Risk Analysis of Information Technology Using Si Semar Layak in Online Umrah Passport Registration

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Abstract

This study aims to identify potential risks and provide a foundation for developing effective mitigation strategies. The research employed a qualitative approach to analyze information technology risks in online Umrah passport registration. Data collection was conducted through interviews, observations, and documentation. The analysis revealed that risks in online passport registration for Umrah pilgrims include data security risks, system vulnerability risks to cyber-attacks, network infrastructure failure risks that could disrupt online access, data processing errors risks, and application vulnerability risks to hacking. Mitigation measures include enhancing data security through encryption and strong access control, implementing appropriate security measures to reduce cyber-attack risks, conducting regular data backups to anticipate system failures, improving staff training and awareness on data processing, and performing regular security updates.

Keyword: *risk of information rechnology, online passport, Si Semar Layak*

Abstrak

Penelitian ini bertujuan untuk mengidentifikasi potensi risiko yang timbul dan memberikan dasar untuk mengembangkan strategi mitigasi yang efektif. Metode penelitian menggunakan pendekatan kualitatif untuk menganalisis risiko teknologi informasi dalam pendaftaran paspor umrah online. Pengumpulan data pada penelitian ini melalui wawancara, observasi, dan dokumentasi. Hasil analisis menunjukkan bahwa risiko yang timbul dalam pendaftaran paspor online bagi jemaah umroh meliputi risiko keamanan data, risiko kerentanan sistem terhadap serangan cyber, risiko kegagalan infrastruktur jaringan yang dapat mengganggu akses online, risiko kesalahan pemrosesan data, dan risiko kerentanan aplikasi terhadap serangan peretasan. Langkah-langkah mitigasinya antara lain meningkatkan keamanan data melalui enkripsi dan kontrol akses yang kuat, menerapkan langkah-langkah keamanan yang tepat untuk mengurangi risiko serangan siber, melakukan pencadangan data secara berkala untuk mengantisipasi kegagalan sistem, meningkatkan pelatihan dan kesadaran staf mengenai pemrosesan data, dan melakukan pembaruan keamanan secara berkala

Kata Kunci*: risiko teknologi informasi, paspor daring, Si Semar Layak*

Introduction

The evolution of the internet has been remarkable, transforming significantly from its inception. Both information systems and information technology have progressed rapidly, leaving a notable impact across all fields. The increasing complexity of business activities and organizational operations, coupled with the swift advancement of information systems and technology, necessitates that organizations plan and develop systems capable of supporting their operations effectively and efficiently. The application of information technology extends beyond the business sector, also permeating the public sector by facilitating community services (Setiawan & Savitri, 2019).

Information technology has played a pivotal role in transforming various sectors, including the organization of Hajj and Umrah. The introduction of online passport registration has emerged as a crucial innovation, streamlining and expediting the administrative process for Umrah pilgrims. Nonetheless, the adoption of information technology is accompanied by potential risks that must be meticulously managed.

Risks associated with information technology can stem from a multitude of sources, including data security breaches, system vulnerabilities, network infrastructure failures, data processing inaccuracies, and hacking incidents. To effectively manage these risks, a comprehensive and efficient risk analysis approach is essential.

The SI SEMAR (Structure, Infrastructure, System, Management, Application, and Risk) method offers a structured framework for the identification, evaluation, and management of information technology risks.

Specifically, in the realm of online passport registration for Umrah pilgrims facilitated by Hajj and Umrah organizers, risk analysis utilizing the SI SEMAR method can offer invaluable insights, aiding in overcoming challenges and ensuring the successful execution of this process.

This study endeavors to perform a risk analysis of information technology using the SI SEMAR method in the context of online passport registration for Umrah pilgrims by Hajj and Umrah organizers. Through this research, the aim is to identify potential risks, focusing on the security, reliability, and efficiency of the online passport registration process.

In the management of information technology risks, adopting a comprehensive framework that covers network infrastructure, data security, application systems, policy management, and potential risks associated with each of these elements is crucial. Consequently, this study aims to offer a deeper understanding of the

potential risks involved in online passport registration for Umrah pilgrims and to propose effective mitigation strategies.

By implementing robust mitigation measures, Hajj and Umrah organizers can significantly enhance the security and quality of online passport registration services for Umrah pilgrims. Thus, this research is of paramount importance in aiding Hajj and Umrah organizers to ensure the security, reliability, and efficiency of the online passport registration process.

Literature Review

Risk Management

Gondodiyoto (2007) defines risk as the potential for a negative outcome resulting from vulnerabilities, taking into account both the probability and impact of such risks. Companies can mitigate risks through controls and preventative measures, but it is impossible to completely eliminate exposure, even with the most comprehensive control structures. Risk management is the process of measuring or assessing risk and developing strategies to manage it effectively. Strategies may include transferring the risk to another party, avoiding the risk altogether, reducing the negative impact of the risk, or accepting some or all of the consequences of a particular risk. The risk management process entails identifying risks, assessing them, and implementing measures to reduce risks to an acceptable level. It allows IT managers to find a balance between the operational and economic costs of security measures and the benefits of mission achievement by safeguarding IT systems and the data that support an organization's objectives (Stoneburner, G., Goguen, A., & Feringa, A., 2022).

Information Technology

Warsita (2008) describes information technology as encompassing hardware, software, and useware systems and methods for acquiring, transmitting, processing, interpreting, storing, organizing, and meaningfully using data. Lantip and Rianto (2011) view information technology as rapidly evolving knowledge in the field of information based on computers. Similarly, Hamzah and Lamatenggo (2011) define information technology as the technology utilized for data processing.

Information technology facilitates the exchange of data and messages without the constraints of space and time, which often restrict individual movement. It includes tools such as hardware, information theory, data networks, workstations, and robotics or artificial intelligence, derived from human thought through robotic media. The primary function of information technology is to enhance human interaction and

communication processes, acting as a bridge to ensure the effective conveyance of information. Information technology is divided into methods and means, encompassing system analysis components, design methodologies, programming, computer software and hardware, and the internet, all integrated into a cohesive system. Adietya et al. (2015) project information technology as a tool designed to address various human challenges in life.

Wahyono (2004) identifies several characteristics that define the nature of information itself, including:

1. True or False: This characteristic pertains to the authenticity of the information.

2. New: Information may be completely new to the recipient, or it may update or add value to existing information.

3. Corrective: Information can correct previous misinformation or inaccuracies.

4. Confirmatory: Information can reinforce existing information, enhancing the recipient's perception of its accuracy.

The Si Semar Layak Application

The Si Semar Layak Application is an innovative solution introduced by the Class I TPI Semarang Immigration Office to facilitate public access to immigration services online and in a paperless manner. The objectives of the Si Semar Layak Application include streamlining the immigration service process for the public; establishing a service process that is fast, easy, affordable, transparent, reliable, and accessible; and providing broader access for the public to obtain services.

The Si Semar Layak Application can be utilized for both new passport applications and passport renewals at the Class I TPI Semarang Immigration Office. The procedure for using the Si Semar Layak Application for passport applications is outlined as follows:

1. Online Registration: Applicants register for a passport queue online through the website https://sisemarlayak.imigrasisemarang.com or via the "Si Semar Layak" application, which can be downloaded from the Play Store.

2. Account Creation: Applicants create an account.

3. Login: Once an account is created, applicants log into the application using their registered account.

4. Application Submission: Applicants submit their application according to the available options.

5. Form Completion: Applicants fill out the available online form.

6. Document Upload: After completing the form, applicants upload the necessary application documents on the application.

7. Online Verification: Officials conduct online verification of the application documents.

8. If verification is rejected, applicants can reapply.

9. If verification is successful, applicants choose their schedule and arrival time.

10. Scheduled Arrival: Applicants arrive at the chosen schedule with the original documents required for the application and a printed declaration letter.

11. Queue Number: Applicants receive a Si Semar Layak queue number for the next process.

The Si Semar Layak Application represents one method for passport application processes at the Class I TPI Semarang Immigration Office. Additionally, there is another method available through the Online Passport Queue (APAPO) (Immigration Office, 2019).

Research Methods

This study employs a qualitative approach to analyze the risks associated with information technology in the online passport registration for Umrah pilgrims. The qualitative approach allows researchers to gain a deep understanding of the existing risks and the context of information technology use in online passport registration.

Data collection for this study was conducted through various methods, including interviews, observations, and documentation. Interviews were conducted with Hajj and Umrah organizers, information technology staff, and Umrah pilgrims in Semarang to gain insights into the existing risks. Observations were made to directly observe the online passport registration process and identify potential risks. Documentation was used to gather data from related documents, such as risk management policies and procedures, security incident reports, and technical documentation related to infrastructure and systems.

Result and Discussion

The Si Semar Layak Application

The Si Semar Layak represents the latest innovation by the Class I TPI Semarang Immigration Office, conceived as an integrated service application to promote public services as part of the Integrity Zone Development towards WBBK (Corruption Free Area)/WBBM (Clean and Serving Bureaucratic Area). This application has been officially awarded a Copyright Certificate by the Directorate General of Intellectual Property. The creative mind behind this application is Doni Alfisyahrin, who also held the position of Head of the Class I TPI Semarang Immigration Office at that time.

Launched on October 23, 2020, in Semarang, the application introduces an online passport application service that simplifies the process for users by allowing them to fill out an application form and upload necessary documents online. The Class I TPI Semarang Immigration Office then conducts an online review of these documents. Upon approval of all requirements by the Immigration Office, applicants are invited to the office for photograph and fingerprint scanning.

The Class I TPI Semarang Immigration Office outlines three primary benefits of this application on its website: Simplification of the application process, as applicants are able to register and upload required documents online; Enhanced communication regarding document completeness, delivered to applicants in a manner that is faster, clearer, and more transparent; and During the pandemic, the application process is made safer for applicants as they can directly proceed to the interview and biometric photo stages.

The Si Semar Layak Method

The Si Semar Layak method introduces a comprehensive risk analysis framework that includes six key elements: Structure, Infrastructure, System, Management, Application, and Risk.

1. Structure encompasses the architecture and framework of the information technology utilized.

2. Infrastructure includes the network, hardware, and facilities that support IT operations.

3. System covers the software, databases, and applications employed in information management.

4. Management relates to the policies, procedures, and practices established to manage risks and IT operations effectively.

5. Application refers to specific applications deployed in the realm of information technology.

6. Risk addresses the identification, assessment, and mitigation of risks associated with the employment of information technology.

Risk Identification

1. Risks Related to Structural Devices

   The risks associated with structural devices include the following:

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Table 1.

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Identifying Causes of Risk in the Reliability and Robustness of Physical Infrastructure

The reliability and robustness of the physical	Hardware damage
	Natural disasters

infrastructure used to store and manage online passport registration data	Physical attacks against the data center

2. Risks Related to Infrastructure

   The risks associated with infrastructure include:

Table 2.

Identifying Causes of Risk in Network and Communication Infrastructure

Network and communication infrastructure	Unstable internet providers
	Network disruptions
	Cyber attacks
	Communication failures between involved systems

3. Risks Related to the System

   The risks associated with the system include:

Table 3.

Identifying Causes of Risk in the System

System	System failures
	Data loss
	Errors in data processing
	Vulnerability to cyber attacks

4. Risks Related to Management

   The risks associated with management include:

Table 4.

Identifying Causes of Risk in Management

Management	Lack of training for new staff
	Insufficient understanding and knowledge among the elderly population regarding the rapid technological advancements in the use of the Si Semar Layak information technology
	Changing policies
	Data input errors
	Failure in managing emerging risks

5. Risks Related to the Application

   The risks associated with the application include:

Table 5.

Identifying Causes of Risk in the Reliability and Security of Applications

The reliability and security of applications used in online passport registration	Vulnerability to hacking attacks or data breaches
	Errors in application use
	Failure to provide the latest security updates

6. Risks Related to the Potential Impact of Previous Risks

    The risks associated with the potential impact of previous risks include:

Table 6.

Identifying Causes of Risk in the Potential Impacts of Risk

The potential impacts of previous risks that could affect the overall online passport registration process	Damaged reputation
	Financial losses
	Loss of trust from the community

To mitigate these risks, the following measures are recommended:

1. Strengthen the physical structure and security of data centers to protect online passport registration data from damage and unauthorized access.

2. Ensure the reliability and security of network and communication infrastructure by implementing.

Mitigation

Risk mitigation involves the actions taken by an organization to reduce or minimize the impact of potential risks. The objective is to decrease the organization's exposure to various risks that could cause significant disruptions or financial losses. Risk mitigation is a crucial part of risk management, encompassing the identification, analysis, and handling of risks (Novadilla, A. 2023).

Mitigation strategies are formulated based on the results of risk assessments. According to the risk assessment results in the table, the following mitigation strategies can be implemented:

1. Enhancing Data Security: In addition to adopting data encryption and strict access policies, Hajj and Umrah organizers should conduct regular security audits to identify and address emerging vulnerabilities.

2. Utilizing Intrusion Detection Systems: Implement intrusion detection systems that can monitor and track suspicious activities within the system. This will help in the early detection of attacks and enable rapid response to mitigate risks.

3. User Training and Awareness: Conduct regular training sessions for staff and system users on information security, strong password practices, and preventive measures against phishing and malware attacks.

4. Disaster Recovery and Data Backup: Develop a comprehensive disaster recovery plan and perform regular data backups. This will facilitate quick system recovery in emergency situations and prevent significant data loss.

5. Evaluating Service Providers: If using third-party service providers, ensure they have robust security measures in place and comply with the necessary standards to protect Umrah pilgrims' data.

6. By implementing and enhancing these measures, the risks associated with the online passport registration of Umrah pilgrims can be effectively managed, thereby improving the security and success of the Si Semar Layak implementation.

Conclusion

The risk analysis of information technology for the online passport registration of Umrah pilgrims using SI SEMAR, conducted by Hajj and Umrah organizers, concludes that the implementation of SI SEMAR is feasible. However, it is imperative to adopt additional security measures to mitigate risks and ensure the successful implementation of the system. Critical risks that need to be addressed include data security, system vulnerabilities, network infrastructure failures, data processing errors, and susceptibility to hacking attacks.

To mitigate these risks, several preventive steps and security enhancements are recommended. Enhancing data security through data encryption, implementing strict access policies, and actively monitoring for suspicious activities are essential. Regular updates are necessary to address system vulnerabilities and ensure operational stability. The network infrastructure's sustainability should be enhanced through proactive monitoring and effective disaster recovery plans. Strict supervision and validation of data are crucial to minimize data processing errors. Moreover, robust security measures, such as firewalls and active attack detection systems, should be employed to mitigate the risk of hacking attacks.

The researchers offer the following recommendations:

1. While the IT operational processes are generally performing well and reliably, both technical and non-technical improvements should be continuously pursued.

2. Enhance the provision of adequate human resources to support good IT Governance by recruiting personnel with expertise in IT fields such as

networking, coding, or graphic design for information dissemination, and by conducting seminars or training to improve skills and expertise related to IT.

3. Innovate in information system management to meet office needs. For example, by developing the "Si Semar Layak" application to streamline bureaucracy and improve service delivery.

4. Adopt IT governance standards/best practices as a consistent reference and perform independent IT performance assessments, for instance, using COBIT.

5. Improve team coordination by organizing meetings or discussions to evaluate, monitor, and enhance information technology performance and governance.

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