

The Role of Task-Technology Fit on the Design and Use of a Hotel Management System

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Abstract

Hotels have many problems regarding how to improve their service performance by using technologies, especially when the hotels have a bit of understanding the importance of their employees' tasks and the technology fitness. This study designed a hotel management system based on the tasks that the employees use to provide services. The purpose of this research is to investigate the influence of task-technology fit on the intention to use the designed hotel management system. In addition, statistical testing methods are also carried out on the system by measuring the impact of task-technology fit on the suitability between user task needs and technology, on user perceptions of technology and how these perceptions affect user intentions and behavior in accepting and using technology. The results of this study indicate that task-technology fit has a significant impact in facilitating its use. The results of this study contribute to the academic implementation of task-technology fit theory in the hotel reservation management system.

Keywords: Confirmatory Factor Analysis, hotel, Hotel Management Information System, Task-Technology Fit.

1. Introduction

A hotel is a form of accommodation that provides lodging, food and beverage, and other services to the general public that are operated commercially (Yudhanto et al., 2017). According to data from Statistics Indonesia (*Badan Pusat Statistik*), the number of hotels in Indonesia in 2022 will reach 3,763 hotels (Badan Pusat Statistik, 2022). Nevertheless, most local hotels still face some significant obstacles when it comes to recording and reporting room and service reservations. Many hotels do not yet have adequate information technology capabilities and financial resources. Manual hotel management, without an integrated information system, can have a negative impact on the quality of service provided to visitors. One of the problems that often occurs is the existence of errors and overlaps in financial records and room reservations (Nurzaman et al., 2022).

This situation shows that there is an increasing need for hotel guests and information technology in the hotel business. With the information system, hotels can get assistance in managing daily operational activities, such as storing guest data, room data, reservations, guest check-in/check-out process, and financial reporting (Asshokin et al., 2015; Yudhanto et al., 2017). However, existing information systems are still unable to explain the relationship between information technology and the needs of tasks that must be performed by hotel employees who use it.

The Task-Technology Fit (TTF) model is a conceptual framework that explains how technology functions can support individuals in completing their tasks (Permana & Setianto, 2017). In the context of hotels, TTF can be used to evaluate the extent to which information systems can make it easier for hotel guests to use the system. The TTF concept emphasizes the relationship between tasks to be performed, individual capabilities, and existing technological functions, so that the designed information system can provide optimal support for hotel guests in completing their tasks (Permana & Setianto, 2017).

The TTF model has been applied in various studies in various sectors. For example, research on the analysis of the suitability of virtual learning technology to individual tasks (Sulistyaningsih & Nugraha, 2022), analysis of the suitability of retail employees in using m-commerce applications (Justino et al., 2022a, 2022b), and evaluation of hospital information systems against hospital needs (T et al., 2022).

The purpose of this study is to investigate the relationship between TTF and the intention of using Hotel Management Information System (HMIS) which is built in accordance with the results of the analysis of the needs of HMIS users. This study develops a hotel management information system that is adjusted to the characteristics of the tasks in hotel management, so that it can be tested to respondents to determine the relationship between TTF and the desire to use the system in the future.

2. Literature Review

2.1. Hotel management information system

Hotel Management Information System (HMIS) is a system in the hotel that is responsible for managing information about hotel rooms, guests, and visitors, as well as providing reports needed for decision making by hotel employees with the help of computers (Kusumawardani & Wardati, 2014). In the context of hotel management, HMIS can be interpreted as an interconnected integration between users, data, computer networks, and technology, which unite into an integrated unit to meet the needs of daily transaction management. The aim is to support and improve the quality of day-to-day hotel operations (Wirapraja et al., 2022).

There have been several previous studies that conducted research related to HMIS. Pamungkas et al. (2020) proposed an integrated HMIS in order to assist employees in carrying out services and processing guest data effectively so as to save time and energy in hotel operations. Permatasari et al. (2022) proposed a system that is able to integrate information media, system data management, and employee data with the aim of simplifying hotel management tasks and optimizing data processing, thus enabling time and energy savings. Lianawati and Hermanto (2022) proposed a web-based hotel management system that can be used to make online room reservations by customers, as well as being able to manage hotel operational data.

2.2. Task technology fit

Task Technology-Fit (TTF), in theory, is to determine the ability of information technology in its role to help an individual in doing and completing his work (Wirapraja et al., 2022). TTF is an adjustment between task needs, individual capabilities and technological functions (Pamungkas et al., 2020). TTF can measure how far a technology is capable of supporting hotel guests in completing their tasks (Permatasari et al., 2022).

The basic model of TTF, as illustrated in Fig. 1, provides a view to understand hotel guests and the value of the technology they create. Individuals use this technology to perform a specific task, or set of tasks. The premise of this model is that technological value/performance is created by the alignment or suitability, task requirements, and technological characteristics that enable hotel guests to perform those tasks (Putra & Juliarsa, 2016).

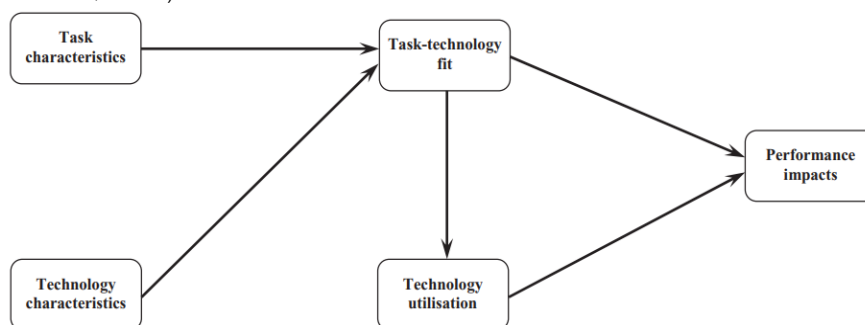


Fig. 1. The Task Technology Fit Basic Model (Kim et al., 2010).

Fig. 1 shows the TTF model, which has various variables that have mutually significant relationships. Task Characteristics are defined as the magnitude of dependence of an individual's actions or tasks on a technology or information system (Kim et al., 2010). Technology Characteristics is a computer technology or system and similar supporting services or technologies that provide assistance to individuals in completing their tasks (Kim et al., 2010). Technology Utilisation is defined as the benefits expected by an individual to a system or technology in the completion of a task by that individual (Kim et al., 2010). Performance Impact is a description of the high quality of technology suitability with an individual's task,

meaning that the higher the level of technology suitability with individual tasks, the higher the quality of the system (Kim et al., 2010).

TTF was used by Sulistyarningsih and Nugraha (2022) in conducting an analysis of the suitability of virtual learning technology with individual tasks. The results of Sulistyarningsih and Nugraha's (2022) research show that TTF can make it easier to analyze the compatibility between virtual learning technology and individual tasks. In addition, TTF has also been used by Justino et al. (2022b) in conducting suitability analysis of retail employees in using m-commerce applications. T et al. (2022) also used TTF in evaluating hospital information systems so that they have an impact on technological support for achieving the completion of tasks in hospital business processes. This research uses TTF in order to create a hotel management system that can cover all individual needs and maintain the sustainability of the hotel management system.

This study tested a research model that included TTF as one of the main variables to determine its relationship with intention to use or future use of the system in Korea. The research conducted by Kim et al. (2010) is an integration between the conceptual model of TTF and the Technology Acceptance Model (TAM). This combined approach allows the identification of solutions and adjustments needed to increase the level of acceptance and effectiveness of the technology in achieving user task objectives (Kim et al., 2010). In addition, the merging of the two models is based on the relationship that the perception of expediency (usefulness) in TAM is also related to the extent to which technology can help meet the needs of user tasks, which is aligned with the TTF concept. Fig. 2 shows the research model of Kim et al. (2010) applied to this study. This study uses this model because the use case in Korea may be different from that in Indonesia, especially in local hotels.

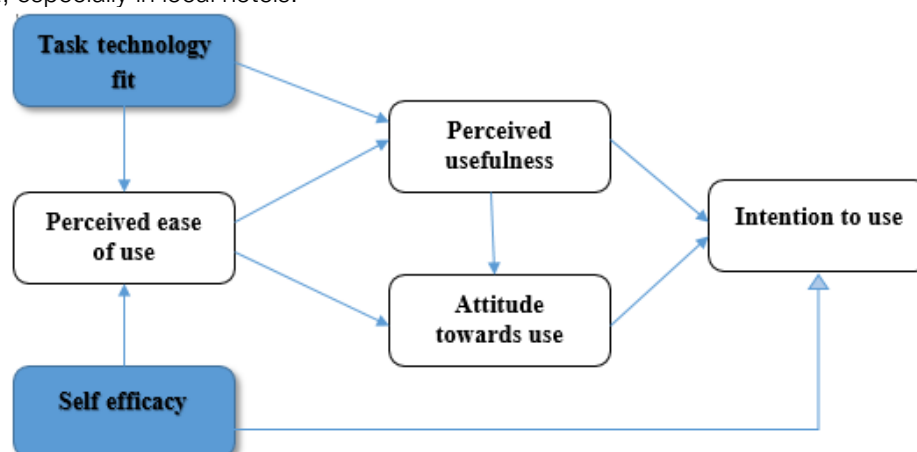


Fig. 2. Research models and hypotheses by Kim et al. (2010) used in this study.

In the hypothetical model, TTF and Self-efficacy (SE) variable affects the perception of ease of use of technology on the Perceived ease of use (PEU) variable. The TTF and PEU variables affect the impact of technology use on the Perceived usefulness (PU) variable. The PU and PEU variables affect the attitude of technology use by users on the Attitude towards use (AT) variable. SE, PU, and AT variables affect the user's intention to use the technology on the variable Intention to use (IU).

3. Methods

This study aims to investigate the impact of research models and hypotheses on the future use of HMIS by users by considering the development of HMIS in accordance with user needs. Data collection is carried out by observation method as a reference to design and analyze hotel management information system needs. The results of data collection are used to determine the functional and nonfunctional needs of the hotel management information system to be built.

This research uses Waterfall Systems Development Life Cycle (SDLC). The Waterfall model, in the context of software development, refers to a development approach that follows a linear and sequential sequence from the initial stage to the final stage. This model is based on the concept of water flow flowing from one stage to the next without any possibility of returning to the previous stage (Sommerville, 2011). The Waterfall model is often illustrated in a software life cycle model consisting of a series of stages namely analysis and planning, design, implementation, testing, and deployment and maintenance.

The stages of system requirements analysis use StarUML tools in the creation of various structured model designs and behaviors. The design phase is assisted by Figma to plan the design of the system

prototype. System development uses Laravel Framework to create a web-based HMIS and testing is done by quantitative analysis on the structural equation model described in Fig. 2.

Table 1
Test questions.

| Category | Questions for Hotel Employees | Questions for Hotel Customers |
|-----------------------|--|--|
| Task Technology Fit | This system suits the needs of my job at the hotel. The system is available when needed. This system is very important for my work in hotels. This system can help me deal with unexpected situations while doing my work in hotels. | This system suits my needs when I book a hotel room. The system is available when needed. This system is very important for me to book a hotel room. This system can help me deal with unexpected situations when booking a hotel room. |
| Self-efficacy | I feel comfortable using this system. I can use this system quite well. I can use this system even if no one is around to help me. | I feel comfortable using this system. I can use this system quite well. I can use this system even if no one is around to help me. |
| Perceived ease of use | Learning to operate this system is easy for me in doing my job in hotels. It is easy to master the use of this system. Overall, I believe that the system is easy to use to do my chores in the hotel. It does not require much effort in using this system. | Learning to operate this system was easy for me to book a hotel room. It is easy to master the use of this system. Overall, I believe that the system is easy to use to book hotel rooms. It does not require much effort in using this system. |
| Perceived usefulness | Using this system in my work allows me to increase productivity. Using this system in my work allows me to increase my effectiveness. Using this system in my work makes it easier for me to do my job. Overall, I believe that this system is very useful for my work in hotels. | Using this system to book rooms allows me to increase productivity. Using this system to book rooms allows me to increase my effectiveness. Using this system makes it easier for me to book a room. Overall, I believe that this system is very useful for me. |
| Attitude towards use | Using this system is a good idea. Using this system is highly recommended. Overall, using this system is fun. I am satisfied using this system. | Using this system is a good idea. Using this system is highly recommended. Overall, using this system is fun. I am satisfied using this system. |
| Intention to use | I plan to use this system more often in my work. I want to use this system in my work. It is likely that I will use this system to carry out my work in the future. | I plan to use this system more often when booking hotel rooms. I want to use this system to book a hotel room. It is likely that I will use this system to book rooms in the future. |

In testing the hypothesis on the structural equation model, the study developed a questionnaire based on the research model of Kim et al. (2010) to determine the significance relationship between variables. The questionnaire consists of 22 question items shown in Table 1. The constructed questionnaire was given to 23 respondents. The calculation of the data obtained is carried out using the Confirmatory Factor Analysis (CFA) method using the SmartPLS tool.

3.1. System requirements

In the Waterfall SDLC model, the first stage carried out is to conduct a system requirements analysis. This research has conducted requirement analysis to find the functional and nonfunctional requirement of HMIS that correspond to the activities of system users. Functional requirements are the requirements of the facilities or needed features and what activities can be carried out by the system (Nugroho, 2016). Nonfunctional requirements are functions or services offered by the system (Nurhayati & Ristanto, 2017). The HMIS built in this study has several actors with different interaction patterns, namely customers, receptionists, and hotel managers. Based on the results of the requirement analysis, this study categorizes requirements into four categories as follows:

1. The requirements for customers in making online reservations,
2. The requirements for receptionists in managing reservations, rooms, and hotel finances,
3. The requirements for managers to send and manage all hotel data and various types of reporting, and

4. The nonfunctional requirements of the hotel information system are carried out by finding out requirements namely reliability, availability, security, maintenance, performance, and portability. These functional and nonfunctional requirements become the basis for researchers to design systems using various models.

3.2. System design and development

The design and development of HMIS in this study are based on research models and hypotheses as shown in Fig. 2. The design process of this system was carried out after making observations in the form of interviews with hotel managers and employees. This step is carried out to understand the requirements for a system that can help hotel employees with tasks and to create a perception of usefulness and intention to use the HMIS. The design and development of HMIS in this study include flow diagrams, use case diagrams, and interface displays.

Fig. 3 shows the flowchart of the online reservation process performed by hotel guests. Such flowcharts are used to support functional and nonfunctional requirements that have been discovered. This study describes the functional needs of the system into three use case diagrams shown in Fig. 4 according to the use cases of each actor.

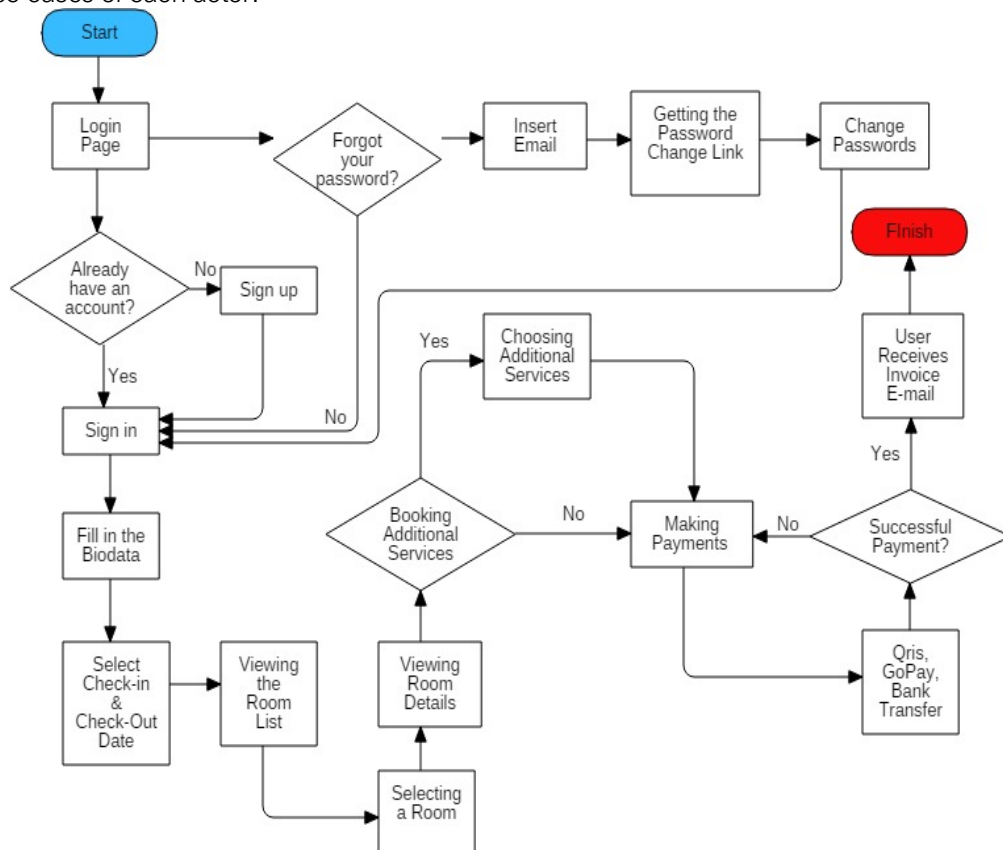


Fig. 3. Customer online reservation flowchart.

Fig. 4 is an illustration of a use case diagram having a total number of 37 use cases, which includes 11 main use cases. The main use case is derived into an activity diagram showing the various activities performed by related actors. The study developed 11 activity diagrams. The entire activity diagram created is then derived into a sequence diagram to determine the flow relationship between various components in the system ranging from actors, interfaces, classes, objects, and tables in the HMIS database. On the other hand, this research also develops system prototypes that become a reference for system interface development.

Fig. 5 shows the dashboard interface of the system when users (managers, receptionists, and customers) open the HMIS website. On this page, customers can enter check-in and check-out dates to search for available rooms. In the next step, the available rooms and ready to be reserved will be displayed. Fig. 6 shows the interface of the room reservation process selected by the customer. Customers fill in their personal data on the reservation form provided and customers can see a summary of the reservation. In addition, customers can also choose available additional facilities.

During the payment process, the details of the reservation made by the customer will be displayed, as shown in Fig. 7. After confirming the reservation details, customers can proceed by making payments through the payment gateway. To do so, customers need to click on the "Pay" button located on the reservation details page, as shown in Fig. 8. The front desk can manage the entire guest reservation process, including check-in and check-out, as well as access the guest list history as shown in Fig. 9.

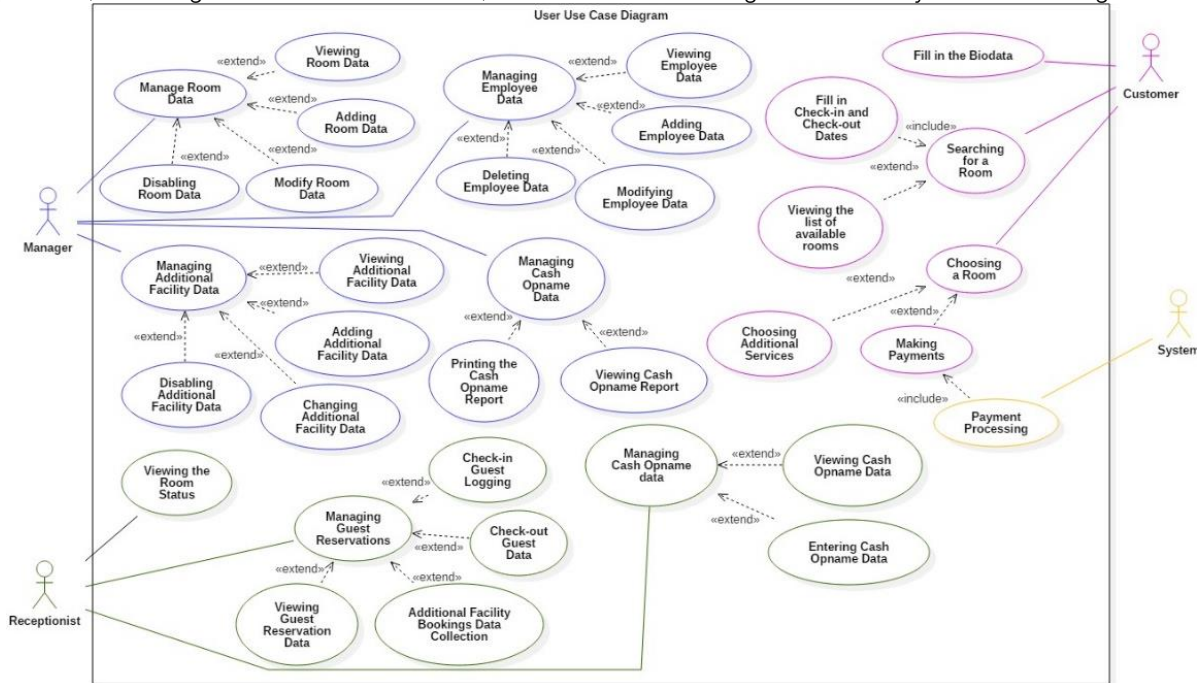


Fig. 4. User use case diagram.

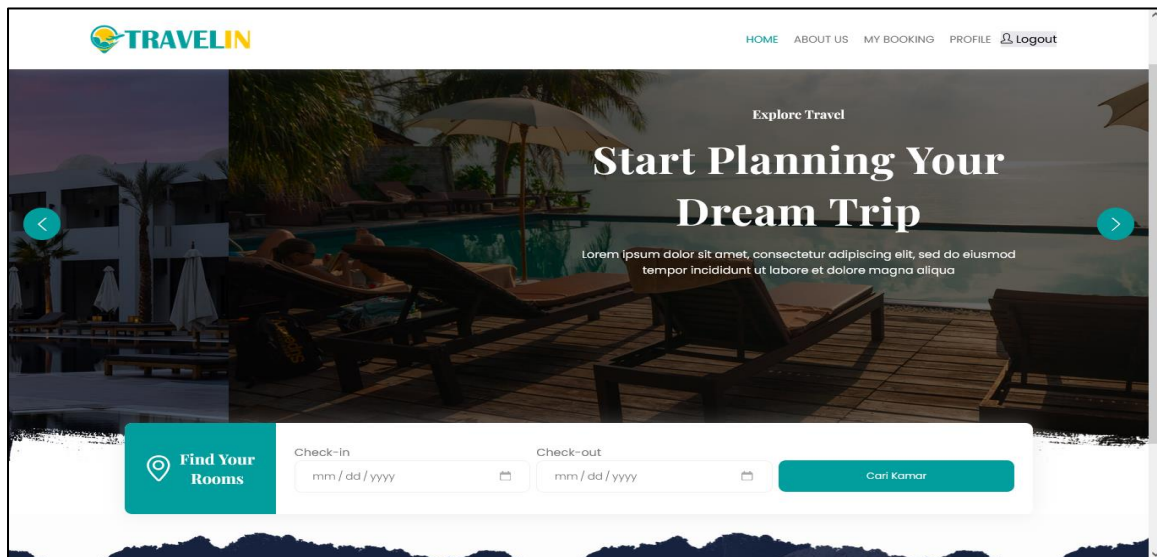


Fig. 5. Interface for customer's dashboard.

In the cash-taking process, receptionists are required to fill out several forms which include the start date, end date, and choose the payment method that will be used in the cash-taking process. Once the form is filled out, the system will automatically display the amount of revenue collected. Next, the receptionist will fill out an opening balanced form to display the total overall income. The process can be seen in Fig. 10.

4. Results and Discussion

4.1. Statistical testing

This study evaluates the use of HMIS that has been built by using the statistical test of Confirmatory Factor Analysis (CFA) on the research model illustrated in Fig. 2. This is done to ensure that the system can

support users in making hotel reservations and managing hotel operations. To analyze the research model, questionnaires using the Likert scale are designed to collect data samples on the use of the system (Lu & Dzikria, 2020). Based on the questionnaire shown in Table 1, the number of respondents involved in this study is 23 people. The respondents are divided into two groups, namely 11 people were hotel employees and 12 people are customers or hotel guests. In terms of data acquisition, it is carried out by conducting demonstrations of HMIS to respondents.

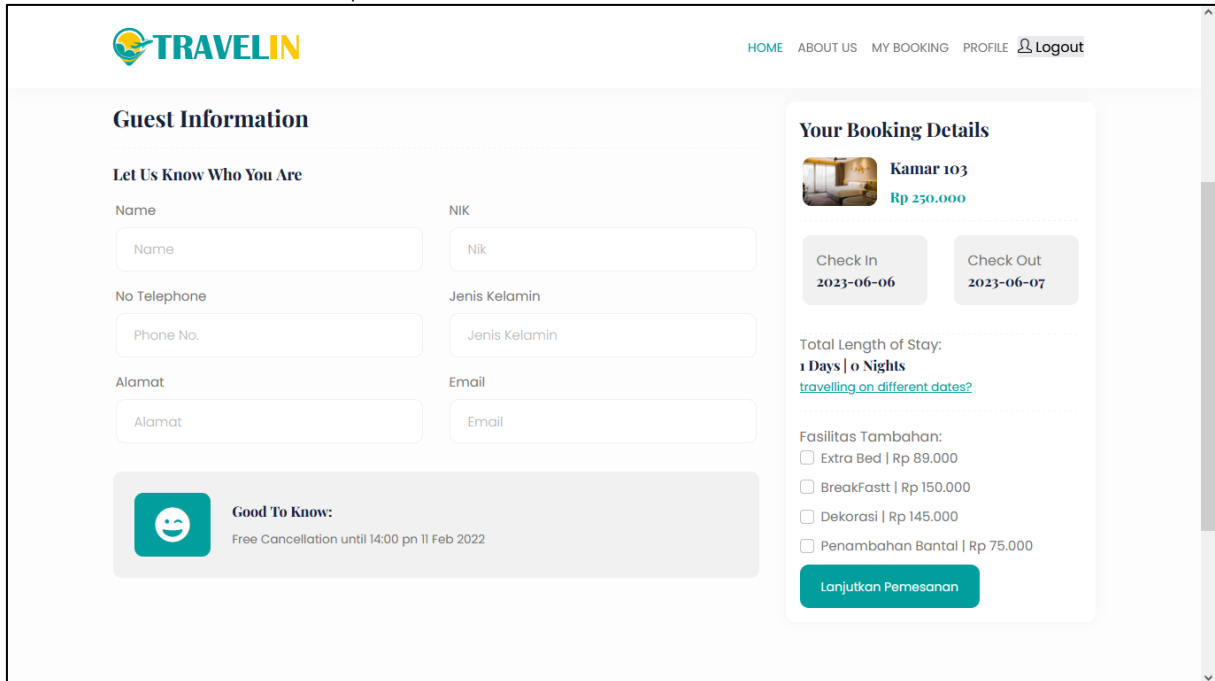


Fig. 6. Interface for customer's reservation.

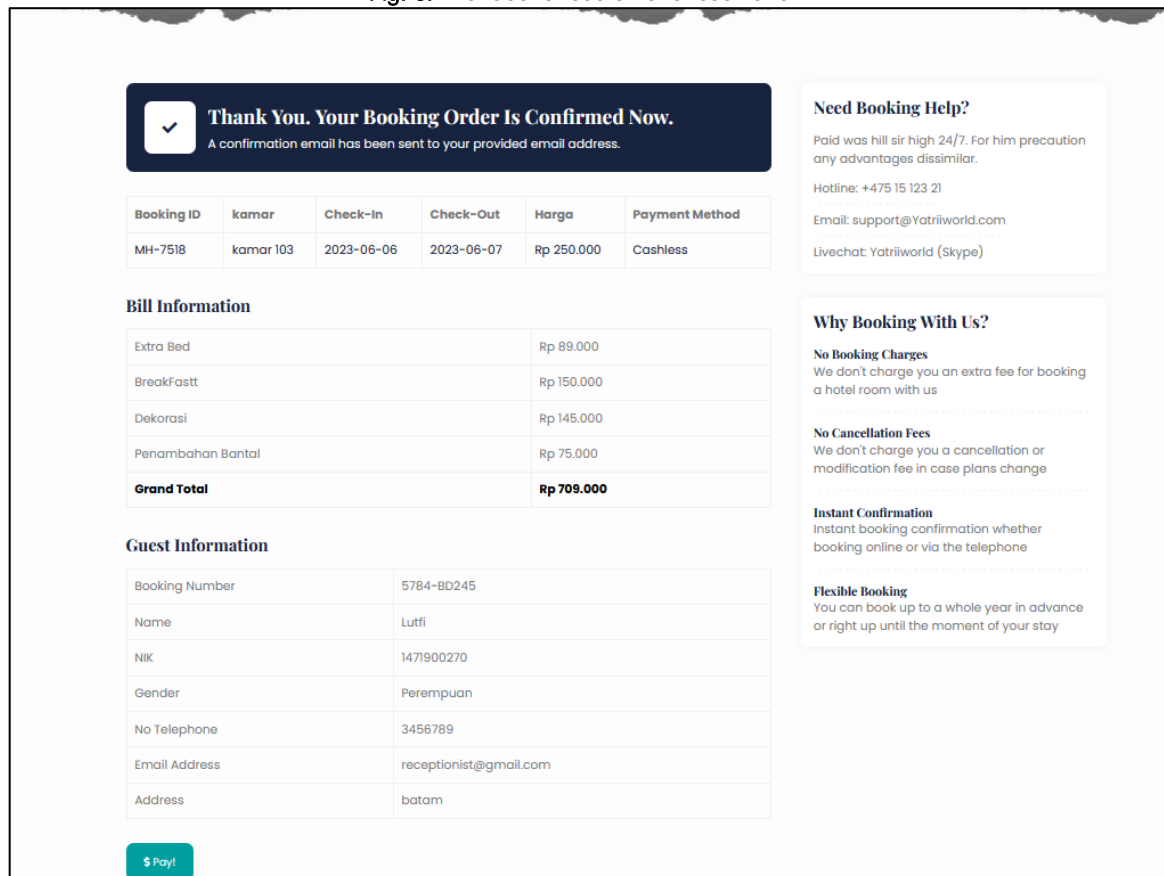


Fig. 7. Interface for reservation details.

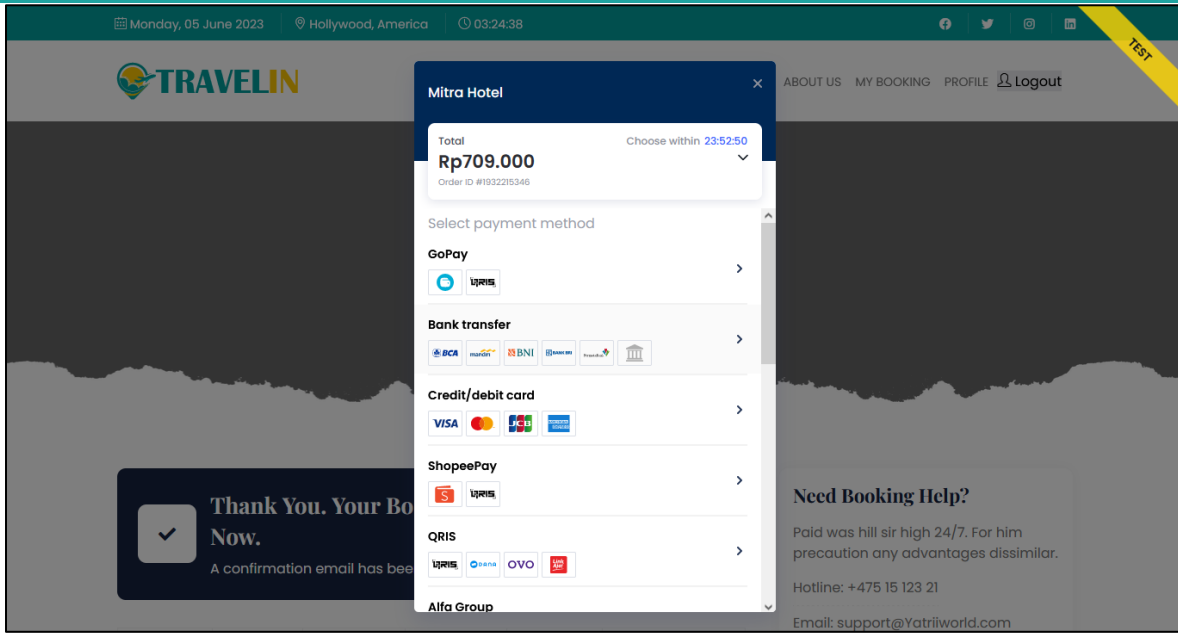


Fig. 8. Interface for payment.

Table 2
Reliability and validity statistics.

| Variables | Items | Factor Loadings | Cronbach's Alpha | Composite Reliability | AVE |
|------------------|-------|-----------------|------------------|-----------------------|-------------|
| TTF | P1 | 0.865 | 0.749 | 0.857 | 0.667 |
| | P2 | 0.814 | | | |
| | P4 | 0.814 | | | |
| SE | P5 | 0.894 | 0.863 | 0.918 | 0.789 |
| | P6 | 0.968 | | | |
| | P7 | 0.795 | | | |
| PEU | P8 | 0.871 | 0.843 | 0.893 | 0.679 |
| | P9 | 0.915 | | | |
| | P10 | 0.767 | | | |
| PU | P11 | 0.728 | 0.931 | 0.951 | 0.830 |
| | P12 | 0.911 | | | |
| | P13 | 0.943 | | | |
| AT | P14 | 0.868 | 0.939 | 0.956 | 0.845 |
| | P15 | 0.919 | | | |
| | P16 | 0.916 | | | |
| IU | P17 | 0.943 | 0.777 | 0.895 | 0.810 |
| | P18 | 0.921 | | | |
| | P19 | 0.896 | | | |
| | P21 | 0.944 | | | |
| | P22 | 0.854 | | | |
| Result | | 0.728~0.968 | 0.749~0.939 | 0.857~0.956 | 0.667~0.845 |
| Criterion | | >0.5 | >0.65 or >0.8 | >0.7 | >0.5 |
| | | Reliable | Reliable | Reliable | Reliable |

The collected data is analyzed using statistical calculation methods using a third-party application, SmartPLS. Statistical calculations of reliability and validity show that all variables have factor loadings, Cronbach's alpha, rho_A, composite reliability and average variance extracted (AVE) values with different criteria. The validity and reliability of the data depend on the results of statistical calculations and criteria as shown in Table 2. The CFA criteria used in this study used the criteria that Fornell and Larcker (1981) used to test the validity and reliability of the data.

Factor loading establishes the relationship between items in the model and factors that conform to validity criteria with values above 0.5. Cronbach's alpha measures the level of reliability. The convergent validity criterion reveals that Chronbach's alpha value is recommended to pass the threshold of 0.5 (Fornell & Larcker, 1981). Composite reliability is used to calculate scale consistency on existing variables, with a

validity recommendation value above 0.7. AVE is usually used to calculate the validity of convergence on various variables, with a minimum threshold of 0.65 for the data on the variable to be said as valid.

As shown in Table 2, all items except P3 are valid and reliable. P3 is removed from advanced statistical calculations because its factor loading has a value below the 0.5 threshold. This study also calculates statistical Discriminant Validity and Correlation Matrix, with the results shown in Table 3. According to Fornell dan Larcker (1981), the square root of the AVE must be greater than the corresponding correlation coefficient. As a result, all variables have a higher AVE square root than other related correlation coefficients. Based on these findings, it can be concluded that all variables contained in Table 3 have valid data.

Table 3
Correlation matrix and discriminant validity.

| Variables | AVE | AT | IU | PEU | PU | SE | TTF |
|-----------|-------|--------------|--------------|--------------|--------------|--------------|--------------|
| AT | 0.845 | 0.919 | | | | | |
| IU | 0.810 | 0.685 | 0.900 | | | | |
| PEU | 0.679 | 0.745 | 0.498 | 0.824 | | | |
| PU | 0.830 | 0.831 | 0.827 | 0.821 | 0.911 | | |
| SE | 0.789 | 0.882 | 0.797 | 0.803 | 0.871 | 0.888 | |
| TTF | 0.667 | 0.729 | 0.569 | 0.726 | 0.704 | 0.657 | 0.817 |

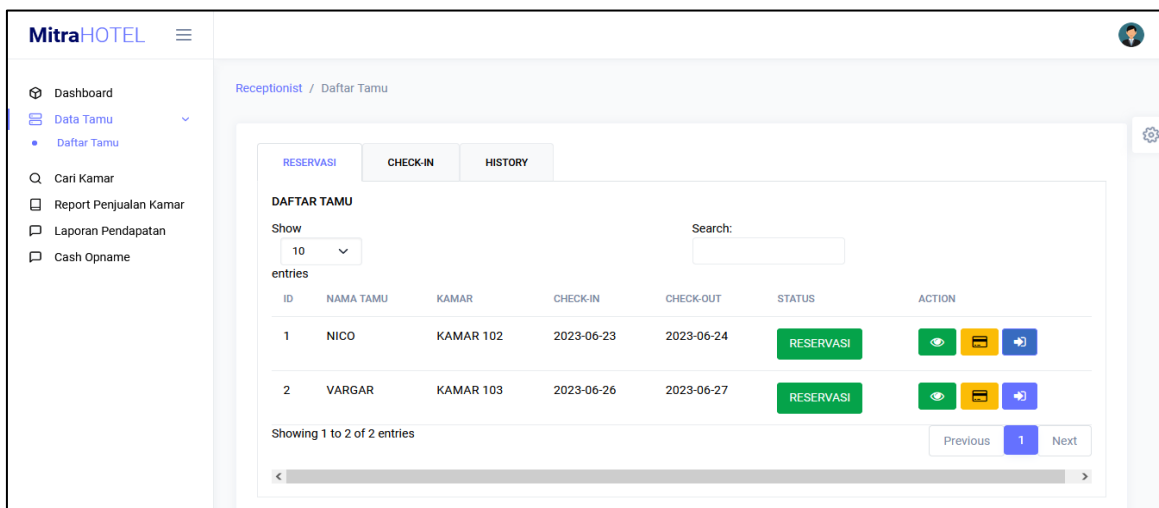


Fig. 9. Interface for managing guest's reservations.

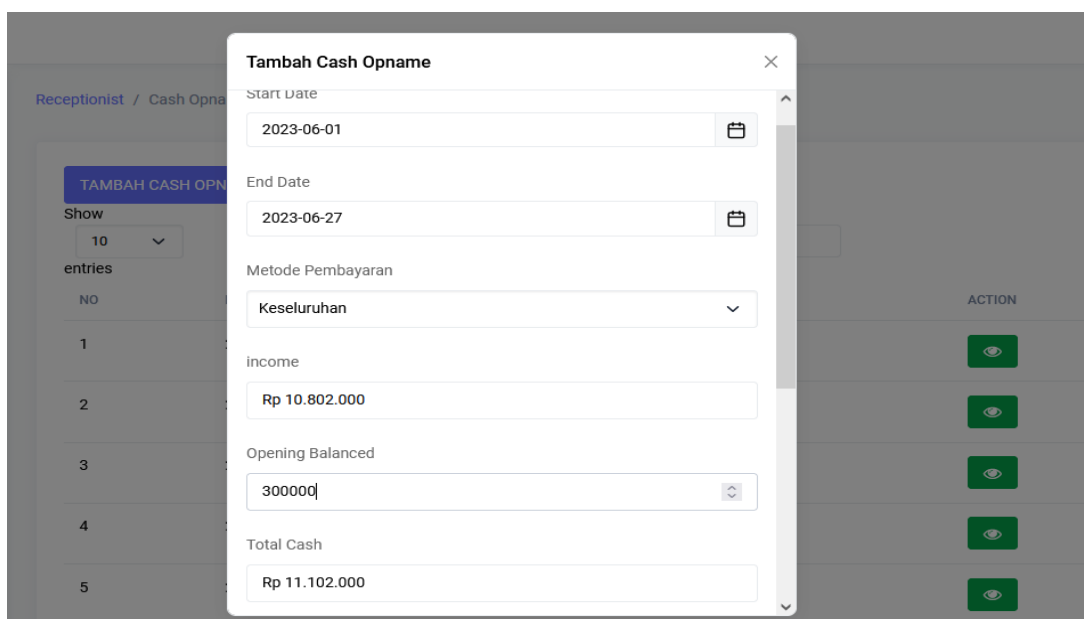


Fig. 10. Interface for cash-taking.

The calculation of the structural equation model is carried out using SmartPLS to determine the relationship between variables. The result of the calculation of the path coefficient is shown in Fig. 11. There is a significant degree of relationship between variables, that is, significant 1(*) if p-value < 0.05, significant 2(**) if p-value < 0.01, and significant 3(***) if the p-value < 0.001. The degree of significant relationship between variables is obtained by calculating the inverse of the entire data.

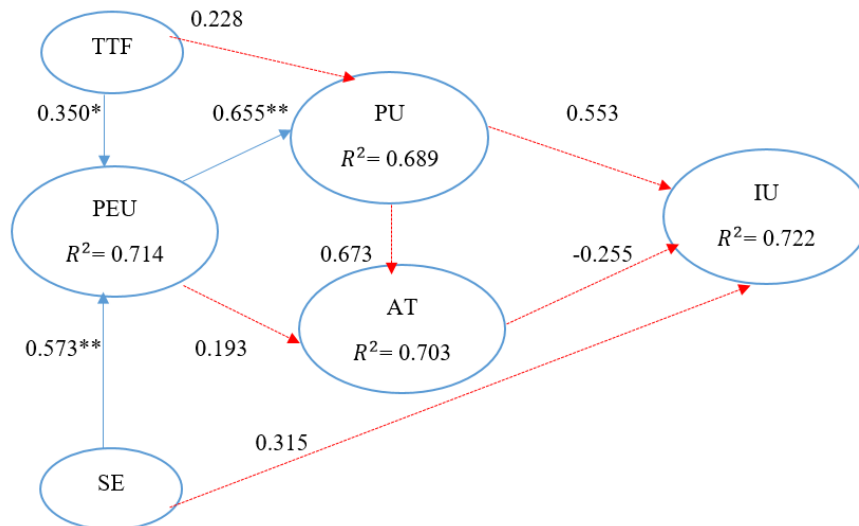


Fig. 11. Path coefficient.

The result of the path coefficient calculation shows that out of 9 hypotheses, there are 3 proven hypotheses. TTF ($\beta = 0.35$, $p < 0.5$) has a significant effect on PEU ($R^2 = 0.714$). SE ($\beta = 0.573$, $p < 0.1$) has a significant influence on PEU ($R^2 = 0.714$). Furthermore, PEU ($R^2 = 0.714$, $\beta = 0.573$, $p < 0.1$) has a significant influence on PU ($R^2 = 0.689$). These results can be concluded that with valid calculation results, TTF and SE can have a significant influence on the ease of use of hotel management systems by users and the ease of use can affect the impact of using the hotel information system that has been built.

However, the result also shows that there are many relationships between variables and determinants that are not significant. TTF has no direct effect on PU, but an impact was found on indirect relationships through PEU. This shows that users will find HMIS useful if it is easy to use taking into account the various activities accommodated by the system. PU and AT do not have a significant effect on IU, nor does SE on IU. This happens because users still have a strong habit of doing hotel operations and reservations manually, without using HMIS. Although HMIS has been designed and built with a high level of capability and efficiency to assist users in this regard, these factors resulted in no indirect influence from TTF to IU.

The result of this study shows that the use case of HMIS in Indonesia is different from other countries even though it uses the same research model. This difference may be affected by several factors, such as the habit of hotel employees and guests who manage operations and reserve hotel rooms manually without using HMIS. This familiarity makes HMIS seem unneeded in doing these jobs and activities. In addition, hotel employees and guests may have a lack of understanding in operating HMIS even though the HMIS has been built and designed by considering aspects of ease of use by users.

5. Conclusions

The purpose of this study is to investigate the relationship between TTF and the intention to use HMIS which is built in accordance with the results of the HMIS user requirement analysis. To help answer this goal, this study has designed, built, and tested a hotel management information system based on TTF using confirmatory factor analysis to determine the capabilities of the built system in assisting users in managing and booking hotels online.

The results shows that the hotel management system that has been designed and built can help users in carrying out the overall management of hotel operations and room reservations online. This evident is concluded from the study results which show that data from the statistical calculations are all declared valid and reliable. The results show a significant relationship between TTF and self-efficacy with the perception of ease of use of HMIS by users. Thus, the perception of ease of use also has a significant positive relationship with the perception of system usability to facilitate the tasks of system users.

There are six insignificant hypotheses out of the total hypotheses. The research hypothesis that TTF might influence the intention to use HMIS was thwarted through the results of quantitative analysis

calculations, both direct and indirect relationships. These results may be caused by the visual appearance of the system interface that is still less interactive, as well as real-world conditions where there are still many hotel employees who are not used to carrying out hotel operational processes using the system. In addition, there are still many customers or hotel guests who are not used to making reservations through the system. To overcome this, a step that can be taken is to improve the visual appearance of the system interface to make it more interactive and attractive. Furthermore, it is important to educate hotel employees about how to use the system, so that they can educate every guest who arrives on how to make reservations online.

The results of this study contribute academically as one of the proofs of the use of TTF testing and evaluation methods to measure the ability of a technology to help users work. This research also contributes practically to the industry by producing a hotel management information system so that it can be useful to be applied to the hotel business.

This research has shortcomings in terms of interface design that is still less attractive to users and the possibility of bias in the low number of respondents. So that further research is expected to be able to reduce the level of bias in several ways, namely by increasing the number of respondents and by making multiple comparisons on the results of quantitative analysis. On the other hand, future research can incorporate the success factors of an HMIS by using various psychological and economic theories to assess the relevance of user interaction with existing systems.

6. CRediT Authorship Contribution Statement

Intan Dzikria: Conceptualization, Formal Analysis, Funding Acquisition, Methodology, Resources, Supervision, Validation, and Writing – review & editing. **Muhammad Lutfi Syahindra Solihin:** Conceptualization, Data Curation, Formal Analysis, Investigation, Project administration, Software, Validation, Visualization, and Writing – original draft.

7. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

8. Acknowledgments

The authors would like to thank the anonymous referees for their helpful comments and suggestions.

9. Data Availability

Data will be made available on request.

10. Funding

No funding was received for this study.

11. Ethical Approval

Ethical approval No patient-identifying parts in this paper were used or known to the authors. Therefore, no ethical approval was requested.

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