform everyday tasks tailored to hotel guests, the anticipated benefits of saving time, reducing costs, and improving service quality encourage adoption (Ahmed *et al*., 2023). These benefits significantly enhance operational performance by increasing productivity and reducing errors. Therefore, perceived benefits act as an intermediary, promoting technology adoption and improving hotel operations (Betrand & Onyema, 2023).

Based on this, the following hypotheses are proposed:

H7. *There is a statistically significant indirect effect between tasks and operating efficiency through speeding up benefit*

2.8 The challenges faced by technological applications as a moderator

challenges often hinder the relationship between the ease of use of technological applications and the functionality of those applications (Supartini *et al*., 2018). Poor User Interface (UI) design or complex functionalities can lead to misunderstandings, requiring additional effort from users to interact with the technology (Rahman *et al*., 2022). In the hospitality industry, for example, a counter-intuitive booking system with repeated failures can frustrate both employees and guests, leading to delays and dissatisfaction. These issues not only hinder adoption but also prevent users from fully enjoying the intended benefits of the technology (Ezzaouia & Gidumal, 2023).

Based on this, the following hypotheses are proposed:

H8. *Technological challenges moderate the relationship between the functionality of technological applications and the ease of use.*

2.9 The challenges faced by technological applications as a moderator

Challenges facing technological applications can significantly limit their ability to deliver on their promised benefits. Poor integration, technical difficulties, and user resistance often impede the effectiveness of technology applications (Supartini *et al*., 2018). When technology is difficult to use or incompatible with operational needs, its performance suffers. For example, a faulty hotel management system may result in inefficiencies, delays, and errors, negatively impacting both staff and guest experiences (Rahman *et al*., 2022). These challenges prevent technology from providing the intended benefits, such as enhanced efficiency and service quality. Therefore, addressing these issues is crucial for unlocking the full potential of technological applications (Ezzaouia & Gidumal, 2023).

Based on this, the following hypotheses are proposed:

H9. *Technological challenges moderate the relationship between the functionality of technological applications and the benefit.*

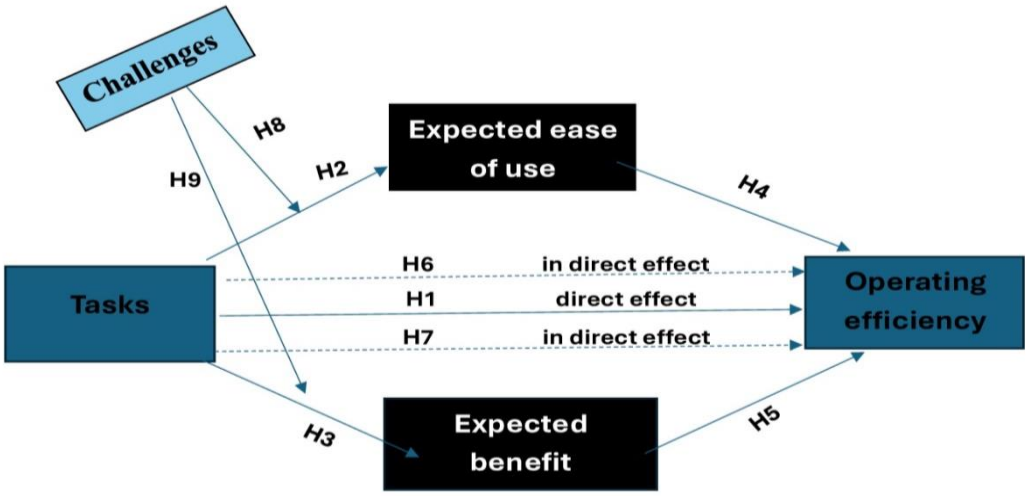

Figure 1 Conceptual framework

3. Method

3.1 Scales

A questionnaire was developed to test the study's hypotheses, and the study's measures were extracted from a previous study. the technology programs tasks were evaluated using 10 items derived (Howard & Rose, 2019; Scalise & Gifford, 2006). The Operating efficiency was operationalized using the 6 items scale suggested by (De Jorge & Suárez, 2014b; Laudati, 2017; Nguyen & Nguyen, 2022). Additionally, the ease of use and usefulness were estimated using 6 items from (Mezhuyev *et al*., 2019) Finally, the "challenges" was evaluated using the 9 items scale proposed by (Sanabria *et al*., 2022; Han *et al*., 2021) A Likert scale of 5 points was used where one refers to "strongly disagree" and five means"Strongly agree.

3.2 Participants

In MAY 2024, Questionnaires were directed to hotel employees of the room division department, Front Desk and Reservations, to gauge the variables of our proposed models. using convenient sample method. 20 of the 271 gathered questionnaires were discarded because they lacked sufficient responses. Thus, 251 questionnaires were found to be valid. Respondents were required to sign a consent form and could either take part in the survey or skip it. All respondents were assured that the results of their participation in the survey would be kept private. The SPSS v22 and SamrtPLS v3 were used to analysis the collected data.

4 Data Analysis

The SPSS v22 and SamrtPLS v3 were used to analysis the collected data.

4.1 Validating Outer Model

The study looked at discriminant and convergent validity, internal consistency, and composite reliability to evaluate the outer model. Cronbach's alpha (α), composite reliability (CR), and Average Variance Extracted (AVE) are presented in Table (7); Cronbach's alpha values range from 0.894 to 0.946, composite reliability values range from 0.925 to 0.951, and AVE values range from 0.657 to 0.827, which indicate proper reliability and validity across the constructs.

Table 1. Psychometric results.

Variables	Loading	VIF	α	C_R	AVE
functions			0.942	0.950	0.657
Fun1	0.708	2.255			
Fun2	0.744	2.964			
Fun3	0.747	2.809			
Fun4	0.833	2.899			
Fun5	0.814	2.799			
Fun6	0.822	2.689			
Fun7	0.883	3.698			
Fun8	0.882	4.801			
Fun9	0.866	3.478			
Fun10	0.787	2.894			
operating efficiency			0.902	0.925	0.672
OES 1	0.884	2.986			
OES 2	0.811	2.182			
OES 3	0.824	2.320			
OES 4	0.794	2.043			
OES 5	0.822	2.230			
OES 6	0.781	1.933			
ease of use			0.896	0.935	0.827
EOU1	0.937	3.808			
EOU2	0.840	2.061			
EOU3	0.947	4.420			
benefit			0.894	0.934	0.826
EXbenefit1	0.885	2.362			
EXbenefit2	0.904	2.800			
EXbenefit3	0.935	3.508			
Challenges			0.946	0.951	0.684
DTA 1	0.822	3.258			
DTA 2	0.837	4.481			
DTA 3	0.878	3.929			
DTA 4	0.885	3.289			
DTA 5	0.865	3.870			
DTA 6	0.809	3.639			
DTA 7	0.807	3.378			
DTA 8	0.767	4.291			
DTA 9	0.767	3.917			

"Note: The abbreviation 'Fun' stands for Functionality of Technological Applications."
"Note: The abbreviation ' OES ' stands for Operating efficiency."
"Note: The abbreviation ' EOU ' stands for ease of use."
"Note: The abbreviation ' benefit ' stands for benefit."
"Note: The abbreviation ' DTA ' stands for Challenges Encountered by Technological Applications."

Finally, all standardized factor loading (SFL) scores were greater than 0.60 (Henseler *et al.*, 2009), indicating that the factors had satisfactory reliability. The average variance extracted (AVE) scores

were greater than the threshold value of 0.50, evidence for a proper convergent validity (Henseler *et al*., 2009). Finally, three criteria were checked to test the discriminant validity: cross-loading, and Fornell-Larcker criterion (Leguina, 2015). Outer-factor loading for each latent observed variable (bolded) was greater than cross-loading in Table 2

Table (2): Cross loading results

Abbreviation	**Technology Program functions**	Benefit	Challenges of using technology	Ease of use	operating efficiency
DTA 1	0.022	0.161	**0.822**	0.076	0.074
DTA 2	-0.037	0.091	**0.837**	0.015	0.019
DTA 3	0.012	0.182	**0.878**	0.116	0.081
DTA 4	0.012	0.163	**0.885**	0.127	0.108
DTA 5	-0.009	0.133	**0.865**	0.084	0.042
DTA 6	-0.016	0.122	**0.809**	0.069	0.053
DTA 7	-0.003	0.087	**0.807**	0.066	0.036
DTA 8	-0.111	0.004	**0.767**	-0.053	-0.075
DTA 9	-0.053	0.092	**0.767**	0.012	-0.005
EOU1	0.630	0.805	0.097	**0.937**	0.781
EOU2	0.407	0.575	0.090	**0.840**	0.573
EOU3	0.549	0.742	0.089	**0.947**	0.685
EXbenefit1	0.596	**0.885**	0.196	0.727	0.684
EXbenefit2	0.590	**0.904**	0.139	0.667	0.725
EXbenefit3	0.616	**0.935**	0.128	0.755	0.754
Fun1	**0.708**	0.363	-0.132	0.302	0.491
Fun2	**0.744**	0.394	-0.089	0.314	0.525
Fun3	**0.747**	0.427	-0.132	0.311	0.547
Fun4	**0.833**	0.561	-0.030	0.505	0.657
Fun5	**0.814**	0.552	-0.082	0.521	0.653
Fun6	**0.822**	0.556	0.035	0.475	0.658
Fun7	**0.883**	0.598	0.049	0.558	0.737
Fun8	**0.882**	0.613	0.115	0.560	0.706
Fun9	**0.866**	0.625	0.091	0.590	0.695
Fun10	**0.787**	0.572	0.054	0.538	0.625
OES 1	0.712	0.819	0.086	0.798	**0.884**
OES 2	0.620	0.651	0.065	0.620	**0.811**
OES 3	0.631	0.614	0.005	0.579	**0.824**
OES 4	0.629	0.561	0.038	0.533	**0.794**
OES 5	0.623	0.639	0.089	0.604	**0.822**
OES 6	0.639	0.585	0.085	0.549	**0.781**

"Note: The abbreviation 'Fun' stands for Functionality of Technological Applications."
"Note: The abbreviation ' OES ' stands for Operating efficiency."
"Note: The abbreviation ' EOU ' stands for ease of use."
"Note: The abbreviation ' EXbenefit ' stands for benefit."
"Note: The abbreviation ' DTA ' stands for Challenges Encountered by Technological Applications."

Table (2) demonstrates that the bolded scores of the AVEs on the diagonal line exceed the correlation coefficient between the research variables, which supports discriminant validity (Henseler *et al*., 2009). Also, some studies examined the Heterotrait–Monotriat ratio of correlation (HTMT) test to confirm the discriminant validity. Table (8) also shows that the discriminant validity is appropriate because all HTMT values are <0.90 (Leguina, 2015). Accordingly, the results demonstrated that the structure model has sufficient discriminant validity. In this way, the results from the outer measurement model were adequate to move forward with the structural model evaluation.

Finally, three tests were performed to assess discriminant validity (DV): cross-loadings, the Fornell-Larcker matrix, and the Heterotrait-Monotrait ratio of correlation (HTMT) (Leguina, 2015). In Table 2, the outer-factor loading for each latent observed variable (highlighted in bold) was higher than the corresponding cross-loading.

Table (3): Discriminant validity criteria (Fornell-Larcker Criterion)

Variables	Technology Program functions	benefit	Challenges of using technology	ease of use	operating efficiency
Technology Program functions	0.811				
benefit	0.661	0.909			
Challenges of using technology	0.000	0.169	0.827		
ease of use	0.593	0.789	0.101	0.910	
operating efficiency	0.785	0.794	0.076	0.757	0.820

Table (4): Discriminant validity criteria (HTMT)

Discriminant Validity	Technology Program functions	benefit	Challenges of using technology	ease of use	operating efficiency
Technology Program functions					
benefit	0.708				
Challenges of using technology	0.117	0.154			
ease of use	0.616	0.869	0.102		
operating efficiency	0.842	0.876	0.082	0.823	

Table (5): Model Goodness of Fit (GoF)

Endogenous Latent Construct	(R^2)	(Q^2)
benefit	0.466	0.349
ease of use	0.362	0.257
operating efficiency	0.776	0.484

Finally, the direct and indirect effects were examined using the bootstrapping option in the Smart PLS program to evaluate the study hypotheses. All direct and indirect assumptions were assessed through the path coefficient (β), significance p-values, and the related t-value (Table 6). tasks affected operating efficiency (β = 0.429, t= 8.575, p < 0.000), ease of use (β = 0.595, t= 7.128, p < 0.000), and benefit (β = 0.665, t= 10.187, p < 0.000), thus, H1, H2, and H3 are supported. Similarly, ease of use affected operating efficiency (β = 0.265, t= 5.099, p < 0.000), confirming H4. Also, benefit affect operating efficiency (β = 0.302, t= 5.074, p < 0.000), supporting H5. As for indirect effect, ease of use and benefit successfully

mediates the linkage between process tasks and operating efficiency at (β = 0.157, t= 4.035, p < .000), and at (β = 0.201, t= 4.568, p < .000), respectively, supporting H6 and H7. Regarding the moderating effect, challenges as a moderating variable had no significant effect on either the relationship between tasks and ease of use or between tasks and benefit. Thus, H8 and H9 are rejected.

Table (6): The structural inner model's findings.

Hypothesis	Effect Type	Beta (β)	T-Value	p Values	Results
Direct effect					
H1	Technology Program functions -> operating efficiency	0.429	8.575	0.000	supported
H2	Technology Program functions -> ease of use	0.595	7.128	0.000	supported
H3	Technology Program functions -> benefit	0.665	10.187	0.000	supported
H4	ease of use <- operating efficiency	0.265	5.099	0.000	supported
H5	benefit <- operating efficiency	0.302	5.074	0.000	Supported
Indirect Effect					
H6	**Technology Program functions** -> ease of use **<-** operating efficiency	0.157	4.035	0.000	supported
H7	Technology Program functions -> benefit <- operating efficiency	0.201	4.568	0.000	supported
Moderating Effect					
H8	**tasks x** challenges → ease of use	-0.010	0.076	0.940	Reject
H9	tasks **x** challenges → benefit	-0.018	0.162	0.872	Reject

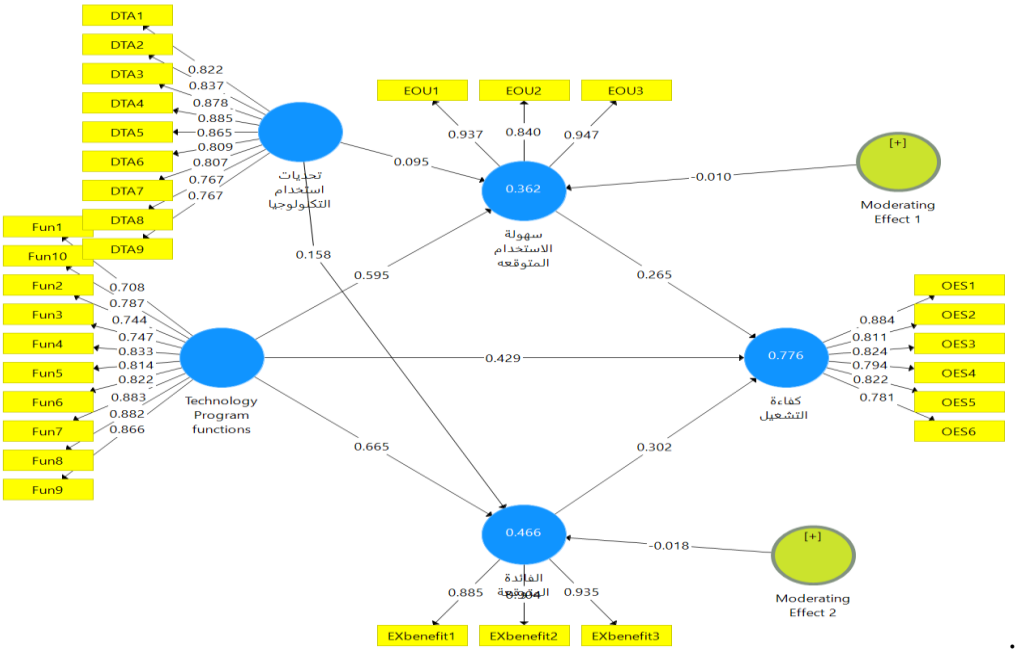

Figure 2 The inner and outer model results.

5. Discussion and implications

5.1 Discussion

The study demonstrates a significant relationship between the variety and effectiveness of jobs performed by technological applications and their involvement in achieving operational efficiency in hotels. Significant increases in service quality, speed, accuracy, time to complete activities, paper reduction, data privacy, and technical assistance were noticed. These findings support the first hypothesis by illustrating how technology improves operational performance, cost savings, and service response. The findings are consistent with prior studies (De Jorge & Suárez, 2014b; Malkawy, 2016), Emphasize the importance of technological applications, such as property management systems (PMS), in increasing service efficiency and quality in the hotel industry.

The study results show a positive relationship between the tasks of technological applications and their ease of use, supporting the second hypothesis on how ease of use impacts hotel operational efficiency. User-friendly designs and efficient task execution in technological applications significantly enhance operational efficiency. Clear, intuitive interfaces increase the likelihood of employees fully utilizing the technology, improving task speed and accuracy. These findings align with previous research (Sintala, 2019; Sredojević & Njeguš, 2024). Emphasizing the importance of user-friendly design to prevent complexity that could reduce performance efficiency.

The study results show a statistically significant positive relationship between the variety of tasks offered by technological applications and the benefits, supporting the third hypothesis. This suggests that an increase in the number of tasks and functions performed by applications enhances users' perceptions of the benefits they will gain, leading to higher satisfaction and greater interaction with the application These findings align with numerous previous studies highlighting that the variety of functions and tasks in technological applications significantly enhances the benefits users can derive from them (Sintala, 2019).

The study results demonstrate a statistically significant positive relationship between users' perceptions of ease of use and their actual efficiency in operating the application, supporting the fourth hypothesis on the impact of ease of use on operational efficiency. These findings suggest that greater ease of use leads to improved user performance, effectiveness, and efficiency, with simpler, more user-friendly applications enabling faster and more accurate task completion. This aligns with previous research, including (Ezzaouia & Gidumal, 2023), which highlighted the critical role of ease of use in enhancing operational efficiency, particularly in the hospitality sector.

The study results reveal a statistically significant positive relationship between users' perceptions of the benefits of technological applications and their actual efficiency in using them, supporting the fifth hypothesis. This suggests that the greater users' perception of the benefits, the more effectively they can complete tasks with speed and accuracy. These findings align with previous studies, such as those by (Betrand & Onyema, 2023; Ezzaouia & Bulchand-Gidumal, 2023), which confirmed that a positive perception of technology's benefits enhances user motivation and improves performance.

The study reveals a significant indirect relationship between the tasks of technological applications, specifically Property Management Systems (PMS), and operational efficiency in hotels, mediated by " ease of use." This means that user-friendly applications enhance operational efficiency by improving task execution. These findings support the sixth hypothesis, highlighting the critical role of ease of use in boosting efficiency, consistent with previous studies showing that easier applications reduce task time and increase accuracy (Ahmed *et al.*, 2023; Betrand & Onyema, 2023).

The results support the eighth hypothesis, indicating that technological challenges, such as difficulties in adapting to systems or employee resistance, can influence users' perceptions of ease of use. However, these challenges do not significantly affect the ability of applications to enhance operational efficiency. This aligns with previous studies(Ezzaouia & Bulchand-Gidumal, 2023; Rahman *et al*., 2022; Supartini *et al*., 2018), which have found that while such challenges may impact implementation, they do not necessarily diminish the benefits of technological systems in improving operational processes.

The study's results show an insignificant relationship between challenges as a moderating variable and the link between technological application tasks and benefits. While challenges like adaptation issues, resistance to change, and the need for ongoing training may influence initial perceptions of benefits, they do not significantly affect the role of applications in enhancing operational efficiency in hotels. This supports the eighth hypothesis, highlighting the need to overcome challenges through continuous support, training, and fostering a culture of technological acceptance. These findings are consistent with previous studies (Ezzaouia & Bulchand-Gidumal, 2023; Rahman *et al*., 2022; Supartini *et al*., 2018).

5.2 implications

Based on the study's findings, several recommendations are made to improve operational efficiency in hotels. First, the implementation of continuous training programs for hotel staff is crucial to familiarize them with the effective use of technological applications, reducing errors and enhancing task execution. Additionally, improving the design of applications by adding more functions or example, the "Smart Occupancy Tracking" function allows for tracking occupancy levels and identifying peak or low activity times, helping to dynamically allocate staff based on actual needs. Additionally, the "Instant Feedback & Reviews" function provides guests with the opportunity to share their feedback during their stay, enabling the hotel to respond quickly and address any issues before they impact the guest experience. Furthermore, the "Emergency Medical Support" function enables guests to request immediate medical assistance through the app, enhancing the hotel’s response to any emergency situations. These functions not only improve the guest experience but also contribute to reducing errors and increasing employee satisfaction by providing smart tools that streamline tasks and reduce workload and simplifying user interfaces will help streamline operations. The study also emphasizes the need for ongoing technical support to address challenges and reinforce positive perceptions of technology's benefits. Furthermore, fostering a culture of technology acceptance within hotels and providing incentives for proficient technology use will encourage employees to embrace these tools. Lastly, periodic evaluations of technological applications should be conducted to ensure their effectiveness and identify areas for improvement.

Limitations and future research

Although this study offers valuable insights, it has several limitations. First, the research sample is limited to hotels in Marsa Alam, which may not fully represent the diverse range of hotels globally, limiting the generalizability of the findings. Additionally, the study primarily focuses on the perspectives of hotel employees, and future research could include guest feedback to offer a more holistic view of technological impacts. Future studies could expand the scope by examining the long-term effects of technology on operational efficiency and employee satisfaction. Furthermore, exploring the influence of newer technologies, such as artificial intelligence and machine learning, on hotel operations could provide valuable insights into future trends in the hospitality industry.

References

Abdelwahab, H., Mohamed, H., Wahab, H. A., Rady, A., & Hussien, H. M. (2022). *The Impact of Information and Communication Technologies (ICTs) on Enhancing Performance The Impact of Information and Communication Technologies (ICTs) on Enhancing Performance in Hurghada Travel Agencies and Hotels* (Vol. 19).

Abukhalifeh, A. N., & Pratt, T. J. (2022). Hotel Property Management System. In *Encyclopedia of Tourism Management and Marketing* (pp. 604–607). Edward Elgar Publishing. https://doi.org/10.4337/9781800377486.hotel.property.management

Ahmed, Y., Moustafa, L., & Abdien, M. (2023). Information Technology in Hotels to Improve Employee Performance: The Moderating Role of Employee Empowerment. *Journal of Tourism, Hotels and Heritage*, *7*(2), 19–34. https://doi.org/10.21608/sis.2023.254691.1159

Betrand, C., & Onyema, C. J. (2023). *Automated Hotel Management Information System*. https://www.researchgate.net/publication/370801940

Botín-Sanabria, D. M., Mihaita, S., Peimbert-García, R. E., Ramírez-Moreno, M. A., Ramírez-Mendoza, R. A., & Lozoya-Santos, J. de J. (2022). Digital Twin Technology Challenges and Applications: A Comprehensive Review. In *Remote Sensing* (Vol. 14, Issue 6). MDPI. https://doi.org/10.3390/rs14061335

Caddeo, F., & Pinna, A. (2021). *Opportunities and challenges of Blockchain-Oriented systems in the tourism industry*. http://arxiv.org/abs/2107.06732

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly: Management Information Systems*, *13*(3), 319–339. https://doi.org/10.2307/249008

De Jorge, J., & Suárez, C. (2014a). Productivity, efficiency and its determinant factors in hotels. *Service Industries Journal*, *34*(4), 354–372. https://doi.org/10.1080/02642069.2013.778977

De Jorge, J., & Suárez, C. (2014b). Productivity, efficiency and its determinant factors in hotels. *Service Industries Journal*, *34*(4), 354–372. https://doi.org/10.1080/02642069.2013.778977

Dsouza, E., D'souza, E., D'souza, K., & Souza, D. '. (2023). A Study on the Impact of Innovative Technologies in the Hospitality Industry. In *Journal of Tourism, Hospitality & Culinary Arts (JTHCA) 2023* (Vol. 15, Issue 1). https://www.researchgate.net/publication/374117091

El Nemar, S., Vrontis, D., Massoud, M., & Dennaoui, H. (2022). The impact of e-service on hotels' booking: adjusted TAM framework for customers' intentions to book hotels online. *Global Business and Economics Review*, *26*(3), 285. https://doi.org/10.1504/gber.2022.10046361

Enrica Ryan Geminarqi, & Purnomo, H. (2023). Improving Operational Management Efficiency in the Food and Beverage Industry: A Systematic Literature Review. *Open Access Indonesia Journal of Social Sciences*, *6*(5), 1143–1149. https://doi.org/10.37275/oaijss.v6i5.184

Ezzaouia, I., & Bulchand-Gidumal, J. (2023). The impact of information technology adoption on hotel performance: Evidence from a developing country. *Journal of Quality Assurance in Hospitality and Tourism*, *24*(5), 688–710. https://doi.org/10.1080/1528008X.2022.2077886

Gonzalez, R., Gasco, J., & Llopis, J. (2019). ICTs in hotel management: a research review. *International Journal of Contemporary Hospitality Management*, *31*(9), 3583–3609. https://doi.org/10.1108/IJCHM-07-2017-0470

Gretzel, U., Sigala, M., Xiang, Z., & Koo, C. (2015). Smart tourism: foundations and developments. *Electronic Markets*, *25*(3), 179–188. https://doi.org/10.1007/s12525-015-0196-8

Gretzel, U., & Stankov, U. (2021). ICTs and well-being: challenges and opportunities for tourism. In *Information Technology and Tourism* (Vol. 23, Issue 1). Springer Science and Business Media Deutschland GmbH. https://doi.org/10.1007/s40558-021-00198-2

Han, S. H., Lee, J., Edvardsson, B., & Verma, R. (2021). Mobile technology adoption among hotels: Managerial issues and opportunities. *Tourism Management Perspectives*, *38*, 100811. https://doi.org/10.1016/J.TMP.2021.100811

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. In R. R. Sinkovics & P. N. Ghauri (Eds.), *Advances in International Marketing* (Vol. 20, pp. 277–319). Emerald Group Publishing Limited. https://doi.org/10.1108/S1474-7979(2009)0000020014

Howard, M. C., & Rose, J. C. (2019). Refining and extending task–technology fit theory: Creation of two task–technology fit scales and empirical clarification of the construct. *Information & Management*, *56*(6), 103134. https://doi.org/10.1016/J.IM.2018.12.002

AH&LA. (2022). *Introduction to Hotel Systems Introduction to Hotel Systems Fundamentals & Glossary Introduction to Hotel Systems*.

Ivanov, S., & Berezina, K. (2016). *Adoption of robots and service automation by tourism and hospitality companies*. https://ssrn.com/abstract=2964308Electroniccopyavailableat:https://ssrn.com/abstract=2964308Electroniccopyavailableat:https://ssrn.com/abstract=2964308

Kuo, C. M., Chen, L. C., & Tseng, C. Y. (2017). Investigating an innovative service with hospitality robots. *International Journal of Contemporary Hospitality Management*, *29*(5), 1305–1321. https://doi.org/10.1108/IJCHM-08-2015-0414

Laudati, L. L. (2017). Note: Economies of Scale: Weighing Operating Efficiency when Enforcing Antitrust Law. In *Fordham Law Review* (Vol. 49). https://ir.lawnet.fordham.edu/flr/vol49/iss5/13

Leguina, A. (2015). A primer on partial least squares structural equation modeling (PLS-SEM). *International Journal of Research & Method in Education*, *38*(2), 220–221. https://doi.org/10.1080/1743727X.2015.1005806

Magsamen-Conrad, K., Billotte Verhoff, C. C., & Dillon, J. M. (2022). Technology Acceptance Models. In *The International Encyclopedia of Health Communication* (pp. 1–8). Wiley. https://doi.org/10.1002/9781119678816.iehc0776

Mao, C. M., & Hovick, S. R. (2022). Adding Affordances and Communication Efficacy to the Technology Acceptance Model to Study the Messaging Features of Online Patient Portals among Young Adults. *Health Communication*, *37*(3), 307–315. https://doi.org/10.1080/10410236.2020.1838106

Mezhuyev, V., Al-Emran, M., Ismail, M. A., Benedicenti, L., & Chandran, D. A. P. (2019). The Acceptance of Search-Based Software Engineering Techniques: An Empirical Evaluation Using the Technology Acceptance Model. *IEEE Access*, *7*, 101073–101085. https://doi.org/10.1109/ACCESS.2019.2917913

Nguyen, H. T. H., & Nguyen, M. V. T. (2022). EVALUATING THE OPERATING EFFICIENCY OF JOINT-STOCK COMMERCIAL BANKS IN VIET NAM THROUGH THE RESTRUCTURING PERIOD. *Journal of Eastern European and Central Asian Research*, *9*(3), 399–408. https://doi.org/10.15549/jeecar.v9i3.815

Rahman, M. K., Hassan, A., & Jalil, A. (2022). Tourism in Bangladesh: The Application of Technologies. In *Technology Application in Tourism in Asia: Innovations, Theories and Practices* (pp. 383–394). Springer International Publishing. https://doi.org/10.1007/978-981-16-5461-9_23

Scalise, K., & Gifford, B. (2006). Computer-Based Assessment in E-Learning: A Framework for Constructing "Intermediate Constraint" Questions and Tasks for Technology Platforms. In *The Journal of Technology, Learning, and Assessment* (Vol. 4, Issue 6). www.jtla.org

Sintala. (2019). *INFORMATION AND COMMUNICATION TECHNOLOGY IN THE HOTEL*.

Sredojević, K., & Njeguš, A. (2024). *Application of Agile Management in the Hotel Business in Serbia*. 37–46. https://doi.org/10.15308/sitcon-2023-37-46

Supartini, K., Budiasih, I., & Suardikha, I. M. S. (2018). AN EMPIRICAL STUDY ON ACCEPTANCE OF TECHNOLOGY BASED INFORMATION SYSTEMS BY PROPERTY MANAGEMENT EMPLOYEES. *Russian Journal of Agricultural and Socio-Economic Sciences*, *78*(6), 138–150. https://doi.org/10.18551/rjoas.2018-06.15

ملكاوي، ن. م. (٢٠١٦). تطبيق تكنولوجيا المعلومات في قطاع الخدمات السياحية : أثر استخدام نظام الحجز الإلكتروني في تحسين خدمة الزبائن في فنادق الخمس نجوم في الأردن = The Role of Electronic Booking Systems in Improving the Level of Services Study at Jordanian Five - Star Hotels. *مجلة جامعة الأقصى سلسلة العلوم الإنسانية*, *20*(1), 175–205. https://doi.org/10.12816/0026651

أثـر تبنـي التطبـيقـات التكـنـولـوجـيـة عـلـى كفـاءة أداء منـظمـات الضيـافـة: اختبـار الأدوار الـوسيـطـة والمعدلـة

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الملخص:

يهدف هذه الدراسة إلى دراسة تأثير التطبيقات التكنولوجية على كفاءة الأداء في الفنادق بمدينة مرسى علم، مع فحص الأدوار الوسيطة والمعدلة. يعتمد البحث على تحليل العلاقة بين مهام التطبيقات التكنولوجية وكفاءة العمليات التشغيلية، مع التركيز على تأثير هذه التطبيقات في تحسين جودة الأداء، تسريع تنفيذ المهام، وتقليل الأخطاء. تم جمع البيانات من موظفي الفنادق في مرسى علم باستخدام استبيانات. ومع ذلك، تم استبعاد ٢٠ من أصل ٢٧١ استبيانًا تم جمعها بسبب عدم كفاية الإجابات، مما أسفر عن ٢٥١ استبيانًا صالحًا. تم تحليل البيانات باستخدام SPSS v22 و SmartPLS v3. أظهرت النتائج وجود علاقة إيجابية ذات دلالة إحصائية بين استخدام التطبيقات التكنولوجية وزيادة الكفاءة التشغيلية، حيث كان للتطبيقات سهلة الاستخدام تأثير ملحوظ على الأداء الوظيفي. كما وجدت الدراسة أن التحديات التقنية والمقاومة للتغيير قد تؤثر على توقعات المستخدمين من حيث الفوائد المتوقعة، لكنها لا تؤثر بشكل كبير على تحسين الكفاءة التشغيلية. توصي الدراسة بتحسين تصميم التطبيقات التكنولوجية وزيادة التدريب المستمر للعاملين لضمان الاستفادة القصوى منها، كما تشدد على ضرورة تعزيز ثقافة قبول التكنولوجيا بين الموظفين لتحسين الأداء العام في الفنادق.

الكلمات المفتاحية : التكنولوجيا، تطبيقات التكنولوجيا ، كفاءة العمليات، أهمية التطبيقات التكنولوجي