# Enhancing Accountability in Hajj Fund Governance Through Regulatory Impact Analysis and Value Chain Model

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#### **ABSTRACT**

This study analyzes the effectiveness of Indonesia's Hajj financial management regulations following the establishment of the Hajj Financial Management Agency (BPKH) under Law No. 34 of 2014. With increasing pilgrim demand exceeding available quotas, effective management of accumulated Hajj funds has become critical for ensuring pilgrim welfare and maintaining public trust. The research employs Value Chain Analysis and Regulatory Impact Assessment (RIA) methodologies through expert interviews and questionnaire surveys with key stakeholders. Value Chain Analysis identified nine key activities within BPKH's operations, while RIA evaluated policy impacts through systematic assessment of costs, benefits, and stakeholder perspectives. Findings reveal that BPKH's establishment significantly improved Hajj financial management with 100% expert consensus on enhanced transparency, efficiency, and accountability. However, the policy framework remains suboptimal due to service disparities among pilgrims, suboptimal investment returns, and incomplete institutional coordination. The study concludes that Law No. 34/2014 represents significant advancement in establishing clearer investment parameters and accountability frameworks, though digital transformation challenges persist. The research recommends strengthening investment risk management, expanding virtual account systems, and prioritizing comprehensive digital infrastructure development including IoT integration for operational monitoring, artificial intelligence for investment optimization, and blockchain technology for enhanced security while maintaining Sharia compliance.

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## 1. INTRODUCTION

Hajj is one of the pillars of Islam that must be performed and is highly sought after by Muslims worldwide, including Indonesian Muslims [1]. This is demonstrated by the large number of Indonesian citizens wishing to perform the Hajj pilgrimage that continues to increase despite limited quotas, resulting in a growing number of waitlisted Hajj pilgrims (waiting list). The consequence of this increase in Indonesian Hajj and Umrah pilgrims means that components required for Hajj implementation also experience corresponding increases, making oversight of Hajj financial management an area requiring greater attention [2]. Hajj funds

collected from pilgrims represent a trust that must be managed efficiently and effectively to support proper Hajj implementation. Additionally, the risks and complexities involved in managing Hajj funds demand clear and strong regulations to govern various aspects, from investment to supervision [3].

Furthermore, with the increasing number of prospective pilgrims each year, particularly in countries with large Muslim populations, it is important to ensure that existing regulations can accommodate this growth while providing maximum protection and benefits for Hajj pilgrims [4]. Analysis of Hajj financial management regulations also becomes important for addressing various challenges and changes in the external environment, such as fluctuations in global financial markets, government policy changes, and economic uncertainties [5]. Based on Government Regulation (PP) Number 5 of 2018, supervision of Hajj Financial Management implementation is held by a supervisory board. Similarly, Law Number 34 of 2014 states that the supervisory board plays a role in overseeing Hajj financial management, involving tasks such as evaluating policy formulation, supervising and monitoring the implementation of Hajj financial management, and evaluating and providing considerations regarding BPKH accountability reports [6].

In the context of inter-institutional cooperation being carried out by BPKH, efforts to explore and expand this cooperation must be enhanced broadly, both within sectoral and cross-sectoral scopes. It is also important to carefully examine the possibility of cooperation with financial institutions, especially non-banking ones [7]. Therefore, the analysis of Hajj financial management regulations becomes critically important to ensure the safety, security, and welfare of Hajj pilgrims, as well as to strengthen the integrity and public trust in the institutions responsible for managing Hajj funds [8]. The contemporary landscape of hajj financial management increasingly relies on digital transformation and information technology systems to enhance operational efficiency and stakeholder engagement. BPKH has begun implementing digital platforms including virtual account systems, mobile applications, and integrated Management Information Systems (MIS) to improve transparency and facilitate better communication with prospective pilgrims [9]. However, the integration of advanced technologies such as real-time monitoring dashboards, data analytics tools, and cybersecurity frameworks presents both opportunities and challenges that require systematic evaluation within the context of Islamic financial management principles [10].

## 2. METHODOLOGY

This research applies the Value Chain Analysis and Regulatory Impact Assessment (RIA) methods [11]. Respondents identify needs, types, and impacts (benefits and costs) of expected regulations from stakeholders. Value Chain Analysis examines BPKH's nine activities, divided into primary (logistics, operations, marketing, services) and support (procurement, technology, HR, infrastructure), assessed based on benefits and costs [12]. Adjustments are made to suit service organizations. Meanwhile, RIA ensures systematic, transparent, and effective regulatory evaluation, applied both to filter proposed regulations and to review existing ones. It follows seven steps as outlined by Bappenas [13] and OECD [14].

- Formulation of problems or issues that give rise to the need to issue a policy (take action);
- Identification of objectives and targets to be achieved with the policy (risk assessment);
- Identification of various alternative actions (options) to achieve these goals and objectives;
- Assessment of benefits and costs (advantages and disadvantages) for each option, viewed from the perspective of government, society, business actors, consumers, and the economy as a whole;
- Consultation and communication with stakeholders, in all the stages mentioned above;
- Determination of the best option (chosen); and
- Formulation of strategies to implement and revise policies.

The research methodology incorporates assessment of digital analytics tools used in data processing and stakeholder engagement evaluation [15, 16]. Expert interviews and questionnaire data were analyzed using structured analytical approaches, with preliminary exploration of digital visualization techniques to enhance policy communication effectiveness [17]. The study recognizes the potential for scenario modeling tools and simulation technologies in regulatory impact assessment, though comprehensive digital modeling was beyond

the current scope. Future methodological enhancements should include systematic evaluation of information technology systems, cybersecurity frameworks, and digital platform effectiveness in supporting hajj financial management operations [18].

#### 3. RESULT AND DISCUSSION

Based on the research conducted using Value Chain Analysis and Regulatory Impact Assessment methodologies, several key findings emerged regarding the management of Hajj financial resources by the BPKH [19].

# 3.1. Primary Activities in BPKH's Value Chain

Our research identified five distinct primary activities that directly create value in BPKH's operations:

## 3.2. Capital and Fund Collection

This activity focuses on increasing investments in accordance with sharia principles while considering safety aspects, prudence, benefit value, and liquidity. It encompasses the mechanisms through which pilgrim funds are collected, verified, and prepared for subsequent management [20]. This represents the entry point for financial resources into BPKH's value chain and establishes the foundation for all subsequent value-creating activities [21].

## 3.3. Fund Development Products

This component involves the investment products offered by partners, the product mix and financial services, and fund development strategies [22]. BPKH works with financial institution partners to create investment vehicles that generate returns while maintaining strict adherence to Islamic financial principles. The development of these products requires careful balancing of financial objectives with religious requirements [23].

#### 3.4. Product Distribution

Product distribution encompasses the collection, storage, and distribution of products to Hajj pilgrims [24]. This includes the mechanisms through which financial benefits are delivered to pilgrims, as well as the systems for tracking and monitoring fund flows throughout the Hajj implementation process. Effective distribution ensures that financial resources are available when and where needed to support pilgrim needs [25].

# 3.5. Marketing

Marketing activities include the marketing mix, financing, and promotional efforts. While BPKH operates in a regulated environment with captive stakeholders, marketing remains important for communicating with prospective pilgrims, explaining investment strategies, and building public trust in the Hajj financial management system. These activities enhance transparency and stakeholder understanding of BPKH's operations [26].

# 3.6. Services

Service provision involves the arrangement of travel and accommodation, facility provision, and logistical support for pilgrims. This component represents the ultimate delivery of value to pilgrims, as financial management activities translate into tangible services that support the Hajj experience [27]. The quality of these services directly impacts pilgrim satisfaction and reflects the effectiveness of BPKH's entire value chain.

# 3.7. Supporting Activities in BPKH's Value Chain

Our analysis identified four critical supporting activities that provide the foundation for BPKH's value creation process:

#### 3.8. Firm Infrastructure

BPKH's firm infrastructure covers governance structures, organizational systems, and risk management frameworks that enable all value chain activities [28]. It includes management information systems and risk protocols to ensure compliance and efficiency [29]. A key element is the cybersecurity framework, designed to protect sensitive financial data through encryption, multi-factor authentication, and regular assessments. This system aligns with Indonesian regulations and ISO/IEC 27001 standards, safeguarding both

pilgrim funds and institutional data. Digital monitoring tools further support real-time risk assessment, compliance reporting, and regulatory oversight [30], [31].

#### 3.9. Human Resource Management

The human resource management function focuses on developing and maintaining competent personnel who operate according to sharia principles [32]. This includes recruitment policies that prioritize both technical expertise and religious knowledge, training programs that enhance both operational skills and understanding of Islamic financial principles, and performance management systems that evaluate staff contributions to BPKH's unique mandate [33].

# 3.10. Technology Development

Technology development ensures continuous improvement of digital systems supporting BPKH operations. Key initiatives include platforms for fund tracking, investment management, and integrated MIS [34]. Virtual accounts allow pilgrims to monitor fund progress, strengthening transparency and engagement. The infrastructure also incorporates real-time monitoring, data analytics, and automated reporting for regulatory compliance [35]. Future opportunities include IoT for operational monitoring, AI for investment optimization, blockchain for secure transactions, and interactive web/mobile applications to improve communication and consultation. Advanced analytics further support risk management and sharia-compliant decision-making [36].

#### 3.11. Procurement

Procurement manages the acquisition of assets, facilities, and technologies essential to both primary and supporting activities [37]. Effective procurement ensures cost efficiency and resource availability for BPKH's mandate. The value chain model in Figure 1 illustrates the interaction of primary and supporting activities [38]. It highlights integration points such as technology enhancing fund collection efficiency and HR management ensuring quality service delivery. These connections demonstrate how each component collectively contributes to value creation for pilgrims [39].

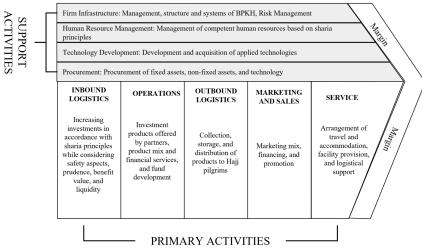


Figure 1. Value Chain Analysis Model of BPKH

The value chain analysis further indicates that BPKH's effectiveness depends on maintaining alignment between its religious mandate and operational practices throughout all components of the value chain. This alignment is particularly evident in the fund development products activity, where investment decisions must balance financial returns with strict adherence to sharia principles [40].

## 3.12. Regulatory Impact Assessment (RIA) Analysis on Hajj Financial Management

RIA analysis related to Hajj financial management by BPKH is based on Law Number 34 of 2014 concerning Hajj financial management. The preparation of risk management guidelines refers to the Hajj Financial Management Agency Regulation (PBPKH) No. 1 of 2018 concerning the Formation of Regulations at the BPKH, as well as the Head of Executive Agency Regulations (PKBP) which technically regulate Investment and Placement Policies at BPKH [41].

Based on questionnaire results regarding the Hajj Fund Performance Comparison survey using Regulatory Impact Assessment (RIA) and Interpretative Structural Modeling (ISM) according to the opinions of four experts or key persons, the questionnaire results obtained are explained below.

## 3.13. Explicit Policy Commitment

Research results in Table 1 show that all experts (100%) confirm the existence of explicit regulations, primarily Law No. 34 of 2014 on Hajj Management, along with related regulations such as Government Regulation No. 5 of 2018 and Presidential Regulation No. 110 of 2017 [42]. Experts also agree that these regulations apply good regulatory principles (100%) since their introduction in 2014. The main motives for these regulations, according to experts, are to enhance effectiveness, efficiency, transparency, and accountability in Hajj Financial Management Performance (100%) [43].

Table 1. Explicit Policy Commitment (in percentage)

Statement	YES	NO
a. Is there a regulation that is explicitly published to promote/introduce Hajj Financial Fund Management?	100	0
If you answer YES		
a(i) Does the regulation explicitly establish good regulatory principles?	100	0
a(ii) In what year was the policy introduced or last substantially revised?	20	14
b. Reasons identified in the policy, as the main motives for needing regulatory reform include:	YES	NO
b(i) Need to improve the effectiveness of Hajj Financial Management Performance	100	0
b(ii) Need to improve the efficiency of Hajj Financial Management Performance	100	0
b(iii) Need to improve the transparency of Hajj Financial Management Performance	100	0
b(iv) Need to improve the accountability of Hajj Financial Management Performance	100	0

#### 3.14. Regulatory Management and Policy Coherence

Research results show that 87.5% of experts say that there is a consultation process when preparing new regulations. Where usually the consultation process is also carried out when preparing subordinate regulations. Thus, when preparing Law No. 34 of 2014 concerning Hajj Financial Management, a consultation process was carried out as a fairly good regulatory requirement. In addition, the consultation process was often carried out, but due to limited internet development at that time, the scope of socialization was still not wide [44].

Table 2. Regulatory Management and Policy Coherence (in percentage)

Consultation in government structure	Always	Some Cases	No
a) Is there a consultation process when preparing new regulations?	12.5	87.5	0
b) Is there a consultation process when preparing subordinate regulations?	37.5	62.5	0
c) Are new regulations consulted with the body responsible for Hajj Financial Management?	0	37.5	62.5
If your answer is YES, is consultation mandatory?	0	12.5	87.5
d) Are there other policy areas involved?	Ministry of Religion, House of Representatives, Finan- cial Services Authority		
Provisions to promote/introduce adoption of international standards and rules.	-	-	-
e) Is there a requirement stating that the BPKH is the institution that manages Hajj finances?	87.5	12.5	0

Based on the results of consultation on government structure, it appears that according to experts, other policy areas involved in consultation activities related to Hajj financial management are the Ministry of Religion, the House of Representatives, and the Financial Services Authority. The majority of experts also state that the BPKH is the institution that manages Hajj finances [45].

#### 3.15. Regulatory Process

The majority of experts emphasize that standard procedures must be met when drafting the Law of the Republic of Indonesia Number 34 of 2014 concerning Hajj financial management (100%), and that these procedures develop draft laws established with binding impacts (100%). However, such drafts are usually not examined by a specific government body other than the responsible department (87.5%) [46]. Similarly, experts affirm that regulations under the law supporting the Hajj financial management legislation also follow standard drafting procedures (100%), ensuring that related regulations are established in formal normative documents such as laws or binding policy documents, which currently consist of legislative documents and administrative procedures [47].

Table 3. Regulatory Process (in percentage)

Twelf of Hegulatery Treeses (in percentage)		
Statement	YES	NO
a) Are there standard procedures in drafting Law of the Republic of Indonesia Number 34 of	100	0
2014 Concerning Hajj Financial Management?		
If there are standard procedures that develop draft laws:		
a(i) Is this established in Law with binding impact	100	0
a(ii) Will the draft Law of the Republic of Indonesia Number 34 of 2014 Concerning Hajj	12.5	87.5
Financial Management be examined by a specific body within the Government other than the		
responsible department?		
b) Are there standard procedures in drafting regulations under the law that support Law of	100	0
the Republic of Indonesia Number 34 of 2014 Concerning Hajj Financial Management?		
If there are standard procedures that develop draft regulations under the law:		
b(i) Are regulations related to Hajj fund management established in formal normative docu-	100	0
ments such as laws or formal policy documents with binding impacts?		
b(ii) Formal documents currently in effect. Legislative or administrative procedures?	100	0

## 3.16. Transparency

On the transparency point, the majority of experts (87.5%) agree that almost all systematic procedures that make regulations of the Republic of Indonesia Law Number 34 of 2014 Concerning Hajj Financial Management can be known and accessed by prospective pilgrims/communities directly affected. Where there is public access through the internet to Law of the Republic of Indonesia Number 34 of 2014, the majority of experts also agree that there is public access through the internet to regulations under Law of the Republic of Indonesia Number 34 of 2014, and the majority of experts agree that the policy is made in simple and easy-to-understand language (majority of experts state Yes 100%) [48].

Table 4. Transparency (in percentage)

Statement	YES	NO
a) Which of the following systematic procedures make regulations of the Law of the Republic	87.5	12.5
of Indonesia Number 34 of 2014 Concerning Hajj Financial Management known and acces-		
sible to prospective pilgrims/communities directly affected?		
a(i) Public access through the internet to Law of the Republic of Indonesia Number 34 of	87.5	12.5
2014		
a(ii) Public access through the internet to regulations under Law of the Republic of Indonesia	100	0
Number 34 of 2014.		
a(iii) Policy made in simple and easy-to-understand language.	100	0

## 3.17. Use of Regulatory Impact Analysis

According to key experts, Regulatory Impact Analysis (RIA) was not conducted before the enactment of Law 34/2014, though in some cases analysis was performed. RIA was not prepared at the beginning of regulatory draft development but rather after the finalization of draft regulations. BPKH as the body responsible for hajj financial management, linearly holds responsibility for developing regulatory drafts using RIA. No other body outside BPKH has responsibility for reviewing the quality of RIA on regulations governing hajj financial management. With analysis using RIA, there is a possibility to revise Law No [49]. 34/2014 on Hajj Financial Management. Although guidelines for using RIA are typically not provided. According to experts, the RIA method as an analysis of regulatory effectiveness is only necessary for main regulations and subordinate regulations below them. It is not required for similar regulations that are not primary regulations. Therefore, RIA analysis results do not need to be published to the public, except to decision-makers of the main regulations. In this case, decision-makers for Law No. 34/2014. However, RIA analysis disclosed to the public can provide benefits on investment placement, operational costs of hajj financial management, value of benefits for hajj pilgrims, and accountability of hajj financial management [50].

Table 5. Use of RIA (in percentage)

Statement	Always	In some cases	No
a) Was RIA conducted before Law 34/2014 was estab-	0	50	50
lished?			
If the answer to a) is "always" or "in some cases":	YES	NO	
b(i) At the beginning of regulatory draft development?	0	100	-
b(ii) After finalization of regulatory draft?	50	50	-
c) Is there a body outside BPKH responsible for review-	0	100	-
ing RIA quality?			
d(i) Is there room for revising Law No. 34/2014 on Hajj	100	0	-
Financial Management?			
e) Are guidelines for RIA preparation provided?	0	100	-
Statement	Always	Only for main	In selected
		regulations	cases
e(i) Is RIA required for laws?	-	50	-
e(ii) Is RIA required for subordinate regulations?	-	50	-
		<b>=</b> 0	
e(iii) Are regulators required to identify benefits of new	-	50	-
e(iii) Are regulators required to identify benefits of new regulations?	-	50	-
	-	50	-
regulations?	- -		- -
regulations? e(iv) Must RIA documents be released publicly?	-		- - -
regulations?  e(iv) Must RIA documents be released publicly?  e(v) In RIA, is it necessary to include assessment of spe-	50		- - -
regulations?  e(iv) Must RIA documents be released publicly?  e(v) In RIA, is it necessary to include assessment of specific impacts on:	-	50	- - -
regulations?  e(iv) Must RIA documents be released publicly?  e(v) In RIA, is it necessary to include assessment of specific impacts on:  Impact on placement and/or investment	50	50 - 50	- - -
regulations?  e(iv) Must RIA documents be released publicly?  e(v) In RIA, is it necessary to include assessment of specific impacts on:  Impact on placement and/or investment  Impact on operational costs of hajj financial manage-	50	50 - 50	- - - -
regulations?  e(iv) Must RIA documents be released publicly?  e(v) In RIA, is it necessary to include assessment of specific impacts on:  Impact on placement and/or investment  Impact on operational costs of hajj financial management	50 50	50 - 50 50	- - - -
regulations?  e(iv) Must RIA documents be released publicly?  e(v) In RIA, is it necessary to include assessment of specific impacts on:  Impact on placement and/or investment  Impact on operational costs of hajj financial management  Impact on benefit values for hajj pilgrims	50 50 50	50 - 50 50 50	- - - - -
regulations?  e(iv) Must RIA documents be released publicly?  e(v) In RIA, is it necessary to include assessment of specific impacts on:  Impact on placement and/or investment  Impact on operational costs of hajj financial management  Impact on benefit values for hajj pilgrims  Impact on accountability reports of hajj financial management	50 50 50	50 - 50 50 50	- - - - -

#### 3.18. Measurement and Reduction of Administrative Burden

The majority of experts state that the country has not completed recent measurements of hajj financial management, with the last conducted in 2014 and 2018, including embedded programs for updating and repeating burden measurements [51]. These involve target groups such as BPKH, the Ministry of Religious Affairs, Islamic financial institutions, air transportation, Regional Government, Ministry of State-Owned Enterprises, Pertamina, Angkasa Pura, and the Airport Authority [52]. Analysis of Law 34/2014 allows comparison of hajj fund management performance before and after BPKH (100%) and highlights the effectiveness of operational expenditures managed by the institution (100%), while most experts also note the existence of a government program explaining hajj fund management with both quantitative and qualitative targets (87.5%) [53].

Table 6. Measurement and Reduction of Administrative Burden (in percentage)

Statement	YES	NO
a) Has the country completed measurements of	50	50
hajj financial management?		
If "YES":		
a(i) When was the last measurement con-	Years 2014, 2018	
ducted?		
a(ii) Is there an embedded program to update	50	50
and repeat burden measurements?		
b) Which groups below are targeted in Hajj Fi-	50	50
nancial Fund Management measurements?		
b(i) BPKH	50	50
b(ii) Ministry of Religious Affairs	50	50
b(iii) Hajj pilgrims	50	50
b(iv) Others (e.g., other sectors), please ex-	Islamic financial institutions, Air Transporta-	
plain	tion, Regional Government, Ministry of State-	
	Owned Enterprises, Pertamina, Angkasa Pura,	
	Airport Authority	
c) Does the analysis of Law 34/2014 allow for	100	0
distinguishing between hajj fund management		
performance before and after BPKH?		
d) Does the analysis of Law 34/2014 make	100	0
it possible to show the effectiveness of oper-		
ational expenditures in hajj financial manage-		
ment managed by the management body?		
<b>Burden Reduction:</b>		
e) Is there an explicit government program for	100	0
managing hajj funds provided by pilgrims?		
If "YES":		
e(i) Does the program include quantitative	50	50
targets?		
e(ii) Does the program include qualitative tar-	50	50
gets?		

# 3.19. Regulatory Quality Skills Training

Based on regulatory quality skill aspects, the majority of experts stated the existence of formal training programs to equip staff/drafting teams of Law No. 34/2014 (Ministry of Religious Affairs/BPKH) in preparing hajj fund management regulations. This training includes training on how to analyze Law No. 34/2014 on Hajj Financial Management based on sharia principles, prudential principles, transparency, accountability, and covers the management of higher-quality hajj fund aspects. The existing strategy already meets Law No. 34/2014, but if needed, other strategies to promote/introduce changes in Law 34/2014 about hajj fund management include strategies related to how Islamic Banking, Islamic Non-Bank Financial Institutions, or Islamic investment institutions allowed by Law No. 34/2014 can grow better and larger in leveraging their institutional portfolios, thus impacting the increase in investment returns at BPKH.

Table 7. Training Skills and Regulatory Quality (in percentage)

Statement	YES	NO
a(ii) Does this training cover the management of higher-quality hajj fund aspects?	100	0
b) Are there other strategies to promote/introduce changes in Law 34/2014 about hajj fund	100	0
management?		

**Comments:** If available, please provide details about any strategies used to promote/introduce changes: conducting dialogues, seminars, focus group discussions with stakeholders, legislative, executive, MUI and Islamic mass organizations.

# 3.20. Stakeholder Supervision Authority over Law No. 34/2014 on Hajj Financial Management

There are special bodies/institutions responsible for promoting/introducing Law No. 34/2014 on Hajj Financial Management, namely the Ministry of Religious Affairs and BPKH. These bodies are consulted as part of the development process of Law No. 34/2014 on Hajj Financial Management and serve as advisory bodies that receive references from the government to review broad regulatory areas and gather views from other stakeholders.

Table 8. Stakeholder Supervision Authority over Law No. 34/2014 on Hajj Financial Management (in percentage)

Statement	YES	NO
a) Is there a special body/institution responsible for promot-	100	0
ing/introducing Law No. 34/2014 on Hajj Financial Management?		
If "YES":		
What is the name of this special body?	Ministry of Religious	
	Affairs, BPKH	
a(i) Is this body consulted as part of the development process of Law	100	0
No. 34/2014 on Hajj Financial Management?		
a(ii) Does this body report on progress made on Law No. 34/2014 on	100	0
Hajj Financial Management?		
b) Is there an advisory body that receives references from the gov-	50	50
ernment to review broad regulatory areas, gathering views from other		
stakeholders?		

# 3.21. BPKH's Role in Managing Hajj Fund Performance

To understand BPKH's role in managing hajj fund performance, the majority of experts state that there are other institutions/work units specifically responsible for Law No. 34/2014 on Hajj Financial Management. These bodies periodically review the quality of proposed laws and examine their influence on hajj financial management, are also trusted to review the quality of regulations under Law No. 34/2014 (i.e., lower-level rules), and review and report progress on Law No. 34/2014 on Hajj Financial Management.

Table 9. BPKH's Role in Managing Hajj Fund Performance (in percentage)

Statement Statement		NO
a) Are there other institutions/work units specifically responsible for Law No. 34/2014 on	50	50
Hajj Financial Management?		
If "YES":		
a(i) Does this body periodically review the quality of proposed laws and examine their	50	50
influence on hajj financial management?		
a(ii) Is this body also trusted to review the quality of regulations under Law No. 34/2014	50	50
(i.e., lower-level rules)?		
a(iii) Does this body review and report progress on Law No. 34/2014 on Hajj Financial	0	100
Management?		

# 3.22. Coordination Between Stakeholders on Law No. 34/2014 on Hajj Financial Management

Most experts agree that Law No. 34/2014 on Hajj Financial Management establishes formal coordination mechanisms among stakeholders. Harmonization efforts include mutual recognition, regulatory agreements, and uniform standards aimed at strengthening transparency, accountability, and ensuring that all parties operate under the same framework.

Such coordination helps prevent overlapping authority, reduce conflicts, and improve efficiency in managing hajj funds. Unified agreements also align with national financial governance principles, thereby safeguarding public trust and reinforcing the credibility of hajj financial management.

Table 10. Coordination Between Stakeholders on Law No. 34/2014 on Hajj Financial Management (in percentage)

Statement	YES	NO
a) Are there formal coordination mechanisms between stakeholders regarding	100	0
Law No. 34/2014 on Hajj Financial Management?		
Statement	YES	SOMETIMES
b) Are any of the following regulatory harmonization mechanisms used?		
b(i) Mutual recognition among stakeholders related to hajj financial manage-	50	50
ment?		
b(ii) Regulatory harmonization agreements?	50	50
b(iii) Strict regulatory uniformity agreements?	50	50

## 3.23. Policy Analysis of Hajj Financial Management

## 3.23.1. Policies Related to Hajj Financial Management

The establishment of BPKH is mandated by Law No. 34 of 2014 concerning hajj financial management and serves as the institution responsible for managing hajj finances. BPKH operates independently and reports directly to the president through the minister. The mechanism for managing hajj funds is divided into several sections as formulated in Law No. 34 of 2014, namely: receipt, development, expenditure, and accountability, which specifies:

## · Hajj fund receipts

The hajj financial receipts as referred to in Law No. 34 of 2014 concerning hajj management in article 4 letter a include:

- BPIH and Special BPIH deposits BPIH, also known as hajj pilgrimage operation costs, represents the funds that must be paid by citizens who intend to perform the hajj pilgrimage.
- Value Benefits of Hajj Finance Value benefit refers to the returns generated from the management of hajj funds or investments made with or by hajj financial institutions.
- Efficiency Funds for Hajj Pilgrimage Operations Hajj pilgrimage operational efficiency funds represent funds resulting from efficiency measures in hajj pilgrimage operations for that year.
- Ummah Endowment Fund (DAU) DAU or Ummah Endowment Fund constitutes the accumulated efficiency savings from hajj pilgrimage operations each year.

# • Development of hajj funds

Development constitutes a strategic process to create new hajj financial management products or to enhance existing hajj financial products in an accountable and transparent manner.

#### • Hajj fund expenditures

Hajj financial expenditures as stipulated in article 4 letter b of Law No. 34 of 2014 concerning hajj financial management encompass:

- Organization and implementation of hajj pilgrimage
- Operational expenses of BPKH
- Placement and/or investment of hajj finances
- Refund of BPIH deposits and/or special BPIH for Hajj Pilgrims who cancel departures with valid justification
- Payment of BPIH special deposit balances to PIHK
- Disbursement of benefit values derived from BPIH deposits and/or Special BPIH
- Activities conducted for the broader benefit of the Muslim community
- Refund of differential amounts between BPIH deposit balances and/or special BPIH from the determination of BPIH and/or special BPIH in the current fiscal year

Accountability of hajj funds

In fulfilling its fiduciary responsibilities for hajj fund management, BPKH is required to submit comprehensive reports concerning all hajj financial matters to the President and the House of Representatives (DPR) through the Minister of Religion of the Republic of Indonesia.

## 3.23.2. Policies Related to Hajj Financial Management

Presidential Regulation No. 110 of 2017 provides a comprehensive definition of hajj finance, encompassing all governmental rights and obligations that can be financially valued in relation to hajj pilgrimage implementation. This includes all assets, whether monetary or convertible to monetary value resulting from the execution of these obligations, sourced from either hajj pilgrims or other legitimate, non-binding sources. The operational scope of this presidential regulation primarily addresses the BPIH draft that, following DPR approval, is submitted to the president for formal determination of the official BPIH amount.

# 3.23.3. Policies Related to Hajj Financial Investment Risk Management

To ensure the establishment of optimal hajj financial management systems, Law No. 34 of 2014 concerning hajj financial management was enacted. To properly implement the provisions outlined in this foundational legislation, Government Regulation No. 5 of 2018 was subsequently formulated and established.

This Government Regulation encompasses a comprehensive regulatory framework for hajj financial management, addressing five critical dimensions: planning, implementation, accountability, reporting, and supervision of hajj finances. A significant provision within this regulation concerns the composition of the hajj financial investment portfolio. Government Regulation No. 5 of 2018 specifically stipulates that for the initial three years following BPKH's establishment, up to 50% of hajj fund investments may be allocated to banking instruments through Sharia Commercial Banks (BUS) and Sharia Business Units (UUS); following this transitional period, investment in Islamic banking instruments is capped at a maximum of 30%.

# 3.23.4. Policies Related to Regulation Formation in the Hajj Financial Management Agency

To effectively implement the provisions outlined in Article 32 of Government Regulation Number 5 of 2018, which concerns the implementation of Law Number 34 of 2014 on hajj financial management, establishing specific regulations for the BPKH regarding hajj financial investment procedures and forms became necessary. These specialized regulations are formally codified in the BPKH Regulation No. 1 of 2018, which establishes clear parameters and limitations for hajj financial investments to ensure full compliance with the mandate established by Law Number 34 of 2014.

## 3.24. Regulatory Impact Analysis (RIA) on Hajj Financial Management Policy

The RIA method developed aims to systematically evaluate the positive and negative impacts associated with regulations that are being proposed or are already in effect. RIA also functions as a policy evaluation tool and can be used as a guide in decision making. In a systematic and consistent manner, RIA thoroughly examines the influence produced by government measures and conveys information about these policies to decision-makers. In addition, RIA also plays a role in ensuring the selection of the most effective and efficient policy options by systematically examining the impact caused by policy-maker decisions and communicating this information to decision-makers. The steps taken in analyzing RIA are as follows:

## 3.24.1. Problem Formulation

Indonesia, with its relatively high population growth, receives a substantial hajj quota compared to other countries. This allocation is accompanied by public demand to perform hajj pilgrimage that consistently exceeds the quota allocated by the Saudi Arabian government. This increasing number of prospective hajj pilgrims creates a significant challenge for the Indonesian government to effectively manage the accumulation of hajj funds during prospective pilgrims' waiting periods.

The growing number of hajj pilgrims caused fund accumulation, leading to Law No. 34/2014 and the establishment of BPKH to replace the Ministry of Religious Affairs in managing hajj finances. Supported by Presidential, Government, and BPKH regulations, financial management covers planning, implementation, accountability, and supervision with involvement of key stakeholders. The Covid-19 pandemic forced adjustments in fund placement and benefit programs. A roadmap is therefore needed to compare hajj fund performance before and after BPKH, with risk management as a core principle.

## 3.24.2. Identification of Objectives

The purpose of issuing these policies is to analyze related to the hajj fund performance management policy carried out by BPKH. Therefore, the existence of this policy aims to compare the performance of hajj funds in the era of the Ministry of Religious Affairs and in the era of BPKH.

# 3.24.3. Developing Alternative Problem Solutions

Currently, these regulations have been implemented with the expectation that Law No. 34/2014 can solve the problems mentioned above. Therefore, alternative solutions to solve the problems include: first, continuing the policy that has been issued. This solution is applied if this policy has been running effectively according to the expected goals. Second, improving the policy that has been issued. This solution is applied if the policy has not been effective but can still be improved. Improvements are minor in nature where some goals have been achieved and improvements are made to perfect the achievement of goals. Third, canceling the policy that has been issued. This solution is applied if this policy is ineffective and unable to achieve the set goals.

## 3.24.4. Cost and Benefit Analysis

Positive outcomes provide advantages to a party, while costs are negative factors that cause disadvantages if a particular option is chosen. The analysis of costs and benefits is not always expressed in monetary terms but also includes identifying who is affected and who gains from a policy. In the context of hajj fund performance management policy by BPKH, the initial identification was carried out to determine the affected parties and the beneficiaries of the policy, namely the government, the Hajj Financial Management Agency (BPKH), and prospective hajj pilgrims.

When conducting cost-benefit analysis, comparisons are made between conditions prior to policy implementation, current conditions, and expected conditions. This comparative approach aims to demonstrate the effectiveness of the implemented policy. If current conditions show improvement over pre-policy conditions and align with expectations, the policy can be deemed effective and worthy of continued implementation. However, if current conditions have deteriorated, the policy is considered ineffective and requires review for potential modification or termination.

As a baseline analysis, the conditions prior to BPKH's establishment as a BPKH were characterized by:

- Hajj pilgrimage organizational costs were structured to obtain benefit values based on principles of security guarantees, benefit values, and liquidity
- Financial reporting was conducted solely on a collective basis, with initial deposits paid by prospective pilgrims not documented in individual reports
- Lack of transparency regarding hajj funds optimization to the broader community, which ultimately led BPKH to propose a virtual account concept enabling pilgrims to monitor the development progress of their managed hajj funds

The adoption of digital technologies in hajj financial management has improved transparency, efficiency, and investment decisions through virtual accounts, mobile apps, and analytics tools. However, challenges remain, including digital literacy gaps, cybersecurity demands, and ongoing technology costs. Expert cost-benefit analysis shows that effective management increases certainty for prospective pilgrims, yet the policy framework is still suboptimal as negative impacts persist after the transfer of responsibilities to BPKH. RIA findings highlight three key stakeholders: the government, BPKH, and prospective pilgrims, with further improvements needed to enhance effectiveness.

• Government For the government, the expected outcome from implementing Law No. 34/2014 is enhanced security aligned with Law No.19 of 2008 concerning State Sharia Securities (SBSN). Expert survey results demonstrate strong consensus among the majority of experts that Law No. 34/2014 implementation delivers significant benefits through guaranteed security and enhanced value benefits for hajj funds. The specific benefit of hajj pilgrim protection measures lies in streamlined management of pilgrim-deposited funds, though a notable negative impact emerges in the failure to adequately account

for variations in capital structure across industries. Additionally, while ummah endowment fund management generates positive impacts on hajj fund utilization strategies, negative consequences manifest in effects on the PIHU Bill, political interests, and various legislation challenges.

- Hajj Financial Management Agency (BPKH) From the governmental perspective, a primary objective
  in implementing Law No. 34/2014 was preventing excessive accumulation in waiting lists for prospective hajj pilgrims. Regarding BPKH operations under Law No. 34/2014, experts strongly concur that
  significant benefits have materialized through expanded managed funds and establishment of clear legal
  frameworks governing hajj fund management. Concerning negative impacts, the majority of experts acknowledge that benefit value proceeds are substantially consumed by hajj financing requirements, while
  also highlighting risks to institutional reputation.
- Prospective Hajj Pilgrims For prospective hajj pilgrims, the primary objective of implementing Law No. 34/2014 is to ensure certainty regarding pilgrim departures. Expert consensus strongly indicates that the implementation of Law No. 34/2014 delivers several key benefits to prospective hajj pilgrims, specifically enhanced hajj fund security, improved benefit values, and access to virtual account systems. However, a notable negative consequence is the increased tendency for pilgrims to demand expedited departures. Regarding accommodation services, pilgrim lodging facilities in the holy land, and transportation arrangements, the principal financial benefit manifests as improved service quality. Conversely, a significant negative impact emerges through the development of service disparities among pilgrims.

## 3.24.5. Public Consultation and Choosing the Best Alternative

Public consultation outcomes align with cost-benefit analysis findings, recommending refinement of existing policies rather than wholesale replacement. To identify optimal alternatives, it is essential to formulate targeted strategies and concrete actions that effectively eliminate or minimize persistent costs and challenges. Specifically, to address the negative impact of suboptimal returns from hajj fund investments, BPKH could implement a strategy centered on developing investment-focused proposals supported by independent studies conducted by the investment risk management division. It should be noted that BPKH's current strategic framework fundamentally complies with the provisions outlined in Law No. 34/2014. If new strategies are needed, the focus should be on how Islamic banking, non-bank financial, and investment institutions permitted under Law No. 34 of 2014 can expand their portfolios to boost investment returns managed by BPKH.

# 4. CONCLUSION

The analysis of Law No. 34/2014 on Hajj Financial Management highlights a significant transformation in Indonesia's management of hajj funds. The establishment of BPKH has introduced a more structured framework that emphasizes transparency and accountability compared to the previous system under the Ministry of Religious Affairs. This shift is especially important in addressing the growing number of pilgrims and the increasing volume of funds.

Value chain analysis indicates that BPKH has succeeded in creating an effective operational structure, although the Regulatory Impact Assessment shows that the overall policy framework is still not optimal. The absence of a formal RIA before the law's enactment may have contributed to challenges in its implementation. Despite improvements in accountability and clearer investment parameters, issues remain regarding service disparities and the optimization of investment returns.

The regulatory reforms have laid a stronger foundation for hajj financial governance in Indonesia, yet they still require refinement. Continuous improvement is needed to balance accountability, efficiency, and fairness, ensuring that the management of hajj funds not only meets financial standards but also fulfills the expectations of stakeholders and pilgrims alike.

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Conceptualization: AI; Methodology: MS; Software: NA; Validation: IS and AI; Formal Analysis: NA and MS; Investigation: IS; Resources: AI; Data Curation: IS; Writing Original Draft Preparation: NA and IS; Writing Review and Editing: MS and AI; Visualization: NA; All authors, AI, NA, MS, IS, have read and agreed to the published version of the manuscript.

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#### REFERENCES

- [1] Z. Ibrahim, N. Effendi, B. B, and R. Kurniawan, "Determinants of profit and loss sharing financing in indonesia," *Journal of Islamic Marketing*, vol. 13, no. 9, pp. 1918–1939, 2022.
- [2] A. Aziz, R. M. Syam, M. Z. N. Hasbi, A. S. Prabuwono *et al.*, "Hajj funds management based on maqāṣid al-sharīah; a proposal for indonesian context," *AL-IHKAM: Jurnal Hukum & Pranata Sosial*, vol. 18, no. 2, pp. 544–567, 2023.
- [3] H. Purwanto, S. Jati, and A. Rofiq, "Policy analysis of enforcement of halal product guarantee regulations through the regulatory impact analysis (ria) approach," *Journal of Digital Marketing and Halal Industry*, vol. 3, no. 2, pp. 149–164, 2021.
- [4] M. A. I. Caniago, "Strategic management of islamic banking in indonesia to increase market share," *Journal of Islamic Economic and Business Studies*, vol. 1, no. 1, pp. 1–19, 2023.
- [5] A. Mantelero, Beyond data: Human rights, ethical and social impact assessment in AI. Springer Nature, 2022.
- [6] S. J. Guastello, Human factors engineering and ergonomics: A systems approach. CRC Press, 2023.
- [7] S. B. Parikesit and K. Herman, "Implementation of regulatory impact analysis as an instrument of regulatory reform towards the formation of quality legislation within the framework of the rule of law in indonesia," *Indonesian Journal of Multidisciplinary Science*, vol. 4, no. 10, pp. 737–750, 2025.
- [8] K. Q. T. Nguyen, "Factors of value chain affect bank efficiency—an empirical study in vietnam," *Available at SSRN 4455147*, 2023.
- [9] H. J. Smidt and O. Jokonya, "Factors affecting digital technology adoption by small-scale farmers in agriculture value chains (avcs) in south africa," *Information Technology for Development*, vol. 28, no. 3, pp. 558–584, 2022.
- [10] M. M. Rahman, "Impact of taxes on the 2030 agenda for sustainable development: evidence from organization for economic co-operation and development (oecd) countries," *Regional Sustainability*, vol. 4, no. 3, pp. 235–248, 2023.
- [11] E. O. Aondo, "Effects of strategic management practices on growth of poultry layers production enterprises in nyaribari chache sub-county, kisii county," Ph.D. dissertation, Kisii University, 2023.
- [12] S. Tasheva and B. B. Nielsen, "The role of global dynamic managerial capability in the pursuit of international strategy and superior performance," *Journal of international business studies*, vol. 53, no. 4, pp. 689–708, 2022.
- [13] Kementerian Perencanaan Pembangunan Nasional/Bappenas Republik Indonesia, "Badan perencanaan pembangunan nasional (bappenas)," https://www.bappenas.go.id/, accessed: 1 June 2025.
- [14] Organisation for Economic Co-operation and Development (OECD), *OECD Annual Report 2008*. Paris: OECD Publishing, 2008, open access: 18 July 2025.
- [15] D. S. S. Wuisan, R. A. Sunardjo, Q. Aini, N. A. Yusuf, and U. Rahardja, "Integrating artificial intelligence in human resource management: A smartpls approach for entrepreneurial success," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 5, no. 3, pp. 334–345, 2023.

- [16] I. A. Rum, A. Tukker, A. de Koning, and A. A. Yusuf, "Impact assessment of the eu import ban on indonesian palm oil: Using environmental extended multi-scale mrio," *Science of the Total Environment*, vol. 853, p. 158695, 2022.
- [17] U. Rahardja, A. Sari, A. H. Alsalamy, S. Askar, A. H. R. Alawadi, and B. Abdullaeva, "Tribological properties assessment of metallic glasses through a genetic algorithm-optimized machine learning model," *Metals and Materials International*, vol. 30, no. 3, pp. 745–755, 2024.
- [18] R. Widayanti, M. H. R. Chakim, C. Lukita, U. Rahardja, and N. Lutfiani, "Improving recommender systems using hybrid techniques of collaborative filtering and content-based filtering," *Journal of Applied Data Sciences*, vol. 4, no. 3, pp. 289–302, 2023.
- [19] S. Lestari, S. Watini, and D. E. Rose, "Impact of self-efficacy and work discipline on employee performance in sociopreneur initiatives," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 6, no. 2, pp. 270–284, 2024.
- [20] O. Jayanagara and D. S. S. Wuisan, "An overview of concepts, applications, difficulties, unresolved issues in fog computing and machine learning," *International Transactions on Artificial Intelligence*, vol. 1, no. 2, pp. 213–229, 2023.
- [21] B. E. Sibarani, C. Anggreani, B. Artasya, and D. A. P. Harahap, "Unraveling the impact of self-efficacy, computer anxiety, trait anxiety, and cognitive distortions on learning mind your own business: The student perspective," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 6, no. 1, pp. 29–40, 2024.
- [22] K. A. A. Manurung, H. Siregar, I. Fahmi, and D. B. Hakim, "Value chain and esg performance as determinants of sustainable lending in commercial bank: A systematic literature review," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 6, no. 1, pp. 41–55, 2024.
- [23] J. Jones, E. Harris, Y. Febriansah, A. Adiwijaya, and I. N. Hikam, "Ai for sustainable development: Applications in natural resource management, agriculture, and waste management," *International Transactions on Artificial Intelligence*, vol. 2, no. 2, pp. 143–149, 2024.
- [24] J. Heikal, V. Rialialie, D. Rivelino, and I. A. Supriyono, "Hybrid model of structural equation modeling pls and rfm (recency, frequency and monetary) model to improve bank average balance," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 4, no. 1, pp. 1–8, 2022.
- [25] I. Amsyar, E. Cristhopher, U. Rahardja, N. Lutfiani, and A. Rizky, "Application of building workers services in facing industrial revolution 4.0," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 3, no. 1, pp. 32–41, 2021.
- [26] J. Siswanto, Hendry, U. Rahardja, I. Sembiring, E. Sediyono, K. D. Hartomo, and B. Istiyanto, "Deep learning-based lstm model for number of road accidents prediction," in *AIP Conference Proceedings*, vol. 3234, no. 1. AIP Publishing LLC, 2025, p. 050004.
- [27] Q. Aini, D. Manongga, U. Rahardja, I. Sembiring, and Y.-M. Li, "Understanding behavioral intention to use of air quality monitoring solutions with emphasis on technology readiness," *International Journal of Human–Computer Interaction*, vol. 41, no. 8, pp. 5079–5099, 2025.
- [28] A. Felix, D. Y. Bernanda, A. S. Kembau, F. Effendy, and R. Nathaniel, "Application-based elementary schools interactive education platform analysis and design," *IAIC Transactions on Sustainable Digital Innovation (ITSDI)*, vol. 6, no. 2, pp. 114–128, 2025.
- [29] R. Z. Ikhsan, S. Rahayu, A. H. Arribathi, and N. Azizah, "Integrating artificial intelligence with 3d printing technology in healthcare: Sustainable solutions for clinical training optimization," *ADI Journal on Recent Innovation*, vol. 6, no. 2, pp. 99–107, 2025.
- [30] F. Rahardja, L. K. Choi, R. C. Wijaya, and R. A. Sunarjo, "Gamification in digital startups: Enhancing user engagement and business growth," *Startupreneur Business Digital (SABDA Journal)*, vol. 4, no. 1, pp. 1–11, 2025.
- [31] R. Aprianto, C. Lukita, A. Sutarman, R. A. Sunarjo, R. N. Muti, and E. Dolan, "Facing global dynamics with effective strategy: A tasted organizational change management approach," *International Journal of Cyber and IT Service Management*, vol. 5, no. 1, pp. 1–11, 2025.
- [32] I. M. Putri, D. P. Ramadhani, P. Indriyani, E. N. Aidah, and A. P. Cahyani, "Predictive analytics in attendance systems for employee productivity and accountability," *International Transactions on Education Technology (ITEE)*, vol. 3, no. 2, pp. 104–113, 2025.
- [33] L. Larisang, S. Sanusi, M. A. Bora, and A. Hamid, "Practicality and effectiveness of new technopreneurship incubator model in the digitalization era," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 7, no. 2, pp. 318–333, 2025.

- [34] A. R. S. Panjaitan, J. Rowena, and T. Handra, "Application of the tam model on instagram ads," *IAIC Transactions on Sustainable Digital Innovation (ITSDI)*, vol. 6, no. 2, pp. 129–138, 2025.
- [35] M. Kuswari, R. Gantino, and J. Maratis, "Maximizing healthcare service information system: Understanding the influence of integration on efficiency," *ADI Journal on Recent Innovation*, vol. 6, no. 2, pp. 108–117, 2025.
- [36] J. I. Saputro, L. F. Sa'adah, Y. Syifa, K. D. Ramadhanti, and M. F. Gojali, "Transforming learning experiences with advanced educational technology solutions," *International Transactions on Education Technology (ITEE)*, vol. 3, no. 2, pp. 114–124, 2025.
- [37] N. D. Noviati, S. D. Maulina, and S. Smith, "Smart grids: Integrating ai for efficient renewable energy utilization," *International Transactions on Artificial Intelligence*, vol. 3, no. 1, pp. 1–10, 2024.
- [38] S. Sudaryono, R. Pratomo, A. Ramadan, R. Ahsanitaqwim, and E. Fletcher, "Artificial intelligence in predictive cybersecurity: Developing adaptive algorithms to combat emerging threats," *Journal of Computer Science and Technology Application*, vol. 2, no. 1, pp. 1–13, 2025.
- [39] N. S. Lubis, S. Hanafi, and S. Hidayat, "Enhancing educator performance through edupreneurship in international baccalaureate programs," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 7, no. 2, pp. 343–359, 2025.
- [40] H. D. Natalia and A. Aprillia, "Exploring the impact of e-wom on generation z purchase intention: The mediating role of brand image and perceived quality," *IAIC Transactions on Sustainable Digital Innovation (ITSDI)*, vol. 6, no. 2, pp. 164–176, 2025.
- [41] E. E. Djajasasana and J. R. K. Bokau, "Utilization of micro influencers and engagement in social media to gain cadet candidates," *ADI Journal on Recent Innovation*, vol. 6, no. 1, pp. 1–7, 2024.
- [42] S. Brown, J. Jones *et al.*, "Creating educational solutions for optimizing learning factory operations and outcomes," *International Transactions on Education Technology (ITEE)*, vol. 3, no. 2, pp. 134–146, 2025.
- [43] D. Martinez, L. Magdalena, and A. N. Savitri, "Ai and blockchain integration: Enhancing security and transparency in financial transactions," *International Transactions on Artificial Intelligence*, vol. 3, no. 1, pp. 11–20, 2024.
- [44] R. Supriati, S. A. Anjani, R. W. Anugrah, R. McCarthy *et al.*, "Enhancing network security with quantum cryptography: A study on future-proofing computer networks against quantum attacks," *Journal of Computer Science and Technology Application*, vol. 2, no. 1, pp. 24–35, 2025.
- [45] F. Syafariani, M. S. Lola, S. S. S. Abd Mutalib, W. N. F. W. Nasir, A. A. K. A. Hamid, and N. H. Zainuddin, "Leveraging a hybrid machine learning model for enhanced cyberbullying detection," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 7, no. 2, pp. 371–386, 2025.
- [46] R. Kardiani, E. Kurniyaningrum, B. E. Yuwono, and T. Widiarso, "House of risk approach in determining delay risk factors," *IAIC Transactions on Sustainable Digital Innovation (ITSDI)*, vol. 6, no. 2, pp. 150–163, 2025.
- [47] S. Suhada, A. Arief, and A. Z. Sarnoto, "Implementations of blended learning from the al-qur'an perspective," *ADI Journal on Recent Innovation*, vol. 6, no. 2, pp. 130–144, 2025.
- [48] A. Williams, Y. Hasudungan, and N. Azizah, "The implementation of effective financial management to increase the profitability of startups," *Startupreneur Business Digital (SABDA Journal)*, vol. 4, no. 1, pp. 47–54, 2025.
- [49] S. Pranata, F. Fanani, D. Hidayati, R. Lesmana, and Z. Ndlovu, "Implementation of smart contracts in tiktok influencer marketing," *Blockchain Frontier Technology*, vol. 4, no. 2, pp. 84–97, 2025.
- [50] C. H. Pangaribuan, A. Valerry *et al.*, "Data-driven approaches to optimize learning experiences in learning factories," *International Transactions on Education Technology (ITEE)*, vol. 3, no. 2, pp. 158–170, 2025.
- [51] L. Lawrence, L. M. Evans, K. Mirdad, C. Yu *et al.*, "Utilizing wearable technologies to foster outcome-based education in learning factories," *International Transactions on Education Technology (ITEE)*, vol. 3, no. 2, pp. 147–157, 2025.
- [52] A. Gunawan, W. Hasyim, M. Putih, T. W. Wirjawan, I. A. Gopar, and S. Stephanie, "A comprehensive bibliometric study of digital leadership influence on technopreneurial success," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 7, no. 2, pp. 492–502, 2025.
- [53] N. P. L. Santoso, R. Nurmala, and U. Rahardja, "Corporate leadership in the digital business era and its impact on economic development across global markets," *IAIC Transactions on Sustainable Digital Innovation (ITSDI)*, vol. 6, no. 2, pp. 188–195, 2025.