


Bow-Tie Analysis in the Management of Tabarru' Funds Using the Investment Adequacy Ratio (IAR) Indicator: A Case Study on the Sharia Unit of PT ABC Life

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Article Info	ABSTRACT
<p>Keywords: Tabarru' Fund, Investment Adequacy Ratio, Bow Tie Analysis, Sharia Insurance, Risk Management</p>	<p>his study is motivated by the decline in the Investment Adequacy Ratio (RKI) in Indonesia's life insurance industry during 2018–2020, particularly throughout the Covid-19 pandemic. RKI is a key liquidity indicator that reflects an insurer's ability, including that of Islamic units, to meet short-term obligations; thus, its deterioration poses significant risk exposure. This research employs a case study method on the Islamic unit of PT ABC Life, focusing on tabarru' fund management as the primary risk source. Data were collected through document analysis of financial statements, internal risk-management guidelines, and supporting interviews with relevant officers. Risk assessment was conducted using the Bow-Tie method to identify causal factors, escalation elements, and controls, aligned with the ISO 31000 framework. The findings reveal several contributors to the RKI decline, including investment-return volatility, reduced participant contributions, and increased claim burdens during the pandemic. The Bow-Tie analysis effectively maps cause-and-effect relationships and highlights the most relevant mitigation controls. These results offer practical insights for Islamic insurance providers in strengthening liquidity risk management and present an analytical framework applicable to similar conditions across the life insurance industry.</p>
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INTRODUCTION

The Islamic life insurance industry in Indonesia continues to develop in line with the growing demand for financial products that comply with sharia principles. The Financial Services Authority reports that over the past five years, the gross contributions of Islamic life insurance have shown a positive trend, although their growth remains lower than that of the conventional insurance industry (OJK, 2023). This condition indicates significant opportunities for Islamic insurance companies to enhance their role, service quality, and product innovation capacity.

On the other hand, national policy dynamics, particularly the mandatory separation of sharia business units (spin-off) as regulated in Law No. 40 of 2014, encourage companies to strengthen governance, operational efficiency, and business integration readiness. Several studies show that institutional readiness for structural changes is strongly influenced by managerial literacy, human resource competence, and the effectiveness of distribution models (Alam & Rahman, 2021; Faozi, 2022). However, studies on how Islamic life insurance companies respond to the spin-off policy within the Indonesian context remain relatively limited.

In addition, external challenges such as increased post-pandemic mortality risk, low insurance penetration in the micro segment, and limited public understanding of profit-sharing principles and sharia cash value (AAJI, 2023) require companies to adapt through stronger risk management strategies and market education. A research gap arises because most studies focus on regulatory analysis or financial performance, while examinations of company readiness and its implications for the sustainability of the sharia business model have not been widely explored.

Based on these conditions, this study is important to provide empirical insights into the factors influencing the readiness of Islamic life insurance companies in facing the spin-off agenda and to analyze its implications for long-term business development. Therefore, the research questions are: (1) what is the level of readiness of Islamic life insurance companies in implementing the business unit separation policy? and (2) what strategies need to be strengthened to maintain competitiveness in the post-spin-off phase? This study is expected to contribute to the strengthening of sharia financial industry literature and offer practical insights for regulators and industry players.

METHODS

This study adopts a qualitative research design to explore in depth the readiness of Islamic life insurance companies in implementing the spin-off policy. A qualitative approach is considered appropriate because the research focuses on understanding processes, perceptions, and institutional responses that cannot be captured solely through numerical indicators. By engaging directly with organizational actors and internal documents, the study aims to uncover how companies interpret risks, constraints, and opportunities associated with the structural transition.

Data collection relies on two primary sources: semi-structured interviews and institutional documentation. Semi-structured interviews allow the researcher to guide conversations while giving participants room to describe their experiences in their own terms. Informants were selected purposively, targeting individuals with strategic roles in governance, risk management, sharia compliance, product development, and distribution. Institutional documents, such as business plans, governance manuals, actuarial reports, and regulatory submissions, were used to triangulate interview findings and provide contextual depth.

To ensure credibility, the interview process was carried out through repeated sessions when clarification was needed. This iterative approach helped uncover nuanced perspectives

on readiness challenges, including operational restructuring, human capital development, and financial sustainability. The researcher also maintained reflective notes to capture observations and emerging insights during the fieldwork process, contributing to a more grounded interpretation of data.

The analysis followed a thematic coding procedure, beginning with careful reading of transcripts and documents to identify recurring patterns. Codes were then grouped into broader themes representing institutional readiness dimensions, such as governance alignment, strategic capability, operational capacity, and market responsiveness. This step-by-step coding process allowed the researcher to move from descriptive accounts toward more analytical interpretations.

To enhance the dependability of the study, all coding decisions were documented systematically, and cross-checked with a second reviewer familiar with sharia insurance governance. Discrepancies in interpretation were discussed until consensus was reached, ensuring that the thematic structure accurately reflected the data. Such collaborative validation contributes to the robustness expected in SINTA-level academic outputs.

Ethical considerations were observed throughout the research. Participants were informed about the study's objectives, the voluntary nature of their involvement, and the confidentiality of their responses. Company identifiers were anonymized to protect institutional privacy, allowing participants to share their views more openly. This ethical mindfulness also helps maintain trustworthiness in qualitative inquiry.

RESULTS AND DISCUSSION

Bow-Tie analysis, as referenced in ISO 31000, is a risk identification technique that visualizes the relationship between a risk event, its causes, and its consequences through a diagram shaped like a bow tie. The left side represents proactive risk management, while the right side reflects reactive measures. This technique provides a comprehensive "helicopter view" by integrating the logic of fault tree analysis and event tree analysis.

The Financial Services Authority (OJK) closely supervises the sharia insurance industry using key health indicators such as Risk Based Capital and the Investment Adequacy Ratio (RKI). RKI is a critical metric that reflects the ability of tabarru' funds to meet their obligations with liquidity. Its calculation consists of assets as the numerator and liabilities as the denominator. Assets include investment instruments such as time deposits, sukuk, government securities, and sharia mutual funds, along with non-investment assets like cash and bank balances. Liabilities cover technical reserves, claim liabilities, and other policyholder-related obligations based on the company's retention.

An evaluation of RKI from the reported financial statements over three consecutive years shows a notable downward trend, indicating weakening liquidity within the tabarru' fund despite remaining slightly above the regulatory threshold. This declining RKI condition is therefore designated as the top event in the Bow-Tie analysis.

Threat identification was conducted by tracing all cash inflow and outflow activities recorded using a cash-basis approach. Inflows originate from participant contributions, claim recoveries, reinsurance surplus underwriting, and investment income. Threats on this side

include failed or delayed contributions, delayed reinsurance receipts, and declining investment returns. Outflow threats include increased mortality, claim payments that deviate from actuarial expectations, and non-liquid investment placements that create mismatch risks.

The determination of the top event begins with outlining the RKI formula, which consists of two core variables shown in the accompanying figure.

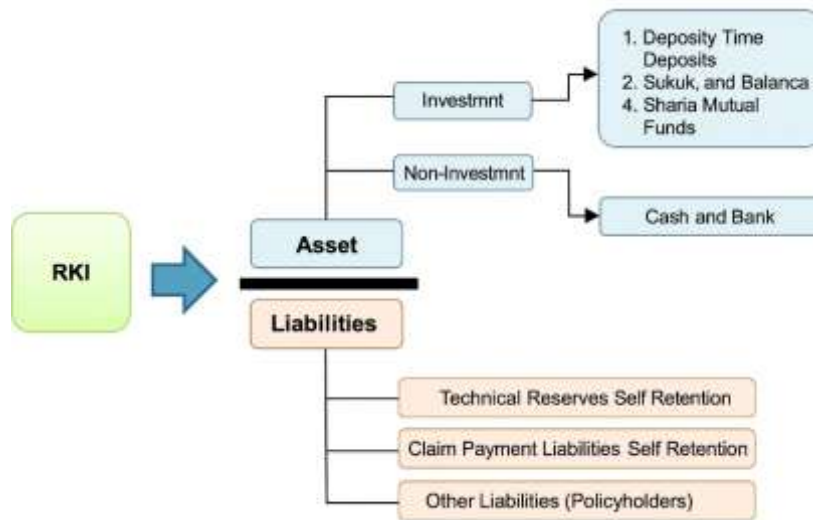


Figure 1. Breakdown of the RKI Formula

The diagram illustrates the components of the Investment Adequacy Ratio by showing how assets, both investment and non-investment, are compared against liabilities such as technical reserves, claim payment obligations, and other policyholder-related liabilities.

Threats in the Sharia Business Unit

The formation of investment assets in the tabarru’ fund, as illustrated in Figure 2, is reflected in the tabarru’ fund’s cash flow statement, which is based on cash-basis recognition.

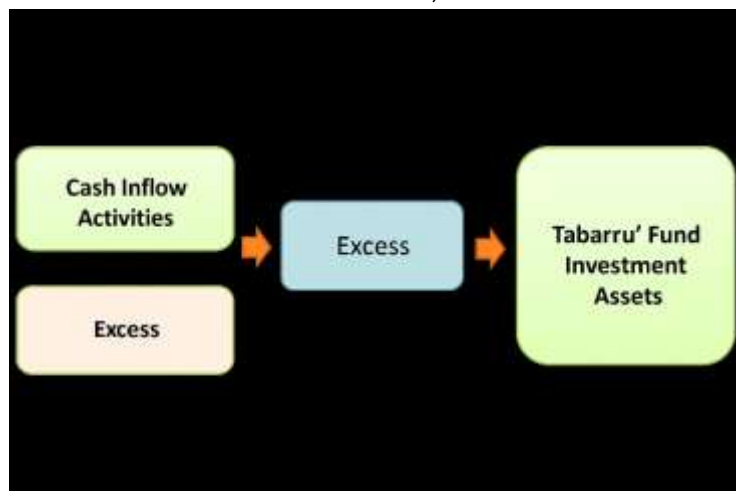


Figure 2. Flow Scheme of Cash Flows Becoming Tabarru’ Fund Investment Assets

Threats will be identified from the activities involved, including worker functions and business processes that affect cash inflows and outflows until they become tabarru' fund investment assets. The following table presents the groups of cash inflow and cash outflow activities, followed by the threats for cash inflow activities:

Threat 1: Contributions that are delayed or do not reach the company.

Participant contributions constitute a cash inflow activity, and this issue is identified as a threat named Threat: Failed Contribution Entry.

Table 1. Threat Identification Table for Failed Contribution Entry

Involved Function	Description of Internal Risk Cause	Code	Description of External Risk Cause	Code
Finance	Error in generating debit date	1.1A	Bank offline	1.1B
	Bank reconciliation and database mismatch	1.2A	Customer not identified	1.2B
Underwriting	Document assessment not in accordance with standards	1.3A	Incomplete customer documents	1.3B
	SLA delays	1.4A	Customer's limited process understanding	1.4B
	Incorrect underwriting assessment	1.5A	High-risk customer group	1.5B
Information Technology	Weaknesses in network, applications, and security	1.6A	Data theft, weak service provider	1.6B
Actuarial	Error in determining rate assumptions	1.7A	Assumptions not aligned with actual conditions	1.7B
	Limited product availability	1.8A	Changing business environment needs	
Sales	Incorrect delivery of product or process information	1.9A	Customer account closed or insufficient balance	1.8B
Accounting	Inaccuracy in the recording process	1.10A		
Legal & Compliance	Regulatory warning due to business activities	1.11A	Regulatory changes occur	1.9B
Corporate Secretariat	Slow or inaccurate media countermeasures	1.12A	Negative news spreads quickly	1.10B

This table outlines the internal and external causes of risk associated with various functions involved in managing cash inflows and related business processes within the sharia business unit.

Threat 2: Receipt of Surplus Underwriting Distribution from Reinsurance (Failed Reinsurance Backup)

Table 2. Identification Table of Reinsurance Receipt Threats (Failed Reinsurance Backup)

Involved Function	Description of Internal Risk Cause	Code	Description of External Risk Cause	Code
Claims	Decision not aligned with Reinsurance/Co-insurance provisions	2.1A	Reinsurance rejection or delay	2.1B
Reinsurance/Co-insurance Admin	Weakness in submitting reinsurance claims	2.2A	Reinsurance rejection or delay	2.2B
Finance	Weaknesses in billing procedures or billing SLA	2.3A	Reinsurance cash flow arrangements	2.3B
Accounting	Inaccuracy in the recording process	2.4A		
Information Technology	Weak network and application performance	2.5A		
Underwriting	Decision not aligned with Reinsurance/Co-insurance provisions	2.6A		
Actuarial	Error in determining retention policy and share portion	2.7A		
	Error in determining rate assumptions	2.8A	Pandemic or natural disaster events	2.4B
Legal & Compliance	Weak contractual agreements	2.9A	Reinsurance or co-insurance claim rejection	2.5B

This table outlines the internal and external causes of risks that may lead to failure in receiving reinsurance surplus underwriting distributions within the sharia insurance business unit.

Threat 3: Others (Operational, Investment & Funding Activities) —Threat of Decreasing Investment Returns

Table 3. Identification Table of Investment Decline Threats

Involved Function	Description of Internal Risk Cause	Code	Description of External Risk Cause	Code
Investment	Decisions not aligned with standard directives	3.1A	Unfavorable investment climate	3.1B
	Misjudged placement predictions		Economic crisis	3.2B
Finance	Early withdrawal before maturity	3.2A	Penalties imposed or declining investment performance	3.3B

Involved Function	Description of Internal Risk Cause	Code	Description of External Risk Cause	Code
	Cash outflows exceeding cash inflows			
Information Technology	Weak network and application performance	3.3A		
Accounting	Inaccuracy in the recording process	3.4A		
Legal & Compliance	Weak contractual agreements (breach of contract)	3.5A	Investment obligations not fulfilled	3.4B

This table presents the internal and external risk causes that contribute to declining investment returns within the sharia insurance fund management process.

The next step is the identification of threats based on cash outflow activities.

Threat 4: Claim Payments — Threat of Increased Mortality Rates

Table 4. Identification Table of Increased Mortality Threats

Involved Function	Description of Internal Risk Cause	Code	Description of External Risk Cause	Code
Claims	Decisions not aligned with procedures	4.1A	Increased mortality risk conditions	4.1B
	Incorrect claim amount due to negligence or delays	4.2A	Claim fraud	4.2B
Legal & Compliance	Differences in understanding of regulations	4.3A	Customers filing legal action	4.3B
Information Technology	Network and application errors	4.4A	Inactive bank account	4.4B
Actuarial	Errors in mortality and catastrophic assumptions	4.5A	Pandemic or natural disaster events	4.5B
Underwriting	Decisions failing to anticipate pandemics	4.6A	Misrepresentation	4.6B
Finance	Inaccuracy in payment processes	4.7A	Incorrect bank account number	4.7B
Accounting	Inaccuracy in the recording process	4.8A		

This table identifies internal and external factors contributing to the threat of rising mortality rates, which directly increases claim payment risks in the sharia insurance business unit.

Threat 5: Insurance Ujroh Payment Not Aligned with Calculations (Incorrect Payment)

Table 5. Identification Table of Incorrect Payment Threats

Involved Function	Description of Internal Risk Cause	Code	Description of External Risk Cause	Code
Finance	Inaccuracy in the payment process	5.1A	Bank offline	5.1B
Actuarial	Errors in product line assumptions	5.2A	Pending appeal claims not yet paid	5.2B
Underwriting	Incorrect submission of cut-off date data	5.3A		
Claims	Incorrect submission of cut-off date data	5.4A		
Information Technology	Network and application errors	5.5A		
Accounting	Inaccuracy in the recording process	5.6A		

Reinsurance Contribution Payments Not Aligned with Calculations (Incorrect Payment)

Table 6. Identification Table of Incorrect Reinsurance Payment Threats

Involved Function	Description of Internal Risk Cause	Code	Description of External Risk Cause	Code
Finance	Inaccuracy in the payment process	6.1A	Reinsurance backup unavailable (regulatory sanction)	6.1B
Reinsurance/Co-insurance Admin	Data not collected properly	6.2A		
Underwriting	Assessment not aligned with reinsurance requirements	6.3A		
Actuarial	Errors in retention policy and share portion	6.4A		
Information Technology	Network and application errors	6.5A		
Accounting	Inaccuracy in the recording process	6.6A		

This table outlines the internal and external factors that may cause reinsurance contribution payments to be incorrect or inconsistent with actuarial and contractual calculations.

Threat 6: Others (Operational, Investment & Funding Activities) — Threat of Investment Placement Mismatch

Table 7. Identification Table of Non-Liquid Investment Placement Threats (Investment Mismatch)

Involved Function	Description of Internal Risk Cause	Code	Description of External Risk Cause	Code
Investment	Decisions not aligned with standard directives	7.1A	Unfavorable investment climate	7.1B
	Placement not aligned with insurance duration	7.2A	High frequency and rate of mortality	7.2B
	Placement not aligned with expected withdrawal timing	7.3A	Withdrawals occurring during market downturns	7.3B
Finance	Early withdrawal before maturity	7.4A	Penalties imposed	7.4B
	Cash outflows exceeding cash inflows	7.5A		
Information Technology	Network and application errors	7.6A		
Accounting	Inaccuracy in the recording process	7.7A		

Threat identification on the liability side is derived from the calculation of technical reserves, which include the tabarru' contribution reserve, the unearned tabarru' contribution reserve, the claim reserve, and the catastrophe reserve. The next step is to identify threats arising from technical reserve activities.

Threat 7: Threats from Technical Reserve Activities (Reserve Deviation)

Table 8. Identification Table of Technical Reserve Deviations (Under- or Over-Reserving)

Involved Function	Description of Internal Risk Cause	Code	Description of External Risk Cause	Code
Company Actuary	Assumptions not aligned with actual experience	8.1A	Claim occurrences exceeding expectations	8.1B
Actuarial	Errors in reinsurance and tariff policies	8.2A		
Underwriting	Receivables arising from decisions not aligned with SLA	8.3A		
Claims	Claim liabilities due to exceeding reporting deadlines	8.4A		
Information Technology	Network and application errors	8.5A		
Finance	Receivables arising from billing beyond SLA	8.6A		

Involved Function	Description of Internal Risk Cause	Code	Description of External Risk Cause	Code
Accounting	Inaccuracy in the recording process	8.7A		

This table outlines the internal and external factors that can lead to deviations in technical reserves, potentially resulting in reserves being set too low or too high relative to actual risk exposure.

Consequences if the RKI Falls Below the Regulatory Threshold (RKI < 100%)

The consequences that may occur if the identified threats materialize and cause the RKI value to fall below the OJK regulatory threshold are as follows:

Table 9. Consequences if the RKI Falls Below the Regulatory Threshold

No	Consequence	Description	Basis of Regulation
1	Utilization of Qardh	The company provides available assets from the Company Fund as Qardh to the tabarru' fund so that the RKI value can be restored to a maximum of one hundred percent.	POJK No. 72/POJK.05/2015 Article 8 Paragraph 2(b) and Article 32
2	Intensive Supervision Sanctions	The company will be placed under intensive supervision by OJK and subject to administrative sanctions if the RKI value is below one hundred percent but still above eighty percent while no assets are available for Qardh.	POJK No. 9/POJK.05/2021 Article 4 Paragraph 1 and Article 19
3	Special Supervision Sanctions	The company will be placed under special supervision by OJK and subject to administrative sanctions if the RKI value is below eighty percent and no assets are available for Qardh.	POJK No. 9/POJK.05/2021 Article 5 Paragraph 2 and Article 19
4	Business Activity Restrictions	The company's business activities will be restricted by OJK and administrative sanctions imposed if the company's condition worsens based on the RKI value and other health indicators.	POJK No. 9/POJK.05/2021 Article 12 and Article 19
5	Revocation of Business License	The company must return its license as a sharia insurance company or sharia unit, or the license may be revoked by OJK if the company cannot be restored to a healthy condition.	POJK No. 9/POJK.05/2021 Article 17

This table summarizes the regulatory consequences imposed by OJK when the Investment Adequacy Ratio falls below the required threshold, ranging from Qardh support to potential license revocation.

Barriers or Controls

Preventive Barriers for the threats are as follows:

Threat	Threat Realized	Origin	Group of Risk Causes SOUUA	Risk Cause Codes	Mitigation/Control - Barriers
Contribution Falls & Exits, Initiated Contribution Entry)	4	Internal	Human Resources Process Control Weakness, Process Smjg Reinsurance Strength Negative Information Human Resources Cut Off Consistent	11B.1, 1.4A 2.2A	1. Set profit rate b 2. Ar the income SME buasial a 3. Seguly look SX mekidatadentaz 4. Aligro date atu with ritcurity
Recovery or Surplus Underwriting Distribution Fate (Reinsurance Backup (ature).	5+	Internal	Control Process Weakness Reinsurance Strength Negative Information Human Resources Cut Off Consistent	11B. 1.3A 2.1A 2.2A 2.2A 3.1B	1. Appropriate risk management 2. Set certain profit ratio 3. Plan restructuring of agreements, SCP Rysem Aekual Management
Investment Results Decline	7	External	Capital Conditions Human Resources Accuracy Control Process Weakness, Control Economic Conditions	3.1A, 5.2A 3.4A 2.1B 4.5B	1. Correct provision oversision 2. SMEs following correct performative 3. Plan restructuring tekt- agreements
Mortality Rate Increases	7	External	Mortality Risk Control Process Weakness Human Resources Actuarial Accuracy	4.1A, 3.2A 4.3A 4.3A 4.3B	1. Correct provision oversision 2. SMEs following correct line 3. Plan restructuring pro- grams of agree- ments
Insurance Service Fee payment not according to calculation (Payment Error)	5	Internal	Human Resources Accuracy Control Process Weakness Weak Process Infor Cut Off Consistent	5.1A, 5.2A 5.4A 5.4A 6.4A	1. Appropriate control provision 2. Only accurate product line SMEs following correct position performance 5. Restructuring pe agreements 4. Product line SM following comar
Reserve Deviation	7	External	Mortality Risk Weak Process Information Control Process Weakness Actuarial Accuracy Human Conditions	6.1A 5.3A 6.6A	1. Proper data process respectively 2. Proper time mshks from Daa WeeHeer neu 3. Aligro daa with Aduary

Figure 3. Matrix for Identifying Barriers or Mitigation/Control of Threats

The image presents a comprehensive Bow-Tie preventive barriers table that maps each identified threat to its internal and external risk causes, corresponding risk codes, and specific mitigation controls used to prevent risk escalation.

Recovery Barriers for the Consequences are as follows:

Table 10. Table of Recovery Barriers for the Consequences

No	Consequences	Mitigation / Recovery Barriers	Regulatory Basis
1	Utilizing Qardh	1. Establishing assets available for qardh from Company Funds. 2. Prioritizing the repayment of qardh when underwriting surplus occurs.	POJK No. 72/POJK.05/2015 Article 8(2)(b) and Article 32

No	Consequences	Mitigation / Recovery Barriers	Regulatory Basis
2	Intensive Supervision Sanction	<ol style="list-style-type: none"> 1. Complying with Regulator Recommendations. 2. Maintaining Solvency Level > 120%. 3. Maintaining RKI & Liquidity Ratio > 100%. 4. Achieving Composite Health Level 3 with Good Governance Level 4/5. 5. Maintaining Composite Health Level 4/5. 	POJK No. 9/POJK.05/2021 Article 4(1) and Article 19
3	Special Supervision Sanction	<ol style="list-style-type: none"> 1. Complying with Regulator Recommendations. 2. Maintaining Solvency Level so it does not fall below 80%. 3. Maintaining RKI & Liquidity Ratio > 80%. 4. Achieving Composite Health Level 5. 	POJK No. 9/POJK.05/2021 Article 5 and Article 19
4	Business Activity Restriction	<ol style="list-style-type: none"> 1. Completing Intensive Supervision within less than 1 year. 2. Completing Special Supervision within less than 6 months. 3. Complying with Regulator Recommendations. 4. Improving Business Conditions until the Cause is Resolved. 5. Ensuring No Violations of Regulations by Management. 	POJK No. 9/POJK.05/2021 Article 19
5	Business License Revocation	<ol style="list-style-type: none"> 1. Notification to the Entire Branch Network regarding Restriction Status. 2. Ceasing Business Activities. 3. Resolving OJK Recommendations. 4. Efforts to Restore Operations and Improve Before the Deadline. 	POJK No. 9/POJK.05/2021 Article 17 and Article 19

This table outlines the consequences, mitigation/recovery barriers, and regulatory references related to solvency, liquidity, and supervisory sanctions in Islamic insurance operations.

Escalation Factor Summary

Based on the preventive barriers related to Threat No. 4 in Table 14, an external escalation factor emerges. Policyholders may reject the company's tariff evaluation and

participant behavior. The findings emphasize that the resilience of the tabarru' fund depends on the organization's capacity to coordinate underwriting, investment, actuarial, claims, and compliance functions, ensuring that each process supports the fund's collective risk-sharing purpose. This approach demonstrates that strengthening governance mechanisms, enhancing accuracy in data and assumptions, improving communication with policyholders, and reinforcing internal oversight are fundamental to sustaining financial soundness. Overall, the bow-tie perspective provides a comprehensive understanding of risk pathways, enabling organizations to anticipate disruptions, prevent escalation, and safeguard the integrity of the tabarru' fund within the broader framework of sharia insurance operations.

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