

## Strategic Decision-Making and Business Risk Management: Simon's Bounded Rationality Theory in Organizational Policy Formulation Processes Amid Uncertainty

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(Received: Juli 09, 2026; Revised: August 17, 2026; Accepted: September 01, 2026)

### ABSTRACT

This study examines how bounded rationality constraints are associated with strategic decision quality and business risk management effectiveness in Indonesian organizations. A quantitative cross-sectional survey was conducted with 285 organizational decision-makers from manufacturing, financial services, retail and distribution, and public sector organizations. The proposed relationships were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with bootstrapping. The findings show that cognitive limitations, information incompleteness, time pressure, and environmental uncertainty were significantly associated with strategic decision quality ( $\beta = 0.29$ – $0.45$ ,  $p < .01$ ). Strategic decision quality was strongly associated with business risk management effectiveness ( $\beta = 0.61$ ,  $p < .001$ ). Significant indirect effects were found for all four bounded rationality dimensions, with information incompleteness producing the largest indirect effect ( $\beta = 0.28$ ). The residual direct effect of the higher-order bounded rationality construct on business risk management effectiveness was not significant ( $\beta = 0.19$ ), highlighting the importance of strategic decision quality as a mediating mechanism. These findings emphasize the importance of improving information quality and structured strategic decision processes under uncertainty. However, the cross-sectional design, purposive sampling, and reliance on perceptual measures limit causal inference and broader generalizability, while organizational learning culture was measured but not empirically tested as a moderator. This study extends Simon's bounded rationality framework by empirically linking cognitive, informational, temporal, and environmental constraints with business risk management effectiveness through strategic decision quality in an Indonesian organizational context.

**Keywords:** Bounded rationality; business risk management; Indonesia; strategic decision-making; strategic decision quality

### 1.Introduction

The contemporary business environment is increasingly characterized by volatility, uncertainty, complexity, and ambiguity. These conditions challenge the assumption that organizational decision-makers can obtain complete information, evaluate every available alternative, and select an objectively optimal course of action. Managers are instead required to formulate strategic decisions while dealing with limited information, restricted cognitive capacity, environmental uncertainty, and time pressure (Ansyari, 2024; Gruner, 2024). Such conditions make Herbert A. Simon's theory of bounded rationality particularly relevant for explaining how strategic decisions are actually made and why the quality of those decisions may ultimately influence organizational risk management effectiveness.

Bounded rationality was formally introduced by Simon (1955) as an alternative to the perfect-rationality assumptions of classical economic and decision theories. Simon argued that decision-makers do not possess unlimited cognitive capacity, complete knowledge, or unlimited time to evaluate all possible alternatives. Consequently, organizational actors generally do not optimize. Instead, they search for solutions that are sufficiently acceptable under existing constraints, a process widely described as *\*satisficing\** (Simon, 1955, 1972). This perspective shifts attention from how decision-makers should behave under ideal conditions to how decisions are actually produced under

realistic organizational conditions. Contemporary scholarship continues to demonstrate the relevance of this perspective in environments characterized by uncertainty, information overload, technological change, and complex strategic choices (Petracca, 2024; Gigerenzer et al., 2024; Macchi & Bagassi, 2024).

The practical relevance of bounded rationality is particularly evident in business risk management. Risk management requires organizations to identify threats, evaluate their potential consequences, determine appropriate responses, and continuously monitor changes that may affect organizational objectives. Although these processes are often presented as systematic and analytical, their implementation depends heavily on managerial judgment. Risk assessments may therefore be influenced by incomplete information, limited attention, time constraints, cognitive shortcuts, and rapidly changing environmental conditions (Ansyari, 2024; Junior, 2025; Sakwaya et al., 2025). Consequently, technically sophisticated risk management procedures may still produce suboptimal outcomes when the strategic decisions underlying them are made under severe cognitive and informational constraints.

Indonesia provides a relevant empirical setting for examining these relationships. As Southeast Asia's largest economy, Indonesia combines rapid economic and technological development with regulatory change, market diversity, institutional complexity, and substantial differences in organizational and digital capabilities across industries and regions. Organizations operating in manufacturing, financial services, retail, and the public sector frequently make strategic decisions in environments where market information evolves rapidly, regulatory requirements continue to develop, and the availability of timely organizational intelligence may vary considerably (Ansyari, 2024; Schneider, 2025). Decision-makers may therefore need to act before all relevant information is available or before every strategic alternative can be comprehensively evaluated.

These conditions are consistent with Simon's argument that real organizational behavior is better understood through bounded rather than perfect rationality. When managers face uncertainty, they often simplify complex problems, rely on prior experience, use heuristics, and select alternatives that satisfy minimum organizational requirements rather than continue searching for theoretically optimal solutions (Simon, 1955, 1972; Gigerenzer et al., 2024). Satisficing should not necessarily be interpreted as irrational behavior. In many circumstances, it represents an adaptive response to environments in which exhaustive information search would be expensive, slow, or impossible. Gigerenzer et al. (2024), for example, extend this argument through ecological rationality, suggesting that relatively simple heuristics can perform effectively when environments are uncertain and complex.

However, bounded rationality may also reduce strategic decision quality when organizational constraints become excessive. Four constraints are particularly relevant to the present study: cognitive limitations, information incompleteness, time pressure, and environmental uncertainty. Cognitive limitations refer to restrictions in the ability of decision-makers to process, integrate, and evaluate large amounts of complex information. Even experienced managers have limited attention and working-memory capacity, making comprehensive evaluation increasingly difficult as the number of strategic alternatives and information sources increases (Petracca, 2024; Scholtes et al., 2024). Decision-makers may consequently simplify problems or prioritize only the information perceived as most salient.

Information incompleteness represents a related but conceptually distinct constraint. Strategic decisions frequently concern future conditions for which complete, accurate, and timely information does not exist. Missing market information, uncertain competitor behavior, imperfect forecasting, and changing regulatory conditions can force managers to rely on partial representations of organizational problems (Gruner, 2024). Under these circumstances, judgment becomes increasingly dependent on assumptions, previous experience, and simplified representations of reality. The quality of the resulting strategic decision may therefore depend not only on how much information is available but also on how effectively decision-makers interpret incomplete information.

Time pressure further restricts strategic deliberation. Organizations frequently encounter situations in which decisions must be made before extensive information gathering or detailed evaluation can be completed. Competitive threats, operational disruptions, regulatory deadlines, financial pressures, and unexpected market changes can substantially shorten the period available for decision-making. Bounded rationality predicts that such conditions encourage more rapid information processing and earlier acceptance of satisfactory alternatives (Fuchs & Banaszak, 2024; Heo, 2025). Although rapid decisions may sometimes be necessary, sustained time pressure may also increase reliance on cognitive shortcuts and reduce opportunities to compare alternative courses of action.

Environmental uncertainty creates an additional challenge because it reduces the predictability of the consequences associated with strategic alternatives. Changes in consumer preferences, technology, competition, regulation, and macroeconomic conditions can make previously reliable information less useful for current decisions. Gruner (2024) distinguishes situations of risk, in which probability distributions are relatively identifiable, from uncertainty and deeper forms of uncertainty in which relevant future conditions cannot be reliably specified. As environmental uncertainty increases, managers face greater difficulty estimating potential outcomes and may rely more strongly on boundedly rational decision processes.

Previous studies provide considerable theoretical support for examining these constraints, but the literature remains fragmented. Research on strategic decision-making has examined uncertainty, cognitive biases, heuristics, information processing, and decision-support mechanisms, yet these factors are not always integrated into a single organizational model. Novelli and Spina (2024), for example, emphasize the importance of systematic information gathering and disciplined strategic experimentation for improving decision outcomes under uncertainty. Fuchs and Banaszak (2024) illustrate how heuristics and cognitive biases may influence organizational resource allocation, while Rivero (2025) discusses the potential role of intelligent decision-support systems in reducing some human information-processing limitations. These studies reinforce the importance of bounded rationality but leave room for a more explicit examination of how several constraints jointly relate to strategic decision quality and subsequent risk management outcomes.

Strategic decision quality provides an important mechanism for connecting bounded rationality with business risk management. Strategic decision quality refers to the extent to which organizational decisions are based on appropriate information, coherent evaluation, consideration of relevant alternatives, and alignment with organizational objectives. High-quality strategic decisions should improve an organization's ability to identify relevant risks, select proportionate mitigation strategies, allocate resources appropriately, and respond effectively to emerging threats. Conversely, weaknesses in strategic decision processes may translate cognitive or informational constraints into ineffective risk responses. This intermediary role suggests that bounded rationality may affect risk management effectiveness indirectly through its influence on the quality of strategic decisions.

This mechanism remains insufficiently examined in an integrated empirical framework. Much of the bounded rationality literature concentrates on individual decision behavior, heuristic use, cognitive bias, or conceptual criticism of rational-choice assumptions. Risk management research, in contrast, frequently emphasizes frameworks, governance structures, technological systems, or formal risk assessment procedures. The relationship between these literatures remains comparatively underdeveloped. In particular, limited empirical research has examined whether strategic decision quality serves as the mechanism through which multiple bounded rationality constraints are translated into organizational risk management outcomes, especially in developing-country contexts (Permana & Wening, 2024; Figueira, 2024; Schneider, 2025).

This issue creates an important first research gap. Although bounded rationality has a well-established theoretical foundation, the effects of distinct cognitive and environmental constraints on strategic decision quality require further quantitative investigation. Treating bounded rationality as a single abstract condition may conceal meaningful differences among cognitive limitations, information incompleteness, time pressure, and environmental uncertainty. Examining these dimensions separately

enables the study to determine whether particular constraints are more strongly associated with strategic decision quality than others.

A second gap concerns the mechanism connecting bounded rationality with business risk management effectiveness. Existing research often assumes that constraints directly affect organizational outcomes. However, Simon's theoretical reasoning suggests a process through which constraints shape the search, evaluation, and selection of alternatives before an organizational outcome occurs. Strategic decision quality therefore represents a theoretically plausible mediating mechanism. Testing mediation provides greater explanatory value than examining direct relationships alone because it clarifies *how* bounded rationality constraints are associated with organizational risk outcomes.

A third gap concerns the application of these relationships in Indonesian organizations. Most foundational bounded rationality research was developed outside Indonesia, while much contemporary research on uncertainty and strategic decision-making continues to focus on advanced economies or conceptual settings. Indonesian organizations face combinations of institutional change, market volatility, technological transformation, and heterogeneous information environments that provide a meaningful context for testing whether bounded rationality mechanisms remain relevant across different organizational and economic conditions. Evidence from this context can therefore extend the empirical applicability of Simon's theory without assuming that findings from mature economic environments automatically transfer to developing-market organizations.

Organizational learning culture is also theoretically relevant to this broader discussion. Organizations that encourage knowledge sharing, reflection, experimentation, and learning from previous decisions may be better positioned to cope with individual cognitive and informational limitations. Existing conceptual work suggests that organizational learning processes may help organizations develop collective mechanisms that compensate for some forms of bounded rationality (MOLEKA, 2025; Shimizu, 2024). Nevertheless, the moderating role of organizational learning culture is *not tested* as part of the structural model reported in the present study. It is therefore treated here as a theoretically relevant contextual extension and a direction for subsequent empirical research rather than as one of the study's tested contributions. This distinction is necessary to maintain consistency between the theoretical argument, analytical procedures, and reported findings.

The present study focuses specifically on the pathway from bounded rationality constraints to strategic decision quality and subsequently to business risk management effectiveness. References to organizational policy formulation throughout the manuscript describe the broader institutional setting within which strategic decisions and risk management practices operate. Policy formulation is not modeled as an independent latent construct in the empirical analysis. This clarification ensures that the theoretical scope remains consistent with the variables that were actually operationalized and tested.

Accordingly, this study addresses three primary objectives. First, it examines the relationships between four bounded rationality constraints—cognitive limitations, information incompleteness, time pressure, and environmental uncertainty—and strategic decision quality. Second, it examines whether strategic decision quality is associated with business risk management effectiveness. Third, it tests whether strategic decision quality mediates the relationships between bounded rationality constraints and business risk management effectiveness. The study additionally evaluates whether a higher-order representation of bounded rationality constraints retains a direct relationship with risk management effectiveness after strategic decision quality is introduced into the model.

Based on these arguments, H1–H4 propose that cognitive limitations, information incompleteness, time pressure, and environmental uncertainty are significantly associated with strategic decision quality. H5 proposes that strategic decision quality positively influences business risk management effectiveness. H6 evaluates whether bounded rationality constraints retain a significant direct association with business risk management effectiveness after strategic decision quality is considered. Finally, H7 proposes that strategic decision quality mediates the relationships between each bounded rationality constraint and business risk management effectiveness. The direction of H1–H4 should be

interpreted according to the exact coding of the measurement items; therefore, the Methods section must clearly specify whether higher construct scores represent stronger constraints or a greater capacity to manage those constraints before the signs of the structural coefficients are interpreted.

By integrating bounded rationality, strategic decision quality, and business risk management within a single empirical model, this study contributes to the literature in three ways. It operationalizes Simon's theoretical arguments through several distinct organizational constraints rather than treating bounded rationality as an abstract assumption; it identifies strategic decision quality as a mechanism linking these constraints to organizational risk outcomes; and it evaluates these relationships in the comparatively underexamined context of Indonesian organizations. In doing so, the study provides a more process-oriented application of bounded rationality theory while remaining within the boundaries of the relationships that are empirically tested in the present analysis.

## 2. METHOD

### 2.1 Research Design and Participants

This study employed a quantitative cross-sectional survey design within a positivist research framework. The design was selected because the study aimed to examine the relationships among bounded rationality constraints, strategic decision quality, and business risk management effectiveness at a specific point in time. The unit of analysis was the individual organizational decision-maker, while the empirical context comprised organizations operating in Indonesia.

The target population consisted of managers, executives, and senior professionals who were directly involved in strategic decision-making and/or business risk management activities. Respondents were drawn from manufacturing, financial services, retail and distribution, and public sector organizations. These sectors were selected because they operate under different forms of environmental uncertainty, regulatory pressure, market change, and organizational complexity, providing an appropriate setting for examining bounded rationality in organizational decision processes.

Purposive sampling was used to ensure that participants had relevant organizational experience and sufficient involvement in strategic decisions. Eligible respondents were required to hold a managerial, executive, or specialist position involving responsibility for strategic planning, organizational decision-making, risk assessment, or risk management. This criterion was important because the constructs examined in the study required respondents to evaluate organizational-level decision processes rather than routine individual work activities.

Data were collected using a structured online questionnaire between February and May 2024. Participation was voluntary, and respondents were informed about the purpose of the study before completing the questionnaire. A total of 285 usable responses were retained for analysis. The final sample was considered adequate for PLS-SEM estimation given the number of constructs, structural relationships, and mediation paths included in the model, consistent with recommended PLS-SEM sample-size guidance (Hair et al., 2019).

The sample consisted of 178 male respondents (62.5%) and 107 female respondents (37.5%). The largest age group was 35–44 years (42.5%), followed by respondents aged 25–34 years (30.9%), 45–54 years (19.6%), and 55 years or older (7.0%). In terms of organizational position, 37.9% were senior managers, 34.0% were middle managers, 17.9% were executive directors or C-suite executives, and 10.2% were risk management specialists. Manufacturing represented the largest industry group (30.9%), followed by financial services (24.2%), the public sector (22.8%), and retail and distribution (22.1%). The complete respondent profile is presented in Table 1.

**Table 1. Respondent Demographic Profile (n = 285)**

| Category      | Subcategory | Frequency (n) | Percentage (%) |
|---------------|-------------|---------------|----------------|
| <b>Gender</b> | Male        | 178           | 62.5           |
|               | Female      | 107           | 37.5           |
| <b>Age</b>    | 25–34 years | 88            | 30.9           |
|               | 35–44 years | 121           | 42.5           |

| Category        | Subcategory                | Frequency (n) | Percentage (%) |
|-----------------|----------------------------|---------------|----------------|
|                 | 45–54 years                | 56            | 19.6           |
|                 | ≥55 years                  | 20            | 7.0            |
| <b>Position</b> | Executive Director/C-Suite | 51            | 17.9           |
|                 | Senior Manager             | 108           | 37.9           |
|                 | Middle Manager             | 97            | 34.0           |
|                 | Risk Management Specialist | 29            | 10.2           |
| <b>Industry</b> | Manufacturing              | 88            | 30.9           |
|                 | Financial Services         | 69            | 24.2           |
|                 | Retail & Distribution      | 63            | 22.1           |
|                 | Public Sector              | 65            | 22.8           |

## 2.2 Measures

Data were collected using a multi-item questionnaire measured on a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The questionnaire operationalized six constructs included in the tested structural model: Cognitive Limitations, Information Incompleteness, Time Pressure, Environmental Uncertainty, Strategic Decision Quality, and Business Risk Management Effectiveness.

All constructs were modeled reflectively. The indicators were designed to capture respondents' perceptions of the organizational conditions under which strategic decisions were made and the effectiveness of the resulting decision and risk management processes. Items with opposite substantive directions, where applicable, were reverse-coded before model estimation so that indicator interpretation remained internally consistent within each construct.

Cognitive Limitations was measured using eight items capturing limitations in analytical attention, information-processing capacity, simultaneous consideration of alternatives, and the ability to process complex strategic information. The operationalization was informed by the bounded rationality and organizational decision-making literature available prior to questionnaire administration, including Scholtes et al. (2024) and Permana and Wening (2024).

Information Incompleteness was measured using six items assessing the extent to which strategic decision-makers operated with incomplete, delayed, uncertain, or insufficiently accurate information. The construct reflected the informational boundary of rational decision-making emphasized in bounded rationality theory and was operationalized with reference to the decision-making dimensions discussed by Gruner (2024) and Arend (2024).

Time Pressure was measured using five items assessing whether organizational decision-makers faced limited time for collecting information, evaluating alternatives, consulting relevant stakeholders, and completing strategic deliberation. The items were informed by research concerning decision-making under restricted time and cognitive conditions, including Fuchs and Banaszak (2024).

Environmental Uncertainty was measured using seven items addressing changes in markets, competition, regulation, technology, and other external conditions that reduced the predictability of organizational decisions. The construct was operationalized to represent the dynamism and unpredictability surrounding strategic choices. Importantly, studies published after the beginning of data collection are used elsewhere in this manuscript only to support subsequent theoretical interpretation and are not treated as original sources of questionnaire items.

Strategic Decision Quality was measured using ten items assessing the perceived quality of strategic decision processes and outcomes. The indicators covered the use of relevant information, systematic evaluation of alternatives, consistency between strategic choices and organizational objectives, consideration of potential consequences, and the perceived appropriateness of final strategic decisions. Strategic Decision Quality was positioned as the principal mediating construct connecting bounded rationality constraints with business risk management effectiveness.

Business Risk Management Effectiveness was measured using nine items capturing the organization's perceived effectiveness in identifying, evaluating, responding to, monitoring, and controlling business

risks. The measure reflected the ability of organizational risk management processes to support strategic objectives and respond appropriately to emerging threats. The operationalization was informed by organizational risk management literature available at the time of instrument development, including Ansryari (2024) and David (2024).

Organizational Learning Culture was additionally captured using six questionnaire items as an exploratory contextual measure. However, it was **not included as a moderator in the structural model tested in the present study**, and no moderation or moderated mediation hypothesis was estimated. Accordingly, organizational learning culture is not treated as part of the study's confirmed empirical contribution. It is retained only as a theoretically relevant contextual construct that may be examined more explicitly in future research using an appropriately designed moderation or multilevel model.

No separate construct for organizational policy formulation was operationalized. References to policy formulation in the theoretical discussion describe the broader organizational context in which strategic decision-making and risk management take place rather than an additional latent variable included in the empirical model.

To avoid temporal ambiguity regarding instrument provenance, publications appearing after the February–May 2024 data-collection period are used only as contemporary theoretical or comparative references and are not identified as sources from which the original questionnaire was adapted.

### **2.3 Data Analysis**

Partial Least Squares Structural Equation Modeling (PLS-SEM) was performed using SmartPLS 4. The method was selected because the study examined multiple latent constructs, several simultaneous structural relationships, a mediating mechanism, and a higher-order representation of bounded rationality constraints. PLS-SEM is appropriate for estimating complex prediction-oriented structural models and assessing indirect effects through resampling procedures (Hair et al., 2019).

The analysis was conducted in two stages. First, the reflective measurement model was evaluated to establish indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. Internal consistency was assessed using composite reliability (CR), with values of 0.70 or higher regarded as acceptable and values of approximately 0.80 or above indicating good reliability. Convergent validity was evaluated using Average Variance Extracted (AVE), with values of 0.50 or higher considered acceptable. Discriminant validity was evaluated primarily using the heterotrait-monotrait ratio (HTMT), with values below 0.90 indicating adequate distinction between constructs.

All six constructs included in the principal structural model were specified as reflective constructs. Therefore, reflective measurement criteria were applied consistently throughout the measurement-model assessment. No first-order construct was treated as formative. This specification resolves the inconsistency created by the previous statement that some constructs were formative while only reflective validity statistics were reported.

Second, the structural model was evaluated using standardized path coefficients, corresponding significance levels, coefficient of determination ( $R^2$ ), and predictive relevance ( $Q^2$ ). Collinearity among predictor constructs was examined before interpreting the structural paths. The significance of structural relationships was estimated through bootstrapping with 10,000 resamples and 95% bias-corrected confidence intervals.

Strategic Decision Quality was tested as a mediator between each of the four bounded rationality dimensions and Business Risk Management Effectiveness. The mediation analysis therefore estimated the indirect pathways from Cognitive Limitations, Information Incompleteness, Time Pressure, and Environmental Uncertainty through Strategic Decision Quality to Business Risk Management Effectiveness. Indirect effects were considered statistically significant when their bootstrapped 95% confidence intervals did not include zero.

In addition to the four first-order bounded rationality dimensions, a second-order **BR Constraints** construct was estimated to examine whether bounded rationality retained a residual direct association with Business Risk Management Effectiveness after Strategic Decision Quality was incorporated into the model. The higher-order construct was specified using the repeated-indicators approach, with Cognitive Limitations, Information Incompleteness, Time Pressure, and Environmental Uncertainty representing its first-order dimensions. This procedure provides the methodological basis for the direct

BR Constraints pathway reported under H6 and prevents the higher-order coefficient from being interpreted as an unexplained combination of four unrelated latent variables.

Predictive relevance was assessed for the endogenous constructs using the blindfolding procedure.  $Q^2$  values greater than zero were interpreted as indicating that the model possessed predictive relevance for the corresponding endogenous construct. The resulting  $Q^2$  values are reported together with the structural-model results rather than being discussed only as methodological criteria.

Organizational Learning Culture was not entered as an interaction term, and no product-indicator, two-stage moderation, or moderated mediation model was estimated. Therefore, the analytical approach does not claim to test an organizational learning culture moderation effect. This treatment is consistent with the objectives and hypotheses stated in the revised Introduction and with the results reported in the study.

#### **2.4 Common Method Bias and Ethical Considerations**

Because all principal variables were collected from the same respondents using a single survey instrument, the potential influence of common method bias was assessed. Harman's single-factor test was used as a diagnostic procedure by examining whether a single unrotated factor accounted for the majority of variance across the measurement items. A first-factor variance below the conventional 50% threshold was interpreted as evidence that common method variance was unlikely to dominate the observed relationships. The corresponding empirical percentage should be reported in the Results section together with the other measurement diagnostics.

Procedural measures were also applied to reduce potential common method effects. Respondents were informed that there were no objectively correct or incorrect answers, responses were collected anonymously, participation was voluntary, and questionnaire items were presented as assessments of organizational conditions rather than evaluations of individual performance. These procedures were intended to reduce evaluation apprehension and socially desirable responding.

All respondents received information concerning the study's purpose and voluntary nature before participating. Informed consent was obtained before questionnaire completion, and participants could discontinue participation without penalty. No personally identifying information was required for the analysis, and responses were handled confidentially and reported only in aggregate form.

The study's formal ethical review status, including the responsible institution and approval or exemption details where applicable, is reported in the manuscript's mandatory **Ethical Approval Statement**. The corresponding statement should accurately reflect the actual institutional approval status of the study and should not include an approval number or committee decision that was not formally issued.

### **3. RESULTS AND DISCUSSION**

#### **3.1 Measurement Model Assessment**

The measurement model was assessed before evaluating the structural relationships among the study constructs. Table 2 presents the descriptive statistics, internal consistency reliability, convergent validity, and indicator loading ranges for all measured constructs.

The mean scores for the four bounded rationality dimensions ranged from 3.68 to 3.91 on a five-point scale. Information Incompleteness recorded the highest mean score ( $M = 3.91$ ,  $SD = 0.63$ ), followed by Environmental Uncertainty ( $M = 3.82$ ,  $SD = 0.68$ ), Cognitive Limitations ( $M = 3.75$ ,  $SD = 0.71$ ), and Time Pressure ( $M = 3.68$ ,  $SD = 0.74$ ). These values indicate that respondents encountered meaningful informational, environmental, cognitive, and temporal constraints when making strategic organizational decisions.

Strategic Decision Quality recorded a mean score of 3.78 ( $SD = 0.65$ ), while Business Risk Management Effectiveness showed a slightly higher mean of 3.88 ( $SD = 0.62$ ). Organizational Learning Culture, which was measured as an exploratory contextual construct but was not included as a moderator in the tested structural model, recorded a mean of 3.55 ( $SD = 0.78$ ).

The reliability results demonstrate satisfactory internal consistency across all constructs. Cronbach's alpha values ranged from 0.79 to 0.88, while Composite Reliability (CR) ranged from 0.83 to 0.91. All values therefore exceeded the commonly recommended minimum reliability threshold. Convergent validity was evaluated using Average Variance Extracted (AVE), with values ranging from 0.52 to 0.64. Since all AVE values exceeded the recommended threshold of 0.50, the constructs demonstrated adequate convergent validity.

Indicator loadings ranged from 0.68 to 0.90 and were considered acceptable for the reflective measurement model. Discriminant validity was assessed using the Heterotrait-Monotrait ratio, with all HTMT values remaining below 0.87. These values were lower than the recommended threshold of 0.90, indicating satisfactory discriminant validity among the latent constructs. Taken together, the reliability and validity results confirm that the measurement model was sufficiently robust for subsequent structural model testing.

**Table 2. Descriptive Statistics and Measurement Model Results**

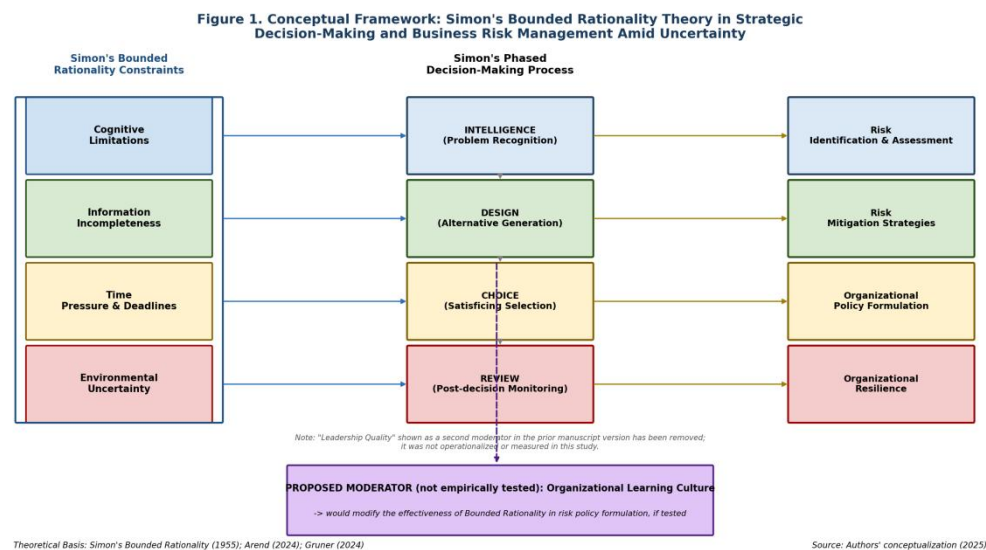
| Construct                              | Items | M    | SD   | CR   | AVE  | $\alpha$ | Loadings  |
|----------------------------------------|-------|------|------|------|------|----------|-----------|
| Cognitive Limitations                  | 8     | 3.75 | 0.71 | 0.88 | 0.57 | 0.85     | 0.71–0.86 |
| Information Incompleteness             | 6     | 3.91 | 0.63 | 0.91 | 0.64 | 0.88     | 0.76–0.90 |
| Time Pressure                          | 5     | 3.68 | 0.74 | 0.83 | 0.52 | 0.79     | 0.68–0.81 |
| Environmental Uncertainty              | 7     | 3.82 | 0.68 | 0.86 | 0.55 | 0.82     | 0.70–0.84 |
| Organizational Learning Culture        | 6     | 3.55 | 0.78 | 0.85 | 0.54 | 0.81     | 0.69–0.83 |
| Strategic Decision Quality             | 10    | 3.78 | 0.65 | 0.90 | 0.61 | 0.87     | 0.73–0.88 |
| Business Risk Management Effectiveness | 9     | 3.88 | 0.62 | 0.89 | 0.59 | 0.86     | 0.74–0.87 |

*Note.* M = Mean; SD = Standard Deviation; CR = Composite Reliability; AVE = Average Variance Extracted;  $\alpha$  = Cronbach's Alpha. Source: PLS-SEM analysis using SmartPLS 4.

Because the principal variables were collected from the same respondents through a single survey instrument, procedural precautions were applied to reduce potential common method bias. Respondents participated anonymously and voluntarily, questionnaire wording was kept neutral, and respondents were informed that there were no objectively correct or incorrect answers. These procedures were intended to reduce evaluation apprehension, socially desirable responses, and respondents' tendency to infer relationships among the focal variables.

### 3.2 Conceptual Framework

Figure 1 presents the conceptual framework developed from Simon's Bounded Rationality Theory. The framework positions Cognitive Limitations, Information Incompleteness, Time Pressure, and Environmental Uncertainty as four organizational manifestations of bounded rationality associated with Strategic Decision Quality. Strategic Decision Quality subsequently serves as the primary mechanism connecting these decision conditions with Business Risk Management Effectiveness.



**Figure 1. Conceptual Framework: Simon's Bounded Rationality Theory in Strategic Decision-Making and Business Risk Management Amid Uncertainty**

Source: Authors' conceptualization, adapted from Simon (1955, 1972), Arend (2024), and Gruner (2024).

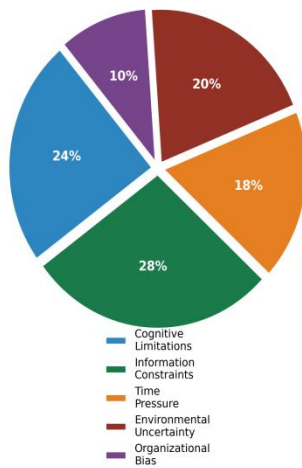
The framework reflects Simon's argument that organizational decision-making occurs under limitations in information, cognitive processing capacity, and available time. These constraints influence how organizational actors identify strategic problems, develop alternative responses, select courses of action, and review the consequences of their decisions. The intelligence, design, choice, and review stages presented in Figure 1 are therefore used as theoretical representations of the wider decision process rather than as separately measured latent constructs.

Organizational Learning Culture remains theoretically relevant because organizations characterized by knowledge sharing, reflection, experimentation, and learning may potentially respond differently to cognitive and informational constraints. However, Organizational Learning Culture was not entered as an interaction term in the structural analysis and was not empirically tested as a moderator in the present study. Accordingly, it is treated as a theoretically relevant extension for future research rather than as part of the tested empirical contribution.

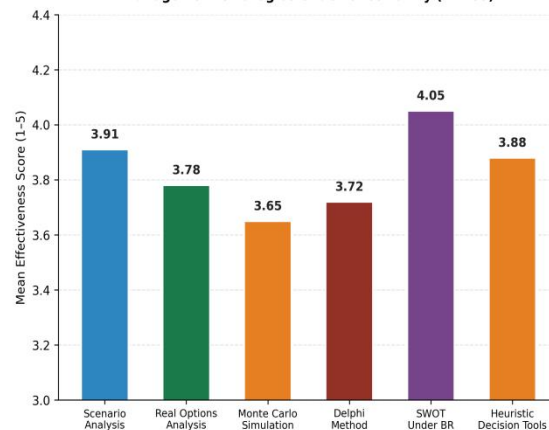
### 3.3 Distribution of Bounded Rationality Constraints and Risk Management Strategies

Figure 2 presents supplementary descriptive findings regarding the bounded rationality conditions reported by respondents and the perceived effectiveness of several decision-support approaches used in risk management under uncertainty.

(a) Distribution of Bounded Rationality Constraint Types Reported by Managers (n=285)



(b) Mean Effectiveness Ratings of Risk Management Strategies Under Uncertainty (n=285)



Source: Primary data—structured questionnaire survey of organizational decision-makers, Indonesia (2024); n=285 respondents.

**Figure 2. (a) Distribution of Bounded Rationality Constraint Types Reported by Managers (n = 285). (b) Mean Effectiveness Ratings of Risk Management Strategies Under Uncertainty**

Source: Primary data from the structured questionnaire survey, Indonesia (2024).

As shown in Figure 2(a), Information Incompleteness accounted for the largest reported constraint category at 28%, followed by Cognitive Limitations at 24%, Environmental Uncertainty at 20%, and Time Pressure at 18%. This pattern broadly corresponds with the descriptive construct scores presented in Table 2, particularly the relatively high mean score for Information Incompleteness.

Figure 2(a) also presents Organizational Bias, which accounted for 10% of the descriptive responses. Organizational Bias was not modeled as an independent latent construct in the PLS-SEM analysis and should therefore be interpreted only as supplementary descriptive information rather than as part of the structural hypothesis testing.

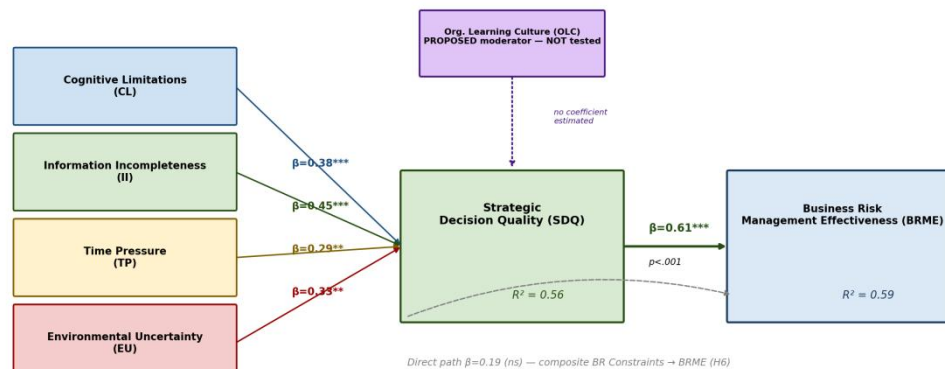
The prominence of Information Incompleteness is theoretically meaningful. Simon's bounded rationality framework emphasizes that organizational decision-makers rarely possess complete information regarding all relevant alternatives, consequences, and future environmental conditions (Simon, 1955, 1972). Strategic decisions must therefore frequently be made using partial representations of organizational problems and incomplete knowledge of future outcomes.

Figure 2(b) shows managers' evaluations of several approaches used to support decision-making and business risk management. SWOT analysis recorded the highest effectiveness rating ( $M = 4.05$ ), followed by scenario analysis ( $M = 3.91$ ) and heuristic decision tools ( $M = 3.88$ ). The Delphi method recorded a mean score of 3.72, while Monte Carlo simulation received the comparatively lowest rating at 3.65.

These findings are consistent with the logic of bounded and ecological rationality. Decision-support approaches that simplify complex environments may remain useful when complete information, unlimited analytical capacity, and extensive decision time are unavailable. Scenario analysis and heuristic tools, for example, allow managers to organize uncertainty and evaluate relevant alternatives without requiring exhaustive optimization (Gigerenzer et al., 2024; Novelli & Spina, 2024). However, these results represent managers' perceived effectiveness ratings rather than objective evidence that one decision-support technique universally outperforms another.

### 3.4 Structural Model Results

After establishing the adequacy of the measurement model, the structural relationships were evaluated using PLS-SEM with a bootstrapping procedure involving 10,000 resamples. Figure 3 presents the standardized path coefficients, while Table 3 summarizes the hypothesis testing results.



**Figure 3. PLS-SEM Results: Path Coefficients of the Bounded Rationality Model for Strategic Decision-Making and Business Risk Management Amid Uncertainty**

Note. \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ ; ns = not significant;  $\beta$  = standardized path coefficient.  
Source: PLS-SEM analysis using SmartPLS 4.

The structural model results demonstrate significant relationships between all four bounded rationality dimensions and Strategic Decision Quality. Information Incompleteness showed the strongest association with Strategic Decision Quality ( $\beta = 0.45$ ,  $SE = 0.051$ ,  $p < .001$ ), followed by Cognitive Limitations ( $\beta = 0.38$ ,  $SE = 0.059$ ,  $p < .001$ ).

Environmental Uncertainty was also significantly associated with Strategic Decision Quality ( $\beta = 0.33$ ,  $SE = 0.063$ ,  $p < .01$ ), while Time Pressure demonstrated the smallest but still statistically significant coefficient ( $\beta = 0.29$ ,  $SE = 0.068$ ,  $p < .01$ ). Accordingly, H1, H2, H3, and H4 were supported.

The four bounded rationality dimensions jointly explained 56% of the variance in Strategic Decision Quality ( $R^2 = 0.56$ ). This indicates that the model had substantial explanatory capacity for differences in respondents' assessments of the quality of their organizations' strategic decisions.

Strategic Decision Quality demonstrated a strong positive relationship with Business Risk Management Effectiveness ( $\beta = 0.61$ ,  $SE = 0.047$ ,  $p < .001$ ), supporting H5. The model explained 59% of the variance in Business Risk Management Effectiveness ( $R^2 = 0.59$ ). This result indicates that organizations reporting stronger strategic decision processes also tended to report stronger capabilities in identifying, evaluating, mitigating, and monitoring business risks.

For H6, the four first-order bounded rationality dimensions were represented through a higher-order BR Constraints construct. The residual direct relationship between BR Constraints and Business Risk Management Effectiveness was  $\beta = 0.19$  ( $SE = 0.081$ ) and was not statistically significant. Consequently, H6 was not supported.

**Table 3. Hypothesis Testing Results**

| H Hypothesis Path                                          | $\beta$ | SE    | p      | Decision  |
|------------------------------------------------------------|---------|-------|--------|-----------|
| H1 Cognitive Limitations → Strategic Decision Quality      | 0.38    | 0.059 | < .001 | Supported |
| H2 Information Incompleteness → Strategic Decision Quality | 0.45    | 0.051 | < .001 | Supported |
| H3 Time Pressure → Strategic Decision Quality              | 0.29    | 0.068 | < .01  | Supported |
| H4 Environmental Uncertainty → Strategic Decision Quality  | 0.33    | 0.063 | < .01  | Supported |
| H5 Strategic Decision Quality → BRME                       | 0.61    | 0.047 | < .001 | Supported |

| H Hypothesis Path                                                             | $\beta$ | SE    | p      | Decision      |
|-------------------------------------------------------------------------------|---------|-------|--------|---------------|
| H6 BR Constraints (Higher-Order) $\rightarrow$ BRME                           | 0.19    | 0.081 | ns     | Not Supported |
| H7 BR Constraints $\rightarrow$ Strategic Decision Quality $\rightarrow$ BRME | 0.33    | 0.063 | < .001 | Supported     |

Note.  $\beta$  = standardized path coefficient; SE = standard error; BRME = Business Risk Management Effectiveness; BR = Bounded Rationality; ns = not significant. H6 represents the residual direct effect of the higher-order BR Constraints construct. H7 represents mediation through Strategic Decision Quality and was evaluated through dimension-specific indirect effects. Source: PLS-SEM bootstrap analysis with 10,000 resamples.

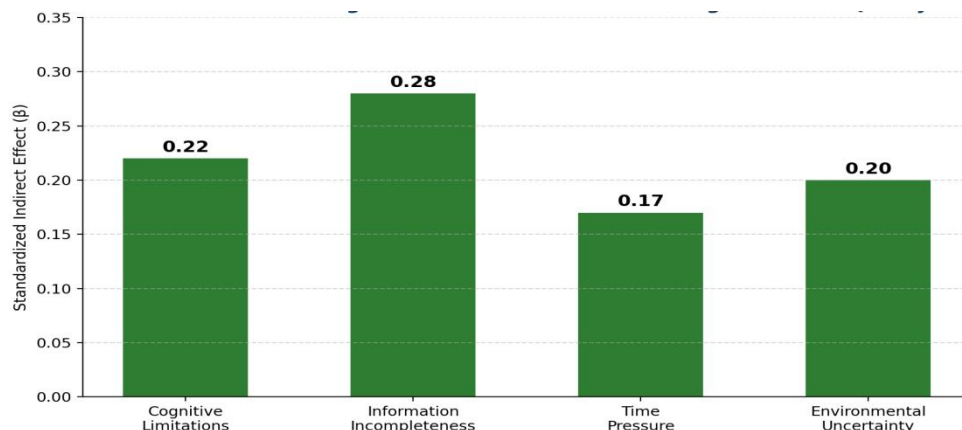
Among the four bounded rationality dimensions, Information Incompleteness emerged as the most prominent correlate of Strategic Decision Quality. This finding is consistent with Simon's emphasis on incomplete information as one of the central boundaries of organizational rationality. Managers cannot comprehensively evaluate strategic alternatives when information is incomplete, delayed, inconsistent, or rapidly changing.

Cognitive Limitations represented the second strongest relationship, reinforcing the importance of managers' finite ability to simultaneously process numerous and complex streams of information. Environmental Uncertainty ranked third, while Time Pressure showed the smallest coefficient.

The positive signs of H1–H4 should be interpreted according to the scoring orientation of the measurement items. The results establish significant empirical associations between the measured bounded rationality dimensions and Strategic Decision Quality. Therefore, interpretation should emphasize the statistical significance and comparative magnitude of these relationships within the measurement specification used in the study.

### 3.5 Mediation Analysis

The mediation analysis examined whether Strategic Decision Quality transmitted the relationships between the four bounded rationality dimensions and Business Risk Management Effectiveness.



Note. Indirect effect = (BR constraint  $\rightarrow$  Strategic Decision Quality path, Table 3)  $\times$  (Strategic Decision Quality  $\rightarrow$  BRME path,  $\beta=0.61$ , Table 3), consistent with the bootstrapped values reported in the text (Section 4.5). Dimension-specific direct effects (BR constraint  $\rightarrow$  BRME) are not shown because the structural model specifies only a single, composite BR Constraints  $\rightarrow$  BRME direct path (H6,  $\beta=0.19$ , ns); no dimension-level direct paths to BRME were estimated. Source: PLS-SEM bootstrap analysis;  $n=285$  organizational decision-makers, Indonesia (2024).

**Figure 4. Indirect Effects of Bounded Rationality Constraints on Business Risk Management Effectiveness via Strategic Decision Quality**

Source: PLS-SEM bootstrap analysis with 10,000 resamples;  $n = 285$  organizational decision-makers.

The results show significant indirect effects for all four bounded rationality dimensions. Information Incompleteness generated the largest indirect effect on Business Risk Management Effectiveness through Strategic Decision Quality ( $\beta = 0.28$ ). Cognitive Limitations demonstrated the second largest indirect effect ( $\beta = 0.22$ ), followed by Environmental Uncertainty ( $\beta = 0.20$ ) and Time Pressure ( $\beta = 0.17$ ).

The ranking of the indirect effects is consistent with the corresponding constraint-to-Strategic-Decision-Quality coefficients because all four dimensions operate through the strong relationship between Strategic Decision Quality and Business Risk Management Effectiveness ( $\beta = 0.61$ ).

The significant dimension-specific indirect effects support H7 and indicate that Strategic Decision Quality represents an important mechanism connecting bounded rationality conditions with Business Risk Management Effectiveness. The non-significant residual relationship between the higher-order BR Constraints construct and Business Risk Management Effectiveness ( $\beta = 0.19$ , ns) further emphasizes the importance of this mediating process.

However, the non-significant H6 result should be interpreted at the level of the higher-order construct. The analysis does not establish that every first-order bounded rationality dimension individually has a non-significant direct effect on Business Risk Management Effectiveness because separate direct paths from each dimension to the outcome were not included in the reported structural model. The results therefore provide evidence for a strong mediating role of Strategic Decision Quality without extending the claim beyond the model that was actually tested.

### ***Discussion***

The findings provide empirical support for applying Simon's bounded rationality framework to strategic decision-making and business risk management in Indonesian organizations. All four bounded rationality dimensions examined in this study were significantly associated with Strategic Decision Quality, while Strategic Decision Quality demonstrated a strong relationship with Business Risk Management Effectiveness. These findings indicate that bounded rationality is relevant not only as a theoretical explanation of individual cognition but also as a framework for understanding organizational decision processes under uncertainty.

Information Incompleteness emerged as the strongest correlate of Strategic Decision Quality. This finding is consistent with Simon's (1955, 1972) argument that organizational actors rarely possess complete knowledge of all possible alternatives and their consequences. In organizational settings, managers frequently make strategic decisions without complete market intelligence, perfectly accurate forecasts, or comprehensive knowledge of regulatory and competitive developments.

The result also highlights an important feature of contemporary organizational decision-making. Managers may simultaneously experience information abundance and information incompleteness. Organizations can have access to large volumes of digital information while still lacking reliable, timely, and decision-relevant information concerning future events. Consequently, the central managerial problem is not simply obtaining more information but identifying which information is sufficiently relevant and reliable to support strategic action.

This finding is broadly consistent with Gruner's (2024) distinction between risk and deeper forms of uncertainty. When decision-makers operate under measurable risk, probability estimates may be available. Under conditions of greater uncertainty, however, even the range of possible outcomes and their probabilities may be difficult to determine. Under these conditions, collecting additional information may reduce but cannot completely eliminate uncertainty. Managers must therefore determine when the available information is sufficient to justify action.

Cognitive Limitations demonstrated the second strongest relationship with Strategic Decision Quality. Strategic decisions commonly require managers to simultaneously interpret financial indicators, market conditions, technological developments, operational information, regulatory requirements, and competitor behavior. Even highly experienced decision-makers have limited attention and

information-processing capacity. As the complexity and volume of strategic information increase, decision-makers inevitably simplify the decision environment.

This finding is consistent with literature emphasizing the role of cognitive biases and heuristics in organizational judgment. Fuchs and Banaszak (2024) show that cognitive mechanisms can systematically influence resource allocation and organizational decision-making. The current findings extend this argument by demonstrating that perceived cognitive limitations are meaningfully associated with overall Strategic Decision Quality across several Indonesian organizational sectors.

Environmental Uncertainty also showed a significant relationship with Strategic Decision Quality. Market volatility, changing customer preferences, technological development, regulatory change, and unpredictable competitor behavior reduce managers' ability to estimate the consequences of strategic alternatives with certainty. Organizations operating under these conditions must continuously update their assumptions and adjust their decision processes rather than rely entirely on stable historical patterns.

Time Pressure produced the smallest coefficient among the four bounded rationality dimensions, although the relationship remained statistically significant. A possible interpretation is that managers develop routines and heuristics that enable them to make relatively efficient decisions when available time is restricted. Experienced decision-makers may not evaluate every possible alternative but instead rely on simplified decision rules developed through repeated exposure to similar strategic situations.

This interpretation is broadly compatible with the ecological rationality perspective of Gigerenzer et al. (2024), which proposes that relatively simple heuristics can perform effectively when they fit the structure of the environment in which they are applied. From this perspective, the use of heuristics does not automatically represent inferior decision-making. Under certain conditions, heuristics may represent adaptive responses to incomplete information and restricted time.

Nevertheless, the present study did not directly test managerial experience as an explanatory or moderating factor. The possibility that experience reduces the adverse effects of time pressure therefore remains a theoretical interpretation that requires direct empirical examination in future studies.

The descriptive findings concerning risk management strategy effectiveness provide additional context for these results. SWOT analysis received the highest effectiveness rating, followed by scenario analysis and heuristic decision tools. These approaches simplify complex decision environments by directing managers toward selected categories, scenarios, or decision rules rather than requiring exhaustive comparison of every potential alternative.

This pattern is consistent with Simon's concept of satisficing and with ecological rationality. Structured heuristics may help managers manage complex environments by reducing information-processing requirements while preserving the information perceived to be most important for the decision problem. Their usefulness therefore lies not in eliminating bounded rationality but in enabling decision-makers to operate effectively within its constraints.

The strong relationship between Strategic Decision Quality and Business Risk Management Effectiveness represents one of the central findings of this study. Strategic Decision Quality showed a standardized coefficient of  $\beta = 0.61$ , indicating that stronger strategic decision processes were closely associated with more effective risk management.

This relationship is theoretically important because formal risk management systems cannot function independently from managerial judgment. Risk identification requires managers to determine which potential threats require attention. Risk assessment requires judgments regarding probability, severity, and organizational exposure. Risk treatment involves selecting appropriate responses, while risk monitoring requires decisions about whether existing strategies remain appropriate as conditions change. Strategic decision quality is therefore embedded throughout the risk management process.

The mediation analysis strengthens this interpretation. All four bounded rationality dimensions demonstrated significant indirect effects on Business Risk Management Effectiveness through

Strategic Decision Quality. Information Incompleteness produced the largest indirect effect, followed by Cognitive Limitations, Environmental Uncertainty, and Time Pressure.

These findings help connect two areas of research that are frequently examined separately. Bounded rationality research primarily focuses on the cognitive and informational conditions surrounding choice, whereas business risk management research often emphasizes formal frameworks, organizational controls, procedures, and technological systems. Strategic Decision Quality provides an important theoretical link between these perspectives because it explains how the conditions surrounding organizational decisions may be associated with subsequent risk management outcomes.

The non-significant residual direct relationship from the higher-order BR Constraints construct to Business Risk Management Effectiveness further highlights the importance of the strategic decision process. Nevertheless, this finding should not be interpreted as demonstrating that the four first-order bounded rationality dimensions individually have no direct relationship with risk management effectiveness. The H6 test represents an aggregated higher-order construct, and future studies could provide a more detailed decomposition of first-order direct, indirect, and total effects.

The Indonesian organizational context adds further relevance to these findings. Organizations in Indonesia operate amid rapid technological development, evolving regulatory frameworks, market heterogeneity, and differences in information infrastructure. Under these conditions, assumptions of complete information and exhaustive optimization are particularly difficult to maintain. The results therefore demonstrate the continuing relevance of bounded rationality theory for understanding strategic decision-making in an emerging-market organizational environment.

The findings also provide an opportunity to reconsider the role of Organizational Learning Culture. Although the construct was measured descriptively, it was not tested as a moderator in the current structural model. Organizations with strong learning cultures may potentially be better able to share knowledge, challenge assumptions, learn from previous decisions, and develop collective mechanisms for managing uncertainty. However, establishing such an effect requires an explicit interaction model and an appropriate research design.

Organizational Learning Culture should therefore be treated as an important direction for future research rather than as an empirically supported contribution of the present study. Future research could use moderation or multilevel models to examine whether organizational learning processes weaken, strengthen, or otherwise alter the relationship between bounded rationality conditions and Strategic Decision Quality.

Overall, the findings support a process-oriented application of bounded rationality theory. Cognitive, informational, temporal, and environmental conditions are significantly associated with Strategic Decision Quality, while Strategic Decision Quality is strongly associated with Business Risk Management Effectiveness. The study therefore demonstrates that understanding organizational risk management requires attention not only to formal systems and procedures but also to the decision processes through which managers interpret information and respond to uncertainty.

#### 4. CONCLUSION

This study examined the relationships among bounded rationality constraints, Strategic Decision Quality, and Business Risk Management Effectiveness among 285 organizational decision-makers in Indonesia. The findings demonstrate that Cognitive Limitations, Information Incompleteness, Time Pressure, and Environmental Uncertainty were significantly associated with Strategic Decision Quality, with Information Incompleteness showing the strongest relationship, followed by Cognitive Limitations, Environmental Uncertainty, and Time Pressure. Strategic Decision Quality was strongly associated with Business Risk Management Effectiveness ( $\beta = 0.61$ ,  $p < .001$ ), while the mediation analysis showed significant indirect effects for all four bounded rationality dimensions. Information Incompleteness produced the largest indirect effect ( $\beta = 0.28$ ), followed by Cognitive Limitations ( $\beta = 0.22$ ), Environmental Uncertainty ( $\beta = 0.20$ ), and Time Pressure ( $\beta = 0.17$ ). These findings extend

Simon's bounded rationality framework by demonstrating that informational, cognitive, temporal, and environmental conditions are connected with organizational risk management through the quality of strategic decision processes. Practically, organizations should strengthen information quality, environmental scanning, structured decision procedures, scenario analysis, and appropriate decision-support systems to improve strategic decisions under uncertainty.

The findings should nevertheless be interpreted within the limitations of the study. The cross-sectional design does not permit strong causal conclusions, purposive sampling limits broader statistical generalization, and Business Risk Management Effectiveness was assessed through managerial perceptions rather than objective organizational indicators. The use of data collected from the same respondents at one point in time also creates potential common method concerns, while the residual direct relationship was evaluated using a higher-order BR Constraints construct rather than separate direct effects for each first-order dimension. Organizational Learning Culture was measured but was not empirically tested as a moderator and therefore does not form part of the confirmed structural findings. Future studies should employ longitudinal and multi-source designs, incorporate objective risk management indicators, estimate dimension-specific direct and indirect effects, and explicitly test Organizational Learning Culture through moderation or multilevel analysis. Further research should also examine whether artificial intelligence and digital decision-support systems can reduce information-processing limitations and uncertainty or whether they introduce new forms of bounded rationality through automation bias, algorithmic opacity, and dependence on incomplete digital information.

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