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HEURISTICS AND SKEPTICISM: DO RED FLAGS SPEAK LOUDER IN FRAUD DETECTION?

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ABSTRAK

Penelitian ini dilatarbelakangi oleh masih rendahnya efektivitas auditor dalam mendeteksi kecurangan, meskipun berbagai skandal besar telah terjadi. Tujuan penelitian adalah menguji pengaruh heuristik, red flags, dan skeptisisme profesional terhadap kemampuan auditor dalam mendeteksi kecurangan, dengan skeptisisme profesional sebagai variabel moderasi. Metode penelitian menggunakan survei kuantitatif dengan pendekatan cross-sectional terhadap 143 auditor pada Kantor Akuntan Publik di Indonesia, dianalisis dengan PLS-SEM. Hasil penelitian menunjukkan bahwa heuristik, red flags, dan skeptisisme profesional berpengaruh positif terhadap kemampuan mendeteksi kecurangan. Selain itu, skeptisisme profesional memperkuat pengaruh heuristik, namun tidak memoderasi pengaruh red flags. Temuan ini menegaskan pentingnya pelatihan yang menyeimbangkan intuisi dengan pemikiran kritis, serta perlunya regulasi audit yang mendorong penerapan skeptisisme profesional secara konsisten.

Kata Kunci: Kemampuan mendeteksi kecurangan, heuristik, red flags, skeptisisme professional

ABSTRACT

This study is motivated by the recurring inability of auditors to detect fraud, despite the prevalence of financial scandals that have drawn significant public and professional scrutiny. In response to this concern, the research investigates the influence of heuristics, fraud risk indicators (commonly referred to as red flags), and professional skepticism on auditors' effectiveness in identifying fraudulent activity. Particular attention is given to professional skepticism as a potential moderating factor in these relationships. A cross-sectional quantitative approach was employed, involving survey data collected from 143 auditors working in public accounting firms across Indonesia. The data were analyzed using partial least squares structural equation modeling (PLS-SEM). The results indicate that heuristics, red flags, and professional skepticism each exert a positive effect on auditors' fraud detection capabilities. Moreover, the analysis reveals that professional skepticism amplifies the impact of heuristics but does not significantly moderate the relationship between red flags and fraud detection. These findings underscore the importance of audit training that cultivates both intuitive and analytical reasoning, as well as the need for regulatory structures that reinforce the consistent application of professional skepticism in practice.

Keywords: Fraud detection ability, heuristics, red flags, professional scepticism

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1. Introduction

Fraud continues to pose a significant threat to the integrity of the global financial system, as evidenced by high-profile corporate scandals such as Enron and WorldCom, which have had systemic economic consequences. In Indonesia, fraud remains a pressing issue, with the country ranking fourth globally in reported fraud cases in 2022. The most prevalent forms of fraud include corruption (64%), misappropriation of state or corporate assets (28.9%), and financial statement fraud (6.7%) (Sara, 2023). The inability of auditors to detect such misconduct has contributed to several financial scandals. Notably, the case of PT Asuransi Adisarana Wanaartha (2014–2019) revealed serious deficiencies in audit oversight, particularly in identifying financial statement manipulation (OJK, 2023). International cases, including the collapses of Wirecard in Germany (DW, 2022) and Carillion in the United Kingdom (White, 2024), further highlight a global crisis of confidence in the auditing profession, as material misstatements went undetected until it was too late.

To understand auditors' judgments in fraud detection, this study draws on Attribution Theory by Heider (1958), which explains how individuals infer causality by weighing internal (dispositional) and external (situational) factors. In the auditing context, this theoretical lens helps explain how auditors interpret potential indicators of fraud. Heuristics—mental shortcuts based on experience and intuition—are viewed as internal attributions that influence how auditors evaluate financial information. While heuristics can expedite decision-making, they also introduce cognitive biases that may impair objectivity (Tversky & Kahneman, 1974). For instance, auditors frequently exposed to specific fraud schemes may disproportionately associate familiar anomalies with past cases, overlooking alternative explanations. In contrast, red flags serve as external cues—observable signals in the financial environment—that alert auditors to heightened fraud risk (Kenyon & Tilton, 2012).

Within the framework of Attribution Theory, auditors must determine whether such red flags indicate fraudulent behaviour or reflect acceptable variations in business practices. Here, professional skepticism plays a central role. Defined as a questioning mindset and a commitment to evidential support, skepticism moderates how auditors process both heuristic judgments and red flag indicators (Fullerton & Durtschi, 2004). Skeptical auditors are less likely to accept information at face value and more inclined to scrutinize inconsistencies in light of external pressures, such as financial distress or aggressive reporting incentives. By serving as a cognitive control mechanism, skepticism helps auditors mitigate heuristic bias while ensuring red flags are rigorously investigated (Kang & Park, 2019). This balancing function enhances the quality of audit judgment in complex environments.

While prior research has explored the roles of heuristics and red flags in fraud detection, few studies have examined how professional skepticism interacts with these factors. Much of the existing literature treats heuristics, red flags, and skepticism as isolated constructs rather than components of a cohesive decision-making process (Griffith et al., 2015; Pramuki et al., 2020). In emerging markets such as Indonesia, these dynamics are particularly salient. Experimental evidence from Pramuki et al. (2020) shows that skepticism enhances auditors' interpretation of red flags when assessing fraud risk.

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Similarly, Achmad and Galib (2022) find that a combination of red flags, independence, and skepticism significantly improves fraud detection among Indonesian auditors. Piserah et al. (2022) further identify behavioural variables, including time pressure and whistleblowing attitudes, as critical influences on audit effectiveness. Collectively, these studies highlight the interplay between technical competence and cognitive or contextual factors in shaping auditors' performance, reinforcing the need to investigate how heuristics and skepticism operate in tandem.

Accordingly, this study seeks to address this gap by developing an integrated model that examines the influence of heuristics and red flags on auditors' fraud detection ability, with professional skepticism serving as a moderating variable. The study contributes to the literature by conceptualising skepticism not merely as an independent predictor but as a mechanism that refines auditor judgment by calibrating internal and external cues. From a practical standpoint, the findings have implications for audit firms seeking to strengthen fraud detection through training programs that develop intuitive reasoning alongside critical thinking. Regulatory bodies, such as the International Federation of Accountants (IFAC), the International Auditing and Assurance Standards Board (IAASB), and the Public Company Accounting Oversight Board (PCAOB), may also benefit from incorporating structured approaches to professional skepticism within competency frameworks, particularly in jurisdictions facing elevated fraud risk and resource constraints. Although grounded in the Indonesian audit environment, the study's insights offer broader relevance to similar institutional and behavioural contexts worldwide.

2. Theoretical Framework and Hypotheses Development

Attribution Theory (Heider, 1958) provides a useful framework for understanding how individuals infer the causes of events, distinguishing between internal (dispositional) and external (situational) attributions. In the auditing context, this theory offers insights into how auditors interpret fraud indicators through the lens of heuristics, red flags, and professional skepticism. Heuristics represent internal attributions, where auditors rely on experience and intuition to simplify decision-making. Conversely, red flags are typically interpreted as external cues that may signal management misconduct or irregularities. Professional skepticism plays a moderating role in this attributional process by prompting auditors to question assumptions and seek corroborating evidence, thereby mitigating bias and improving judgment accuracy. Within this framework, heuristics and red flags are hypothesized to influence auditors' fraud detection capabilities, while professional skepticism is posited to strengthen these relationships through critical and objective evaluation.

Decision-making is a cognitive process through which individuals choose a course of action from several alternatives, based on available information, personal values, goals, and contextual factors (Nelson & Tan, 2005). In practice, decisions are shaped by both rational evaluations and subjective elements, including emotions, experience, and social influences. Given this complexity, audit decision-making is rarely linear and may involve both deliberate and intuitive elements, with long-term implications for audit quality and stakeholder trust.

Study defines effective decision-making as the selection of the most appropriate course of action given the circumstances and objectives (Hastie, 2001). Decision-making in professional settings, particularly auditing, is influenced by the quality of available information, the decision-maker's expertise, and environmental pressures. Other studies identify three primary modes of decision-making: rational, intuitive, and heuristic (Gigerenzer & Gaissmaier, 2011). Rational decisions involve structured analysis of alternatives and consequences; intuitive decisions draw on unstructured, experience-based knowledge; and heuristic decisions rely on mental shortcuts to manage complexity and information constraints efficiently.

In the auditing domain, decision-making is a core component of professional judgment, especially in assessing risk and determining the appropriateness of financial reporting. Auditors are expected to evaluate evidence systematically while exercising professional discretion, as their decisions directly impact the credibility of financial statements and the profession's reputation (Nelson & Tan, 2005).

Fraud detection refers to the auditor's ability to identify material misstatements arising from intentional acts such as misrepresentation, asset misappropriation, or fraudulent financial reporting (Krambia-Kapardis, 2002). Effective fraud detection requires not only technical knowledge but also an understanding of behavioral, psychological, and contextual factors that may signal fraud. Professional skepticism, analytical procedures, and experiential judgment are critical tools in identifying fraud, particularly when indicators are subtle or embedded in complex transactions (Kenyon & Tilton, 2012).

Detecting fraud is inherently diagnostic, requiring the auditor to evaluate symptoms and consider plausible explanations (Grazioli et al., 2006). This process involves both domain-specific knowledge and awareness of fraud patterns and motives. Cognitive approaches emphasize the importance of experience, structured judgment, and attention to situational cues in improving the auditor's capacity to detect fraudulent activity.

Heuristics, or mental shortcuts, allow auditors to make decisions quickly when faced with limited time or information (Tversky & Kahneman, 1974). While these strategies can be efficient, they also introduce cognitive biases that may distort judgment. Common heuristics include the representativeness heuristic—judging the likelihood of an event based on its similarity to known patterns; the availability heuristic—relying on easily recalled examples; and the anchoring and adjustment heuristic—basing decisions on an initial value that unduly influences final judgments (Shanteau, 1989). In auditing, these heuristics may lead to overconfidence or selective attention to familiar fraud types, potentially limiting the effectiveness of fraud detection efforts.

Despite their limitations, heuristics can be beneficial when applied judiciously. Auditors who understand the nature and boundaries of these cognitive tools may use them to efficiently process routine information, reserving analytical resources for more ambiguous or high-risk cases. Accordingly, this study posits the following hypothesis:
H_1: Heuristics have a positive effect on auditors' fraud detection ability.

Red flags are warning signs or anomalies that may indicate potential fraud or material misstatements. These include unusual accounting practices, inconsistent documentation, or unexplained performance trends. The presence of red flags prompts auditors to conduct

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further investigation and, when necessary, expand audit procedures. Although not all red flags signify fraud, their identification is essential to risk-based auditing strategies.

As noted by Rustiarini and Novitasari (2014), the effectiveness of red flag recognition is influenced by various auditor characteristics, such as experience, education, professional training, and individual awareness. As observed in another study, auditors who are more attuned to red flag indicators are better positioned to detect fraud, particularly in environments where aggressive financial reporting or governance weaknesses exist (Achmad & Galib, 2022). Based on this understanding, the study proposes the following hypothesis:

H_2: Red flags have a positive effect on auditors' fraud detection ability.

Professional skepticism is defined as a questioning mindset and an attitude that involves critical assessment of audit evidence (Kang & Park, 2019). It reflects an auditor's ability to withhold judgment until sufficient evidence is obtained and to avoid unwarranted reliance on client representations. Skepticism plays a key role in mitigating cognitive biases and increasing auditors' sensitivity to fraud risks (Piserah et al., 2022).

Importantly, skepticism should not be equated with cynicism. Rather, it involves a disciplined approach to inquiry, maintaining openness to alternative explanations while pursuing verifiable conclusions (Fullerton & Durtschi, 2004). Skeptical auditors are more likely to question assumptions, probe anomalies, and evaluate the relevance and limitations of heuristics within the audit context.

This study posits that auditors with higher levels of professional skepticism will use heuristics more judiciously, challenging their initial judgments and seeking confirmatory evidence before concluding. Consequently, professional skepticism may strengthen the relationship between heuristics and fraud detection. This leads to the third hypothesis:

H_3: Professional skepticism moderates the relationship between heuristics and fraud detection.

In a similar vein, professional skepticism enhances how auditors interpret and respond to red flags. Studies find that auditors with heightened skepticism are more likely to scrutinize irregularities and avoid premature conclusions (Pramuki et al., 2020). Another study further emphasizes that skeptical auditors engage more deeply with evidence, reducing the risk of oversight (Hurtt, 2010). By contrast, auditors with low skepticism may downplay or misinterpret the significance of red flags, thereby diminishing fraud detection effectiveness. Accordingly, the fourth hypothesis is formulated as:

H_4: Professional skepticism moderates the relationship between red flags and fraud detection.

The conceptual model developed in this study is illustrated in Figure 1. It posits that heuristics (HEU) and red flags (RF) each exert a positive influence on fraud detection ability (FD). Professional skepticism (SP) is introduced as a moderating variable that strengthens these relationships. The model suggests that auditors who effectively apply heuristics and are responsive to red flags will demonstrate stronger fraud detection capabilities, particularly when guided by a high level of professional skepticism. This

integrated framework reflects the interaction of cognitive processes and professional attitudes in shaping audit quality outcomes.

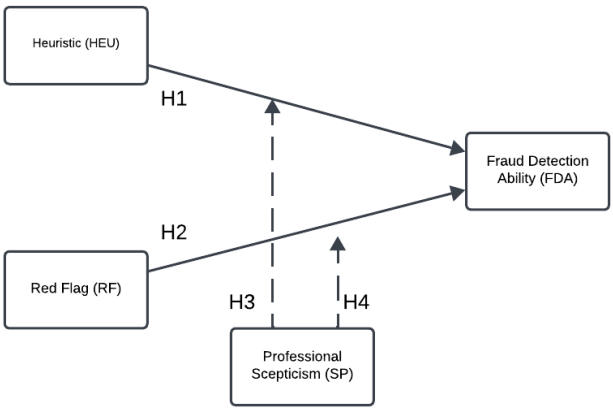

Figure 1. Conceptual Framework

3. Research Method

This study employed a cross-sectional quantitative survey design to examine the influence of heuristics, red flags, and professional skepticism on auditors' ability to detect fraud. Data were collected at a single point in time, allowing for the identification of associations among variables without altering the conditions under observation. The cross-sectional approach offers valuable insights into the immediate relationships among the key constructs, particularly the interaction between auditors' heuristic judgments and sensitivity to red flags, moderated by their level of professional skepticism in the context of fraud detection.

The research variables were measured using a structured questionnaire adapted from established instruments in prior empirical studies. The measurement scales for heuristics, red flags, and professional skepticism were derived from validated sources, ensuring construct reliability and conceptual relevance. Each item was evaluated using a five-point Likert scale, ranging from "strongly disagree" to "strongly agree." A pre-test was conducted to assess the clarity and relevance of the questionnaire items, confirming their appropriateness for data collection. The operational definitions of each construct, along with the corresponding indicators, are presented in Table 1, which outlines the measurement dimensions for fraud detection ability, heuristics, red flags, and professional skepticism.

Table 1. Variable Measurement

Construct type	Item Code	Item measure/Indicators	Reference
Endogenous: Fraud Detection Ability (FDA)	FD1	I am able to detect unauthorized transactions	(Al Natour et al., 2023)
	FD2	I am able to detect fraud committed by employees.	
	FD3	I am able to detect falsification of financial statements.	
	FD4	I am able to detect an incorrect valuation of company assets.	

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Construct type	Item Code	Item measure/Indicators	Reference
	FD5	Fraud, if any, is usually detected through the audit process.	
	FD6	In the last three years, fraud detection techniques in my organization have improved.	
Exogenous: -Heuristic (HEU)	HEU1	I tend to rely on rules of thumb or habit when making decisions	(Saputra, Abrar, & Rinaldy, 2024; Tversky & Kahneman, 1974; Yalcin et al., 2016)
	HEU2	I often use information that is easily accessible or available when assessing risk in an audit, rather than seeking additional information.	
	HEU3	I am more likely to rely on experience or memorable examples in evaluating a situation.	
	HEU4	I focus more on similarities to previous cases and tend to ignore statistical information when evaluating audit risks.	
	HEU5	I would rather avoid risk than attempt an uncertain opportunity.	
	HEU6	I am often influenced by how information is presented, such as the order or format of the presentation.	
-Red Flag (RF)	RF1	I am critical when management faces pressure to meet financial targets.	(Achmad & Galib, 2022; Juanaristo et al., 2024)
	RF2	I can identify unusual and rapid profit growth compared to industry peers.	
	RF3	I can detect unclear bank accounts, subsidiaries, or branch operations.	
	RF4	I am alert when management is dominated by one person or a small group without clear controls.	
	RF5	I notice when management limits auditors' access to the board of directors.	
	RF6	I am cautious when management tries to influence or dominate audit work.	
	RF7	I recognize when management shows excessive desire to maintain or increase profit trends.	
Moderation: Professional Skepticism (SP)	SP1	I do not accept statements without sufficient evidence.	(Amin, 2019; Fullerton & Durtschi, 2004; Piserah et al., 2022)
	SP2	I ensure I consider the most available information before making decisions.	
	SP3	I enjoy finding new information.	
	SP4	I am curious about the reasons behind people's behavior.	
	SP5	I am confident in my own abilities.	
	SP6	I usually accept what I see, read, or hear without further questioning. (reverse-coded)	

The outer model in this study describes the relationship between each latent construct and its observed indicators, represented by the following equations:

Fraud Detection Ability (FDA):

$$FD = \lambda_{FD1}FD1 + \lambda_{FD2}FD2 + \cdots + \lambda_{FD6}FD6 + \zeta_{FD}$$

Heuristic (HEU):

$$HEU = \lambda_{HEU1}HEU1 + \lambda_{HEU2}HEU2 + \cdots + \lambda_{HEU6}HEU6 + \zeta_{HEU}$$

Red Flags (RF):

$$RF = \lambda_{RF1}RF1 + \lambda_{RF2}RF2 + \cdots + \lambda_{RF7}RF7 + \zeta_{RF}$$

Professional Skepticism (SP):

$$SP = \lambda_{SP1}SP1 + \lambda_{SP2}SP2 + \cdots + \lambda_{SP6}SP6 + \zeta_{SP}$$

Here, λ represents the factor loadings of indicators, while ζ denotes measurement errors. The inner model specifies the structural relationships among the latent constructs. Based on the hypotheses (H1–H4), the fraud detection ability (FD) is modeled as:

$$FDA = \beta_1 HEU + \beta_2 RF + \beta_3(HEU \times SP) + \beta_4(RF \times SP) + \xi$$

In this equation, β represents the path coefficients showing the strength and direction of the relationships, while ξ is the residual error term. This inner model captures both the direct effects of heuristics and red flags on fraud detection (H1 and H2) and the moderating role of professional skepticism on these relationships (H3 and H4).

Where,

λ: outer loading (indicator weight on latent construct)

ζ: measurement error term

β: path coefficient (effect between constructs)

ξ: residual error term

The target population for this study comprised auditors employed at various Public Accounting Firms (PAFs) across Indonesia. A voluntary response sampling method was adopted, allowing auditors with relevant experience and willingness to participate in the study to self-select into the sample (Etikan, 2016). To determine the appropriate sample size, G*Power software was used with the following parameters: an effect size of $f^2 = 0.15$, a significance level (α) of 0.05, statistical power of 0.95, and five predictors. Based on this calculation, a minimum of 138 respondents was required. The final sample met this threshold.

Data were collected through an online questionnaire administered via Google Forms. The digital format facilitated broad geographic coverage and timely access to participants. The instrument contained structured items designed to measure auditors' perceptions of fraud detection ability, heuristics, red flags, and professional skepticism. Participation was voluntary, and all responses were anonymized to maintain confidentiality and encourage candour in responses.

Data analysis was conducted using SmartPLS 4 software, employing the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach. The analytical procedure began with an evaluation of the measurement model, including assessments of internal consistency reliability through Composite Reliability (CR) and Cronbach's Alpha, and convergent validity via Average Variance Extracted (AVE). Bootstrapping procedures

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were applied to test the structural model, generating path coefficients along with associated t-statistics and p-values to evaluate the significance of hypothesized relationships.

A key focus of the analysis was the moderating role of professional skepticism in the relationships between heuristics, red flags, and fraud detection ability. Model assessment incorporated variance inflation factor (VIF) values to evaluate multicollinearity and Root Mean Square Error (RMSE) and Q^2 statistics to assess predictive relevance. This structured analytical design enhanced the robustness of the findings, offering a more nuanced understanding of how heuristics and red flags interact with professional skepticism in shaping auditors' capacity to detect fraud.

4. Results and Discussion

Data were collected from 143 respondents, with their demographic characteristics summarized in Table 1. To ensure the relevance and reliability of responses, inclusion criteria required participants to have at least one year of audit experience and to be employed in roles ranging from junior auditor to audit partner. This eligibility threshold ensured that all respondents possessed the requisite professional background to provide informed insights into fraud detection, heuristics, red flags, and professional skepticism.

Table 2. Demographic Profile of Respondents

Profile Respondent		Total	%
Gender	Man	63	44.1%
	Women	80	55.9%
Age	21-25	39	27.3%
	26-30	49	34.3%
	31-35	8	5.6%
	36-40	14	9.8%
	>40	33	23.1%
Education	Diploma	13	9.1%
	Bachelor's degree	114	79.7%
	Magister	16	11.2%
Experience	< 1 year	36	25.2%
	1-5 Years	51	35.7%
	6-10 Years	30	21.0%
	11-15 years	21	14.7%
	>15 years	5	3.5%
Number of Training	Never	14	9.8%
	1-5	43	30.1%
	6-10	24	16.8%
	11-15	30	21.0%
	>15	32	22.4%
Number of Fraud Discoveries	Never	80	55.9%
	1-5	20	14.0%
	>5	43	30.1%
Position	Audit Manager	6	4.2%
	Audit Partner	5	3.5%
	Junior Auditor	75	52.4%
	Senior Auditor	43	30.1%
	Senior Manager	1	0.7%
	Supervisor	13	9.1%

The measurement model was assessed to confirm the validity and reliability of the indicators used in this study. Following Hair et al. (2022), convergent validity was evaluated using three criteria: outer loading values, average variance extracted (AVE), and construct reliability, the latter assessed through Cronbach's alpha and composite reliability (CR), as presented in Table 3.

The results indicate that all indicators within the Fraud Detection Ability (FDA), Red Flags (RF), and Professional Skepticism (SP) constructs exhibit outer loading values exceeding the recommended threshold of 0.70, thereby satisfying the requirement for convergent validity. In addition, each construct achieved AVE values above the minimum threshold of 0.50, indicating that over half of the variance in the observed variables is captured by the latent construct. Specifically, AVE values were 0.791 for FDA, 0.579 for Heuristics (HEU), 0.730 for RF, and 0.616 for SP, all of which reflect strong convergent validity (Hair et al., 2022).

Construct reliability was further evaluated using both Cronbach's alpha and composite reliability. All constructs demonstrated values exceeding the recommended cutoff of 0.70, indicating high internal consistency. The reliability values for each construct were as follows: FDA (α = 0.947; CR = 0.958), HEU (α = 0.852; CR = 0.891), RF (α = 0.938; CR = 0.950), and SP (α = 0.876; CR = 0.906). These results confirm that the measurement items reliably capture their respective constructs and are suitable for further structural analysis.

Discriminant validity was assessed to ensure that each construct is empirically distinct from the others. In line with best practices in Partial Least Squares Structural Equation Modeling (PLS-SEM), the Heterotrait-Monotrait Ratio of Correlations (HTMT) was employed, as it is considered more sensitive in detecting a lack of discriminant validity compared to traditional criteria such as the Fornell-Larcker criterion (Hair et al., 2022).

As shown in Table 3, all HTMT values fall below the recommended threshold of 0.90 for conceptually distinct but related constructs. The HTMT values were 0.783 between FDA and SP, 0.693 between FDA and HEU, and 0.745 between HEU and SP, indicating satisfactory discriminant validity. The lowest HTMT value, 0.318, was observed between HEU and RF, reflecting a strong conceptual distinction between these two constructs. The measurement model is visually represented in Figure 2.

Table 3. Validity and Reliability

Construct	Validity					Realibility		
	FD	HEU	RF	SP	AVE	Cronbach's alpha	Rho_a	Rho_c
FD					0.791	0.947	0.958	0.958
HEU	0.693				0.579	0.852	0.854	0.891
RF	0.4	0.318			0.73	0.938	0.957	0.95
SP	0.783	0.745	0.477		0.616	0.876	0.887	0.906

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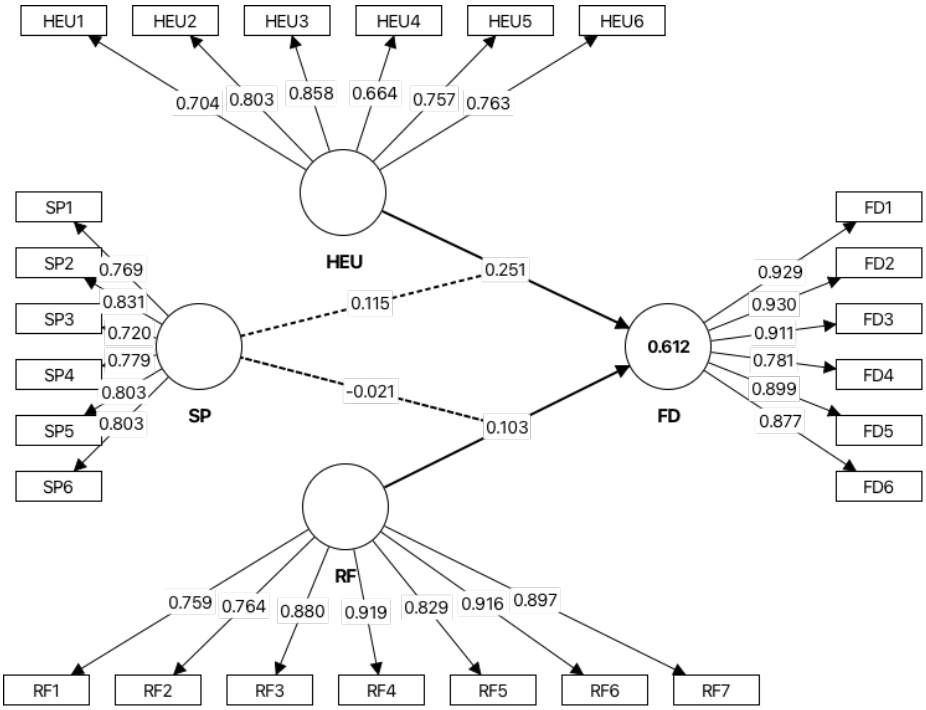

Figure 2. Outer Model Graphics Output

As presented in Table 4, the adjusted R-squared value for the Fraud Detection Ability (FDA) construct is 0.598, indicating that approximately 59.8% of the variance in auditors' fraud detection capability is explained by heuristics, red flags, professional skepticism, and their proposed interaction effects. This suggests that the structural model demonstrates substantial explanatory power (Hair et al., 2022).

Model fit was evaluated using several standard metrics, with the results confirming the model's adequacy. The Standardized Root Mean Square Residual (SRMR) for both the saturated and estimated models was 0.094, below the commonly accepted threshold of 0.10, indicating a good fit. The discrepancy values, d_ULS (2.889 and 2.893) and d_G (1.812 and 1.811), exceeded the minimum benchmark of 0.05, supporting the model's internal consistency. In addition, the Chi-square statistics (1192.329 and 1192.951) surpassed the 0.90 threshold, while the Normed Fit Index (NFI) values of 0.683 for both models, although not approaching unity, remain within an acceptable range, reinforcing the model's adequacy. Collectively, these findings suggest that the structural model achieves both statistical validity and practical relevance.

To further assess the model's robustness, a PLS-Predict analysis was conducted to evaluate its predictive relevance, particularly for the endogenous construct of Fraud Detection Ability (FDA). This approach compares the Root Mean Square Error (RMSE) of the PLS model against a linear regression (LM) benchmark model and examines the Q^2_predict values for each indicator. According to Hair et al. (2022), a model demonstrates predictive relevance when the majority of Q^2_predict values are positive, and the RMSE of the PLS model is lower than that of the benchmark.

As shown in Table 5, all FDA indicators yielded positive Q^2_predict values, ranging from 0.221 to 0.547, indicating out-of-sample predictive relevance. Indicators FD1 through FD3 recorded the highest Q^2_predict values (0.541, 0.545, and 0.547, respectively), with

RMSE values lower than those produced by the linear regression model, demonstrating strong predictive performance. Similarly, indicators FD5 and FD6 exhibited positive Q^2_predict values and lower RMSE under the PLS model, indicating reliable prediction quality.

However, for indicator FD4, while the Q^2_predict value remained positive (0.221), the RMSE of the PLS model (0.637) exceeded that of the linear benchmark (0.507). This suggests a marginal decline in predictive accuracy for this particular item. Nonetheless, as the majority of indicators exhibit superior predictive performance under the PLS model, the overall model can be classified as having moderate to strong predictive capability (Hair et al., 2022). In sum, the results from the PLS-Predict evaluation affirm that the proposed model possesses both explanatory power and predictive relevance, offering a valid and reliable estimate of auditors' ability to detect fraud.

Table 4. Evaluation of Model Fit through R-Squared, F-Squared, and Fit Testing Metrics

Variable	Path	Ajusted. R-Square	f-square	TEST	Model Fit	
					Saturated model	Estimated model
FD	HEU -> FD	0.598	0.095	SRMR	0.094	0.094
	RF -> FD		0.018	d_ULS	2.889	2.893
	SP -> FD		0.369	d_G	1.812	1.811
	SP x HEU -> FD		0.033	Chi-square	1192.329	1192.951
	SP x RF -> FD		0.001	NFI	0.683	0.683

*SRMR <0.10 or 0.08; d_ULS >0.05; d_G >0.05; Chi-square >0.90; NF1 between 0 and 1

Table 5. Summary of PLS-Predicts Statistics

Construct	Item	Q^2predict	RMSE	
			PLS-RMSE	LM_RMSE
FDA	FD1	0.541	0.538	0.568
	FD2	0.545	0.559	0.586
	FD3	0.547	0.578	0.578
	FD4	0.221	0.637	0.507
	FD5	0.476	0.529	0.535
	FD6	0.399	0.682	0.671

Following the confirmation of construct validity and reliability through measurement model evaluation, the analysis proceeded to assess the structural model and test the hypothesised relationships among the study variables. As recommended by Hair et al. (2022), the structural model was evaluated using key indicators, including path coefficients (β), t-statistics, p-values, coefficients of determination (R^2), and effect sizes (f^2). Figure 2 presents the structural path diagram, displaying the relationships among constructs, estimated parameters, and associated test statistics.

As shown in Table 6, heuristics (HEU) exhibit a positive and statistically significant effect on fraud detection ability (FDA), with a path coefficient of $\beta = 0.251$, $t = 3.943$, and $p < 0.001$, thereby supporting Hypothesis H1. This result suggests that auditors' application of heuristics enhances their capacity to identify fraud. Similarly, red flags (RF)

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were also found to have a positive effect on FDA (β = 0.103; t = 1.722; p = 0.043), lending support to Hypothesis H2. Although the magnitude of this effect is smaller, red flags nonetheless contribute meaningfully to the fraud detection process. Professional skepticism (SP) was found to have the strongest direct effect on fraud detection ability, with a coefficient of β = 0.566, t = 7.248, and p < 0.001, thereby confirming Hypothesis H3. This underscores the critical role of professional skepticism in enhancing the effectiveness of auditors' fraud detection judgments.

Moderation analysis revealed further insights into the interaction effects. The interaction between professional skepticism and heuristics (SP × HEU) was positive and significant (β = 0.115; t = 3.036; p = 0.001), supporting Hypothesis H4. This finding suggests that higher levels of professional skepticism strengthen the positive influence of heuristics on auditors' fraud detection ability. Conversely, the interaction between professional skepticism and red flags (SP × RF) did not yield a statistically significant effect (β = -0.021; t = 0.357; p = 0.361), indicating that Hypothesis H5 is not supported. This result implies that professional skepticism does not significantly moderate the relationship between red flags and fraud detection, suggesting that the effect of red flags may operate independently of the auditor's skeptical disposition.

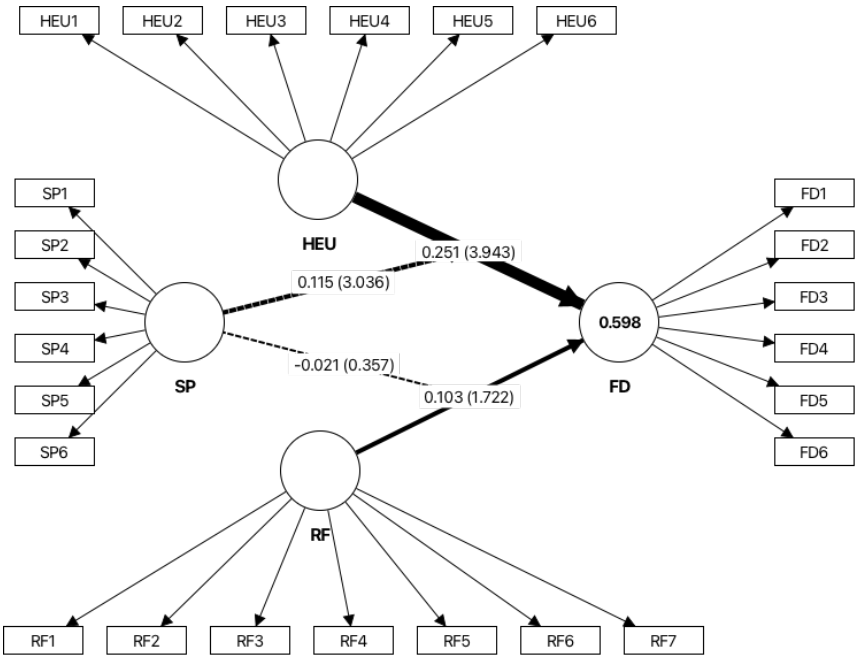

Figure 3. Inner Model Graphic Output

Table 6. Summary of Hypotheses Testing

Hypothesis	Path	Std. Beta	Std. Error	t-value	p-value	VIF	Decision
H1	HEU -> FD	0.251	0.064	3.943	0.000	1.701	Supported
H2	RF -> FD	0.103	0.060	1.722	0.043	1.525	Supported
H3	SP -> FD	0.566	0.078	7.248	0.000	2.238	Supported
H4	SP x HEU -> FD	0.115	0.038	3.036	0.001	1.133	Supported
H5	SP x RF -> FD	-0.021	0.058	0.357	0.361	1.341	Not Supported

The Effect of Heuristics on Fraud Detection Ability

This study provides empirical support for the role of heuristics in enhancing auditors' ability to detect fraud, reinforcing prior evidence that auditing judgments often rely on experience-based decision-making (Saputra, Nawas, & Rinaldy, 2024). Auditors frequently draw upon heuristics—mental shortcuts shaped by prior experiences—to evaluate risk and identify indicators of fraudulent activity. In line with Heider (1958) Attribution Theory, this process reflects an internal attribution mechanism, wherein auditors interpret anomalies through intuitive reasoning grounded in past encounters with similar fraud scenarios.

Recent research further highlights how heuristic processing underpins judgment formation among auditors. For example, a study shows how fractional auditors develop the ability to identify audit irregularities by drawing on accumulated experiential knowledge (Barr-Pulliam et al., 2023). Similarly, other studies emphasize that in increasingly digitized audit environments, systematic processing can complement heuristics, enhancing fraud detection effectiveness. However, the use of heuristics is not without risk (Shang et al., 2023). Anchoring and adjustment biases, among other systematic distortions, can impair judgment accuracy and lead to erroneous conclusions (Henrizi et al., 2021).

These cognitive vulnerabilities are especially relevant in technology-intensive audit contexts, where the speed of information processing can exacerbate bias unless balanced with analytical rigor. As noted by both studies (Barr-Pulliam et al., 2023; Henrizi et al., 2021), auditors must navigate the tension between the efficiency offered by heuristics and the need for evidence-based evaluation. In particular, cognitive biases such as availability and representativeness can distort perception, weakening the reliability of fraud detection if left unchecked.

While heuristics are valuable under time pressure and when information is incomplete, auditors must remain vigilant against the cognitive errors these shortcuts may introduce. It was highlighted that the additional challenge posed by the infrequency of fraud occurrences limits auditors' exposure to diverse fraud patterns and impedes the development of robust detection heuristics (Johnson et al., 2010). This highlight the need for ongoing professional development aimed at enhancing auditors' metacognitive awareness of how heuristics influence their decision-making processes.

The findings of this study corroborate prior research establishing heuristics as a core cognitive mechanism in fraud detection, lending further support to the application of Attribution Theory in auditing contexts. Importantly, the results point to the need for auditors to consciously integrate professional skepticism alongside heuristic reasoning to mitigate overreliance on intuitive judgments and improve the reliability of fraud detection outcomes.

The Effect of Red Flags on Fraud Detection Ability

Empirical research consistently supports the role of red flags as critical cues that enhance auditors' ability to identify potential fraud. Red flags function as early indicators of irregularities, helping auditors allocate attention and resources to higher-risk areas during the audit process. As noted by Sandhu (2019), such warning mechanisms serve as organizational signals that alert auditors to conditions warranting deeper scrutiny. When

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red flags are identified, auditors are expected to respond with heightened professional diligence by designing targeted audit procedures to examine the underlying risk of fraud.

Heider (1958) Attribution Theory provides a useful framework for understanding how auditors interpret such cues. Red flags are treated as external attribution triggers that signal possible fraudulent behaviour, as opposed to benign operational anomalies (Sandhu, 2019). In this context, the presence of red flags prompts auditors to reframe observed deviations not merely as procedural inefficiencies but as potentially intentional misstatements. As Amin (2019) observes, red flags compel auditors to apply more rigorous investigative approaches, thereby reinforcing both analytical reasoning and professional judgment.

Standardized red flag frameworks also contribute to audit consistency and efficiency. Sandhu (2019) argues that predefined indicators help auditors conduct fraud risk assessments more systematically by offering clear procedural guidance. This standardization reduces the likelihood of oversight across audit engagements and facilitates consistency in risk evaluation. Supporting this view, Munteanu et al. (2024) demonstrate that red-flag financial indicators can significantly improve fraud detection outcomes by directing auditors' attention to high-risk areas. However, while red flags enhance auditors' awareness of potential fraud, they do not constitute conclusive evidence. The ultimate assessment still requires the application of professional skepticism and sound judgment (Amin, 2019).

Despite their utility, the use of red flags also presents practical challenges. It highlights that reliance on predetermined red flag lists may inadvertently introduce bias, potentially causing auditors to overlook atypical fraud patterns that fall outside standardized indicators (Fung, 2022). As a result, red flags should not serve as standalone determinants but rather as prompts for broader critical inquiry. It emphasizes the importance of combining red flag analysis with holistic audit techniques to support a more balanced and objective evaluation process (Sandhu, 2020).

The findings of this study reinforce the integral role of red flags in enhancing auditors' fraud detection capabilities. They lend empirical support to the theoretical proposition that external cues, when interpreted through a skeptical and contextually grounded lens, facilitate more effective audit judgment. To maximize their effectiveness, auditors must apply professional expertise to interpret red flags within their specific audit environments, ensuring that evaluations remain evidence-based and free from cognitive bias (Fung, 2022; Juanaristo et al., 2024; Sandhu, 2019).

The Moderation Roles of Professional Skepticism

The results indicate that professional skepticism significantly moderates the relationship between heuristics and fraud detection ability. This suggests that auditors who integrate intuitive judgment with a skeptical mindset are more effective in identifying fraud risks. Auditors exhibiting high levels of skepticism are more likely to challenge their initial impressions formed through heuristic reasoning and seek additional evidence before concluding. These findings are consistent with Attribution Theory (Heider, 1958), which posits that internal attributions—such as heuristics—can be recalibrated through reflective and deliberate cognitive processes. Prior studies by Gracia and Kurnia (2021) and Sampepolan et al. (2023) similarly highlight that skeptical auditors tend to engage more

deeply with audit evidence, thereby enhancing fraud detection quality through critical evaluation.

This finding reinforces the view that while heuristics offer cognitive efficiency, they may also introduce bias when applied uncritically. In this context, professional skepticism functions as a cognitive safeguard that refines the effectiveness of heuristic cues by mitigating overconfidence and judgmental bias. Auditors who exhibit stronger skeptical traits are better equipped to use heuristic inputs judiciously, resulting in more accurate fraud risk assessments. These results underscore the importance of balancing intuitive reasoning with analytical rigor in audit decision-making.

In contrast, the moderating effect of professional skepticism on the relationship between red flags and fraud detection was found to be statistically insignificant. This suggests that red flags serve as strong external cues that elicit consistent auditor responses regardless of individual differences in skepticism. From an attributional perspective, red flags represent situational triggers that prompt external attributions, encouraging auditors—regardless of their skeptical disposition—to undertake further investigation through standard audit procedures.

This result is in line with prior research by Fung (2022), Sandhu (2019), and Silva and Carraro (2023), which observes that red flag responses are often procedural, shaped by predefined checklists and regulatory frameworks. As such, the auditor's interpretation is less discretionary when red flags are present, reducing the relative influence of individual cognitive traits like skepticism. While skepticism may still enhance critical thinking in broader contexts, its incremental value is diminished when auditors follow established protocols in response to explicit risk indicators.

From a practical perspective, these findings imply that professional skepticism should be a focal point in auditor development, particularly in scenarios requiring subjective judgment or reliance on intuition. Audit firms and regulatory bodies should encourage a questioning mindset when auditors confront ambiguous, experience-driven cues. Conversely, in red flag situations, emphasis should be placed on the consistency and adequacy of procedural responses, supported by well-defined detection frameworks.

Theoretically, this study extends the application of Attribution Theory by demonstrating that the influence of professional skepticism is context-dependent. It plays a significant moderating role when fraud cues are internally attributed, such as heuristics, but is less relevant in externally attributed scenarios involving red flags. These findings provide empirical grounding for a more nuanced understanding of how cue types and auditor disposition interact in shaping fraud detection behavior.

Cross-National Perspective on Fraud Detection Awareness

The findings of this study—particularly the significance of heuristics and professional skepticism—are consistent with broader trends in fraud risk awareness across both developed and developing economies. In jurisdictions such as the United States and the United Kingdom, audit regulators, including the Public Company Accounting Oversight Board (PCAOB) and the Financial Reporting Council (FRC), mandate heightened vigilance and the consistent application of professional skepticism in all audit engagements (FRC, 2022; PCAOB, 2017). These regulatory frameworks foster a proactive approach to fraud risk assessment and discourage excessive reliance on routine audit procedures.

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In contrast, auditors in many developing countries operate within environments marked by limited professional training, weaker institutional infrastructure, and inconsistent regulatory enforcement, all of which constrain the effective application of skepticism (ACCA, 2021; IFAC, 2022). For instance, ACCA (2021) highlights that in emerging markets such as Nigeria and Bangladesh, a substantial proportion of auditors lack regular exposure to fraud risk training, forensic audit techniques, and scenario-based learning. Within this context, the Indonesian audit environment examined in this study illustrates that while auditors demonstrate awareness of heuristics and red flags, their capacity to detect fraud can be significantly enhanced through targeted training in skeptical reasoning and fraud-specific case analysis. These insights hold practical relevance for other emerging economies undergoing audit reform or professional capacity-building initiatives. Strengthening the cognitive and procedural dimensions of fraud detection—particularly through structured education in professional skepticism—can contribute to improving audit quality and restoring public trust in financial reporting systems.

5. Conclusion, Implications, and Limitations

This study provides empirical evidence from Indonesian auditors, demonstrating that both heuristics and red flags significantly enhance fraud detection ability. Notably, professional skepticism not only exerts a strong direct influence on detection outcomes but also moderates the relationship between heuristics and fraud detection. However, skepticism does not significantly moderate the relationship between red flags and fraud detection. Collectively, these findings support the relevance of Attribution Theory in explaining auditors' judgment processes within an emerging market context.

The results highlight the critical role of cognitive shortcuts and skeptical reasoning in fraud detection. From a practical perspective, audit firms are encouraged to invest in training programs that integrate intuitive judgment with structured critical thinking. In parallel, regulators should consider embedding formal skepticism competencies into professional standards, particularly for engagements conducted in high-risk or resource-constrained environments.

This study's reliance on cross-sectional survey data and self-reported perceptions presents certain limitations, particularly in capturing the dynamic and evolving nature of fraud detection behaviors. Future research could benefit from longitudinal or experimental designs to better trace judgment development over time. Additional inquiry into contextual variables—such as firm size, industry characteristics, and audit culture—may also yield valuable insights. Furthermore, exploring the interaction between cognitive processes and emerging technologies, including digital tools and artificial intelligence, offers a promising direction. Finally, incorporating considerations of ethical culture and organizational tone may enrich the understanding of how auditors interpret and respond to fraud-related cues.

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