

Simulation-Based Formulation of Quality Risk Mitigation and Reputational Crisis Management

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ABSTRACT

Educational institutions within Islamic boarding schools face a dual risk: the risk of a decline in academic quality and the risk of a reputational crisis that could spread to the image of the boarding school as a whole. This study aims to formulate and evaluate strategies for mitigating quality risks and managing reputation crises at Nurul Jadid Paiton Probolinggo Senior High School, using a risk-based thinking framework and role-play simulations. The research employs a qualitative approach with a single-case study design combined with a tabletop exercise. Data were collected through a review of the school's quality documents, focused group discussions, and observations of two simulation scenarios: a literacy quality deficit and an alleged financial governance scandal; analysis was conducted using an interactive model and a 5×5 risk matrix in accordance with ISO 31000:2018. The research results identified eight priority risks, with the risk of issues going viral on social media rated as 'very high' and four other risks rated as 'high'. Mitigation measures were deemed appropriate if they met seven criteria: relevance to the root cause of the problem; specificity; measurability; proportionality to the risk level; designation of a responsible party and a deadline; integration with the values of the pesantren; and readiness for communication. Simulations showed that the speed of internal verification (tabayyun), a single spokesperson, and coordination between schools and Islamic boarding schools were key determinants of a successful crisis response. This study concluded that integrating the risk-based thinking cycle with the crisis management cycle—trained through regular simulations—can enhance an institution's preparedness, thereby preventing quality risks from escalating into a reputational crisis.

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INTRODUCTION

The quality of education is no longer understood solely in terms of students' academic achievements, but also as an institution's ability to sustain the trust of its stakeholders. In an increasingly open educational landscape, a single poorly managed incident—such as a decline in assessment results, complaints from parents, or allegations of financial mismanagement—can spread within hours via social media and escalate into a reputational crisis (Harsono et al., 2026). These conditions require educational institutions to shift from a reactive management approach to a proactive one—that is, identifying potential problems before they occur. This anticipatory approach is known in quality management systems as risk-based thinking (RBT). The ISO 9001:2015 standard establishes RBT as a principle that replaces the concept of preventive actions, while ISO 21001:2018 adapts it specifically for educational organizations (Standardization, 2015). ISO 31000:2018, meanwhile, provides a framework for the risk management process that includes establishing context, identifying, analyzing, evaluating, and addressing risks, as well as monitoring and reviewing them (Standardization, 2018). Within the tradition of integrated quality management, (Sallis, 2002) emphasizes that quality must be built into processes from the outset, rather than inspected after a failure occurs; this idea aligns with the logic of RBT.

A number of studies in Indonesia have demonstrated the relevance of risk management for educational institutions. (Aristawati & Hidayat, 2024) identified strategic risks associated with quality improvement in secondary schools, using the Education Report Card as the primary indicator. (Siagian et al., 2026) found that risk management shifts the management of educational resources from a reactive to a proactive approach through succession planning, scenario-based budgeting, and contingency funds. In the context of Islamic boarding schools (pesantren), (Anggraini, 2024) implemented ISO 31000 at a pesantren and found that the risks of student absenteeism and payment arrears had not yet been fully managed, while (Maulida et al., 2025) mapped out the ten main risks in the management of change in Islamic education along with their mitigation strategies.

On the other hand, crisis management studies emphasize that reputation is a vulnerable strategic asset. Situational Crisis Communication Theory (SCCT) explains that an appropriate communication response depends on the public's perceived level of responsibility for the crisis, the crisis's history, and the organization's initial reputation (Coombs, 2019). In the context of Islamic educational institutions, a study (Najiburrahman et al., 2024) introduced the "Five-Dimensional Reputation Framework for Islamic Boarding Schools," (Aminah et al., 2026) highlights the role of public relations governance and leadership communication in strengthening reputation, while (Maizah et al., 2026) outlines pesantren public relations strategies for addressing misinformation spread through anonymous accounts and digital chat groups.

Nevertheless, these studies tend to separate two domains that are, in fact, intertwined. Risk management studies generally stop at identification and mitigation measures, without testing whether those mitigation strategies can actually be implemented when a crisis strikes. Conversely, crisis management studies focus more on communication responses after a crisis has occurred, without linking them to the risk register that should have anticipated the crisis in the first place. Furthermore, research using simulations and role-playing as tools to evaluate the effectiveness of mitigation strategies remains rare, even though experience-based learning is recognized as an effective way to build readiness for action. (Boin et al., 2016). SMA Nurul Jadid is a private educational institution located within the Nurul Jadid Islamic Boarding School in Paiton, Probolinggo, with an "A" accreditation status. This position presents both advantages and specific vulnerabilities: the majority of students are boarding students who live in dormitories; school policies intersect with those of the boarding school; and any school-related issue has the potential to be perceived by the public as a

boarding school issue. Therefore, the institution's readiness to manage quality risks and reputation crises is a strategic necessity, not merely an administrative requirement for accreditation.

Based on the above discussion, this study aims to: (1) map priority quality and reputational risks in SMA Nurul Jadid using the RBT framework; (2) formulating appropriate risk mitigation strategies for priority risks; and (3) evaluating the effectiveness of these mitigation strategies through simulations and role-playing exercises addressing cases of quality deficits and governance scandals. The contribution of this research is an integrative model that links the RBT cycle with the crisis management cycle, as well as an evaluation rubric for the appropriateness of mitigation strategies that can be used by other pesantren-based educational institutions.

METHODS

This study uses a qualitative approach with a single-case study design (Yin, 2018) combined with simulation methods in the form of tabletop exercises and role-playing. This design was chosen because the research objective was not only to describe risk conditions but also to test how mitigation strategies function when applied to a controlled, simulated crisis situation. The research location was SMA Nurul Jadid, Paiton, Probolinggo, Jawa Timur. Participants were selected through purposive sampling based on their roles in the institution's quality decision-making and communication processes, namely the principal, the vice principal for curriculum and student affairs, the treasurer, the public relations coordinator, the quality assurance team, homeroom teachers, and representatives from the Islamic boarding school and the school committee. In the role-play session, participants assumed their actual roles, while the roles of external parties—such as journalists, parents of boarding school students, and online users—were played by the facilitator. The research procedure was carried out in four stages. First, the context was established through a review of the school's vision and mission statements, work plan, Education Report Card results, self-evaluation reports, and school-boarding school regulations. Second, risks were identified and analyzed through focused group discussions using a matrix of likelihood (L) and impact (I) on a scale of 1–5. Risk scores were calculated using the following equation:

Classified as low (1–4), moderate (5–9), high (10–14), and very high (15–25). Third, the development of mitigation strategies for high- and very-high-level risks based on the risk treatment options outlined in ISO 31000:2018. Fourth, simulating two crisis scenarios, each consisting of four phased information injections, followed by an after-action review to assess the appropriateness of the mitigation strategies using a rubric of seven criteria. Data were analyzed using the interactive model by Miles et al. (2014), which includes data condensation, data presentation, and the drawing and verification of conclusions. Data validity was ensured through source triangulation (documents, discussions, and simulation observations), methodological triangulation, and confirmation of findings with participants (member check). Ethical considerations were upheld by anonymizing individual identities and clarifying that the simulation scenarios were fictional cases that did not refer to actual events at the institution.

FINDINGS AND DISCUSSION

Quality and Reputation Risk Mapping Based on Risk-Based Thinking

A review of documents and focused group discussions identified eight priority risks, which were grouped into four categories: academic quality risks, governance risks, reputational risks, and safety and data risks. The results of the risk analysis are presented in Table 1.

Tabel 1. Priority Risk Register SMA Nurul Jadid

Code	Risk	Main Cause	L	I	Score / Level
R1	Literacy and numeracy scores in the Education Report Card have declined	Instruction has not been differentiated; follow-up on assessment results is weak	3	4	12 / Height
R2	Effective learning time has decreased due to the dual burden of school and Islamic boarding school activities	School and boarding school schedules are not synchronized; student fatigue	4	3	12 / Height
R3	Teachers' competencies are not yet aligned with the demands of deep learning	Professional development is not yet needs-based	3	3	9 / Currently
R4	Accountability for the management of funds (BOS and parent contributions) is being questioned	Reporting is not yet open to students' guardians	2	5	10 / Height
R5	Viral issues or hoaxes on social media related to school services	Official information channels are slow; anonymous accounts	4	4	16 / Very high
R6	Cases of bullying or violence in school and boarding school settings	Cross-unit oversight is not yet integrated	2	5	10 / Height
R7	Data breaches involving students or information system disruptions	Minimal account security and data backup	2	3	6 / Currently
R8	School and Islamic boarding school policies are not aligned	No coordination forum has been scheduled yet	3	3	9 / Currently

Table 1 shows that the highest-scoring risk is actually in the area of reputation (R5), not in the academic domain. This finding underscores the nature of educational institutions within Islamic boarding schools: the impact of an issue does not stop at the school level but extends to public trust in the boarding school as the parent institution. Meanwhile, R4 and R6 have relatively low probabilities but maximum impact, thus falling into the category of “rare but fatal” risks that require protocol preparedness, not merely routine monitoring. This pattern is consistent with the findings (Aristawati & Hidayat, 2024) which identifies the Education Report Card as a source for identifying quality risks; however, this study adds a dimension of interconnectedness: the academic risks R1 and R2 can evolve into R5 if data indicating a decline in quality is disseminated without an official statement from the institution. In other words, quality risks and reputational risks are not two separate lists, but rather a chain of cause and effect that must be managed within a single registry.

Priority Risk Mitigation Strategies

For high- and very high-level risks, the team formulated mitigation measures by selecting risk management strategies, specific actions, responsible parties, success indicators, and deadlines. The results of this formulation are presented in Table 2.

Table 2. Formulation of Priority Risk Mitigation Measures

Code	Strategy	Mitigation Measures	Person in Charge	Indicators and Deadlines
R1	Reducing likelihood	the Analysis of items on the Education Report Card; a 15-minute cross-curricular literacy program; diagnostic assessments at the beginning of each semester	Deputy Head of Curriculum	The proportion of students exceeding the minimum competency level increased in the subsequent assessment; evaluations are conducted each semester
R2	Reducing likelihood	the Integrated school-boarding school calendar; restrictions on evening activities leading up to assessments	School Principals and the Pesantren Education Bureau	The integrated calendar is approved before the school year begins; effective attendance is $\geq 95\%$
R4	Reducing impact	the Quarterly summary financial reports to the committee; a formal complaint channel; an annual internal audit	Treasurer and Committee	Reports are published on time four times a year; complaints are addressed within ≤ 3 business days
R5	Reducing impact	the Crisis communication protocol; single spokesperson; daily social media monitoring; initial statement template	Public Relations Coordinator	Initial statement issued within 6 hours of the issue being detected; simulations conducted at least twice a year
R6	Avoiding reducing	and Task force on preventing violence in schools and boarding schools; safe reporting channels; training for guardians	Deputy Head of Student Affairs	A task force has been formed; all reports are being followed up in accordance with procedures

The formulations in Table 2 show a shift from normative to operational wording. In the initial draft for discussion, mitigation measure R5 simply stated “improving the school’s image,” while R4 stated “increasing transparency.” Such formulations are not substantively incorrect, but they cannot be tested because they lack specific actions, responsible parties, and metrics. After being reformulated according to the logic of ISO 31000:2018 (Standardization, 2018), each mitigation measure now includes observable actions and verifiable indicators. It is important to note that the choice of strategy is tailored to the risk profile. For high-probability risks (R1, R2), mitigation is focused on reducing the likelihood through process improvements. For risks with maximum impact but low probability (R4, R6), mitigation is directed toward reducing the impact and ensuring protocol readiness. This principle of proportionality aligns with the view (Hopkin, 2018) that mitigation resources should be allocated in proportion to the magnitude of the risk, while avoiding the tendency of organizations to treat all risks with the same intensity.

Crisis Management Simulations and Role-Playing Exercises

To test the mitigation strategies, two hypothetical crisis scenarios were simulated. Scenario A (quality deficit) depicts the circulation of screenshots from the Education Report Card showing a decline in literacy achievement in a parents’ chat group, accompanied by allegations that the school is “too preoccupied with pesantren activities.” Scenario B (governance scandal) depicts a post from an anonymous account accusing the school of non-transparent fees and misuse of activity funds, which

was subsequently picked up by local online media. Each scenario progresses through four information injections: T+0 (issue emerges), T+2 hours (issue spreads), T+24 hours (media requests confirmation), and T+72 hours (demands for follow-up from the committee and parents). A summary of the responses deemed appropriate at each stage is presented in Table 3.

Tabel 3. Crisis response patterns from simulations under two scenarios

Stage	Scenario A: Quality Deficiencies	Scenario B: Governance Scandal
Detection and verification (T+0)	The quality team verifies the data in the Education Report and prepares a root cause analysis	The treasurer and the principal reviewed the financial documents before making a statement (tabayyun)
Initial response (T+2 hours)	Brief statement: acknowledge the data, explain the context, and outline a plan for improvement	Initial statement: accept complaints, ensure investigation, avoid refuting claims before all the facts are known
Stabilization (T+24 hours)	Meeting with representatives of the students' guardians; presentation on the literacy program (R1–R2 mitigation)	Sole spokesperson; presentation of financial reports to the committee; coordination with Islamic boarding schools
Recovery and learning (T+72 hours)	Periodic progress reports; risk register updates	Internal audit results are announced; if errors are found, an apology is issued and the system is corrected (ishlah)

The results of the simulation revealed three critical points. First, the speed of internal verification determines the quality of the initial statement. In the first round of Scenario B, the public relations officer tended to immediately refute the allegations before the financial data was verified; consequently, when the next round of information revealed documents that appeared to support the allegations, the institution's credibility declined. In the second round, the principle of tabayyun was applied as a procedure: verification was conducted first, while the initial statement contained only a commitment to investigate. Second, the presence of a single spokesperson prevented conflicting messages from emerging between the school and the Islamic boarding school. Third, pre-formulated mitigation measures, such as quarterly financial reports, accelerated recovery because the institution had evidence ready to present.

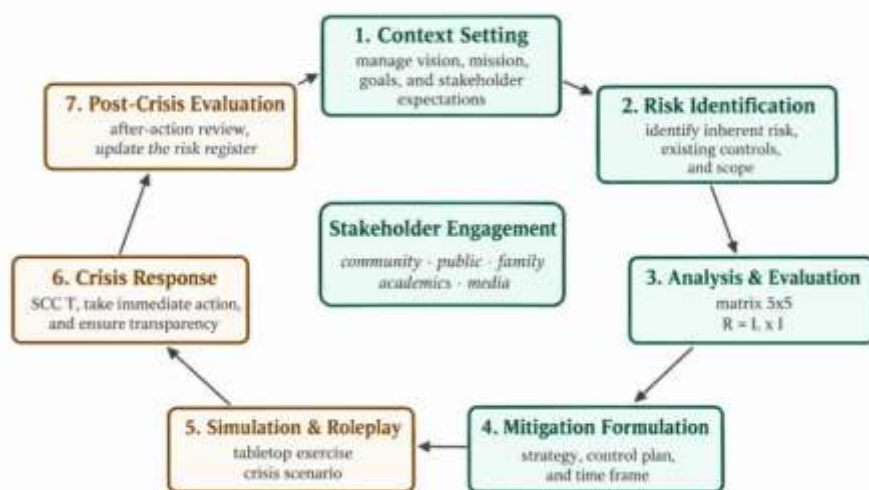


Figure 1. An integrative model of the risk-based thinking cycle and crisis management based on pesantren values

These findings are summarized in the integrative model shown in Figure 1. The green cycle (context setting through mitigation formulation) represents the preventive aspect of RBT, while the brown cycle (simulation, crisis response, and post-crisis evaluation) represents the responsive and

reflective aspects of crisis management. Both cycles are bound by the values of the pesantren tradition: amanah in resource management, shiddiq in the dissemination of information, syura in decision-making, tabayyun in issue verification, and ishlah in post-crisis recovery.

Evaluation of the Appropriateness of Risk Mitigation Strategies

Through an after-action review, the team developed a rubric to assess the effectiveness of the mitigation strategies. This rubric was based on the gaps observed between the mitigation strategies outlined on paper and the actions that could actually be carried out during the simulation. The rubric is presented in Table 4.

Table 4. Evaluation Rubric for the Accuracy of Risk Mitigation Strategies

Criteria	Accuracy indicators	Test questions in the simulation
Relevance	Measures that address the root causes, not the symptoms	Does mitigation change the causes listed in the risk register?
Specificity	An action is defined as an observable activity	Can the implementer carry it out without additional interpretation?
Measurability	Have quantitative indicators or documentary evidence	How do organizations know that mitigation efforts are successful?
Proportionality	Resource allocation based on risk level	Is the risk of receiving stronger treatment very high?
Accountability	Clear responsibilities and deadlines	Who is contacted first when the shipment arrives?
Value integration	In accordance with the values of trustworthiness, honesty, consultation, verification, and reconciliation	Is the response morally and institutionally justifiable?
Communication Readiness	Key messages, channels, and spokespersons are available	Can the initial statement be issued within 6 hours?

Applying the rubric to the initial draft revealed that the most common weaknesses lay in the criteria of measurability and accountability. Many mitigation formulations used general verbs such as “improve,” “optimize,” or “strengthen” without specific indicators, so that in the simulation, no party felt it had the authority to act. After revision, the mitigation measures in Table 2 met all criteria, and this was evident in the second round of the simulation when the initial responses for both scenarios were completed within the specified time limit. The findings of this study reinforce the argument that RBT in educational quality cannot be limited to the creation of a risk register. (Siagian et al., 2026) state that risk management transforms educational administration into a proactive process; this study demonstrates that this proactive nature is only truly tested when mitigation strategies are confronted with time constraints and incomplete information. Simulations serve as stress tests that reveal mitigation strategies that look good on paper but are not operational. This aligns with the cycle of learning from concrete experiences in role-playing, followed by reflection through an after-action review, the reconceptualization of mitigation strategies, and active experimentation in the next round.

From a crisis management perspective, the response patterns in Table 3 align with the SCCT. Scenario A tends to be perceived by the public as a preventable crisis if the institution lacks data and a remediation plan; therefore, the appropriate strategy is to acknowledge the data and demonstrate corrective actions (Coombs, 2007). Scenario B is ambiguous: if the allegations are proven false, the organization falls into the “victim cluster” and need only provide evidence-based clarification; if proven true, the organization needs a “rebuild” strategy through an apology and system improvements (Coombs, 2019). Therefore, rapid internal verification is not only an ethical obligation but also a technical prerequisite for selecting the appropriate communication strategy. These findings build upon (Harsono et al., 2026) and (Maizah et al., 2026) which emphasize early detection and

transparent communication, by adding that early detection must be accompanied by well-rehearsed verification procedures.

The unique nature of the pesantren context is also clearly evident. Coordination between schools and pesantrens (R8)—classified as moderate risk in the registry—turned out to be a determining factor in the simulation, as inconsistent messaging between schools and pesantren elements accelerated the escalation of the issue. This finding aligns with (Ismail et al., 2023) which shows that the pattern of policy centralization in pesantren influences the quality management of educational units within them, as well as with (Najiburahman et al., 2024) and (Aminah et al., 2026) which identify credibility, trust, and leadership communication as pillars of reputation. This study adds that pesantren values can be operationalized into procedures: tabayyun as a verification step, syura as a forum for crisis decision-making, and islah as a commitment to post-crisis improvement. This study has limitations. The scenario used is a hypothetical case, so the emotional stress and public dynamics are not entirely the same as those in a real crisis. In addition, the assessments of likelihood and impact are based on internal expert evaluations, which may be biased. Future research could test this model longitudinally, involve external evaluators, and compare several educational institutions within the same Islamic boarding school environment.

CONCLUSION

This study concludes that quality risks and reputational risks at Nurul Jadid High School form a chain of cause and effect that must be managed within a single integrated framework, with the risk of issues going viral on social media being the highest. Mitigation strategies are considered appropriate if they meet seven criteria: relevance, specificity, measurability, proportionality, accountability, integration of values, and communication readiness. Simulations and role-playing have proven useful as evaluation tools because they reveal mitigation strategies that are normative rather than operational, while also training participants in the speed of verification, the discipline of a single spokesperson, and coordination between the school and the Islamic boarding school. In practical terms, the school is advised to establish an integrated risk register that is reviewed every semester, conduct crisis simulations at least twice a year, and form a joint crisis coordination forum with representatives from the Islamic boarding school. Future research is recommended to test this integrative model in real-world crisis contexts and across a wider range of pesantren-based educational institutions.

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