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Fraud Hexagon Theory in Thai Contexts: Testing Cultural Boundary Conditions of Financial Statement Fraud Determinants and Firm Value Implications

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ABSTRACT

This study examines fraud hexagon theory's cultural boundary conditions in Thai listed companies, identifying which elements operate universally versus requiring reconceptualization for relationship-based Asian economies. Using PLS-SEM analysis of 504 SET-listed companies (2,520 firm-years, 2020-2024), we find systematic theory-practice misalignment. Rationalization emerges as fraud risk's dominant predictor ($\beta=0.394$, $p<0.01$), while pressure shows modest effects ($\beta=0.243$, $p<0.05$). Three findings reveal cultural contingencies: opportunity and collusion demonstrate significant negative effects ($\beta=-0.118$ and $\beta=-0.079$ respectively) through alternative mechanisms, while arrogance shows no significant impact. Fraud risk strongly reduces firm value ($\beta=-0.596$, $p<0.001$) with full mediation patterns (VAF>80%) dominating. Corporate governance selectively moderates only pressure and rationalization, proving ineffective against capability, arrogance, and collusion. These patterns reveal fraud theory's two-tier structure: universal core elements (pressure, rationalization) functioning across contexts, and culturally contingent elements (opportunity, capability, arrogance, collusion) requiring fundamental reconceptualization. We demonstrate that governance functions as legitimacy signal rather than operational constraint in Thai contexts, business group coordination differs from fraud collusion, and Buddhist ethics provide richer rationalization frameworks than Western theory recognizes. Findings advance fraud scholarship by establishing cultural boundary conditions and inform fraud prevention strategies for relationship-based Asian markets.

Keywords: Fraud hexagon theory; financial statement fraud; cultural adaptation; relationship-based economy

1. INTRODUCTION

Financial statement fraud poses a severe threat to Thailand's capital markets, with recent scandals exposing fundamental weaknesses in corporate governance and regulatory oversight. The 2023 Stark Corporation collapse, involving 11.7 billion baht in fabricated revenues and concealed liabilities, represents merely the tip of an iceberg that threatens Thailand's ambitions as a regional financial hub. Between 2022-2024, the Securities and Exchange Commission pursued 67 major fraud cases a 67.5% increase from the previous period, yet detection rates paradoxically declined from 47% to 28% (Stock

Exchange of Thailand [SET], 2024). This deteriorating situation demands urgent examination of why conventional fraud theories and detection mechanisms fail in the Thai context.

The economic consequences extend beyond individual company failures. Thai listed companies demonstrating high fraud risk indicators trade at average discounts of 35-40% compared to low-risk peers, representing billions of baht in destroyed shareholder value (SET, 2024). Beyond direct financial losses, fraud undermines Thailand's competitiveness as an ASEAN financial center, increases capital costs for legitimate businesses, and erodes investor confidence in regional markets. Yet current fraud detection approaches, developed primarily in Western contexts, fail to account for Thailand's unique institutional environment where relationship networks (*sen*, เส้น), Buddhist ethical frameworks, and family-controlled business groups fundamentally alter how fraud manifests and persists. Thailand's corporate landscape presents distinctive challenges that fundamentally alter how fraud manifests and persists. First, ownership concentration is extreme: 68% of listed companies have controlling shareholders owning more than 25% of shares, typically through family networks (SET, 2024), enabling collusive fraud schemes across related entities while weakening minority shareholder protections. Second, cultural factors create unique fraud dynamics. The concept of *kreng jai* (เกรงใจ) reluctance to confront authority directly impedes whistleblowing and internal controls. Similarly, *sen* (เส้น) or connection networks blur boundaries between legitimate business relationships and inappropriate collusion. Buddhist concepts of karma and merit-making (*tam bun*, ทำบุญ) provide distinctive rationalization patterns where perpetrators believe good deeds can offset unethical behavior, fundamentally different from Western guilt-based ethics. Third, the patronage system (*rabob uppatham*, ระบบอุปถัมภ์) provides protection networks for well-connected fraudsters, creating environments where certain individuals enjoy de facto immunity (Sudti-autasilp, 2007; Wu, 2005).

Recent empirical evidence highlights these contextual factors' importance. Inya et al. (2018) demonstrated that Western corporate governance mechanisms show limited effectiveness in mitigating management misconduct in Thailand, while Connelly et al. (2012) found Thai governance structures emphasize form over substance implementing visible compliance with international best practices without necessarily constraining management behavior. Kouwenberg & Phunnarungsi (2013) documented that despite significant negative market reactions to fraud announcements (averaging -1.6% abnormal returns), enforcement remains inconsistent with many violations going undetected. These findings suggest fraud theories developed in Western contexts require substantial adaptation for Thailand's Buddhist-influenced capitalism with its patron-client relationships and face-saving culture (*ruksaa naa*, รักษาหน้า).

This study examines financial statement fraud risk in Thai listed companies through an integrated framework combining fraud hexagon theory with Thailand-specific contextual factors. Using PLS-SEM analysis of 504 SET-listed companies (2,520 firm-years, 2020-2024), we identify fraud patterns and test whether Western fraud theory elements operate as predicted in Thai contexts. Specifically, we examine: (1) which fraud hexagon elements predict financial statement fraud risk in Thailand, (2) whether fraud risk mediates relationships between fraud factors and firm value, and (3) whether corporate governance moderates fraud hexagon effects.

Rather than testing whether fraud hexagon theory 'works' in Thailand—a binary frame

assuming universal applicability we identify boundary conditions where Western theoretical assumptions require modification for relationship-based Asian economies. We distinguish: (1) *universal mechanisms* operating across institutional contexts through fundamental human psychology (pressure creating motivation; rationalization enabling self-justification), and (2) *culturally contingent mechanisms* where constructs operate through different pathways requiring reconceptualization (opportunity as legitimacy signal vs. operational constraint; collusion as business group coordination vs. fraud network; capability as network position vs. individual competence). This approach positions unexpected findings not as theoretical failures but as discovery opportunities revealing where and how culture fundamentally shapes fraud dynamics.

Our contribution extends beyond empirical testing to fundamental reconceptualization of fraud theory for collectivist, relationship-based business environments. We demonstrate that fraud theory exhibits *two-tier structure*: a universal core (pressure, rationalization) functioning across contexts through fundamental psychology, and a culturally contingent periphery (opportunity, capability, arrogance, collusion) requiring reconceptualization where Western assumptions about individualistic decision-making, formal governance structures, and rule-based ethics break down. Specifically, we find that governance functions as *legitimacy signal* rather than operational constraint in Thai contexts, business group coordination differs from fraud collusion, and Buddhist ethics provide richer rationalization frameworks than Western theory recognizes. These theoretical modifications have implications for fraud prevention and detection across Asia's relationship-based economies, addressing calls for context-sensitive theory development in international fraud research (Connelly et al., 2012; Inya et al., 2018).

2. Literature Review

This literature review proceeds in four stages: tracing fraud theory's evolution from triangle to hexagon (Section 2.1), examining empirical evidence for each element across emerging markets (Section 2.2), identifying Thailand's distinctive institutional characteristics requiring theoretical adaptation (Section 2.3), and developing culturally informed hypotheses (Section 2.4).

2.1 From Fraud Triangle to Fraud Hexagon: Theoretical Evolution

Cressey's Fraud Triangle Cressey's (1953) seminal work established the fraud triangle as criminology's foundational fraud framework. Based on interviews with 133 convicted embezzlers, Cressey identified three essential elements present in all cases: *pressure* (perceived non-shareable financial problems creating motivation), *opportunity* (circumstances enabling secret violation of financial trust), and *rationalization* (cognitive justifications allowing perpetrators to maintain positive self-concepts despite unethical behavior). Cressey argued these three elements constitute *necessary conditions* fraud cannot occur unless all three are present simultaneously. The pressure element encompasses financial difficulties (debt, addiction, lifestyle expectations), performance pressures (meeting targets, maintaining appearances), or organizational expectations. Opportunity arises from weak internal controls, lack of oversight, organizational positioning enabling override, or knowledge of control weaknesses. Rationalization involves cognitive processes whereby individuals justify wrongdoing: "*I'm just borrowing it*," "*The company owes me*," "*Everyone does it*," or "*I deserve this*." This framework dominated fraud research for five decades, providing parsimonious explanation

grounded in psychological and situational factors.

Wolfe & Hermanson's Fraud Diamond. Wolfe & Hermanson (2004) recognized the fraud triangle inadequately explained sophisticated financial statement frauds requiring substantial technical expertise and organizational positioning. They observed that while many individuals experience pressure, have opportunities, and can rationalize, most do not perpetrate fraud—suggesting missing elements. This led to the *fraud diamonds*, adding *capability* as the fourth element. Capability encompasses: (1) *authoritative position* enabling override of controls and directing others' activities, (2) *intelligence and creativity* to exploit control weaknesses and understand internal systems, (3) *confidence and ego* to believe detection avoidance is possible, (4) *coercion skills* to enlist others' cooperation, (5) *effective lying* to maintain deception under questioning, and (6) *stress management* to handle guilt and detection fear. This addition shifted fraud theory from purely motivational (triangle) to incorporating execution prerequisites (diamond). The capability element explains why organizational position matters executives possess authority, system knowledge, and stress tolerance enabling complex fraud schemes beyond typical employees' reach.

Marks' Fraud Pentagon Marks (2012) observed that major corporate scandals (Enron, WorldCom, Tyco, HealthSouth) involved executives displaying extraordinary hubris, a pattern the fraud diamond couldn't fully explain. This observation led to the fraud pentagon, incorporating arrogance as the fifth element. Arrogance manifests as narcissistic personality traits, superiority beliefs creating entitlement perceptions, invulnerability illusions making detection seem impossible, and belief that rules apply to others but not oneself. Arrogant executives display contempt for internal controls, disregard regulatory requirements, exhibit grandiose behavior, and demonstrate excessive confidence in personal judgment. Psychological research on narcissistic CEOs supports this element narcissists pursue self-interest more aggressively, take excessive risks, and rationalize unethical behavior more easily (Chatterjee & Hambrick, 2007). The pentagon explains fraud persistence despite obvious detection risks: arrogant perpetrators genuinely believe they're too clever to be caught or too powerful to face consequences.

Vousinas' Fraud Hexagon. Most recently, Vousinas (2019) proposed the fraud hexagon by adding collusion as the sixth element, acknowledging that significant financial frauds typically require multiple actors coordinating efforts. Collusion involves: (1) coordinated circumvention of segregation of duties and dual control mechanisms, (2) shared rationalization where multiple perpetrators validate each other's justifications, (3) distributed capability pooling complementary skills across conspirators, (4) mutual pressure where co-conspirators become mutually dependent, and (5) concealment coordination maintaining consistent false narratives. Examples include auditor-client collusion (Arthur Andersen-Enron), management-board collusion (WorldCom directors approving fictitious entries), and inter-company collusion (related party transactions concealing performance). The collusion element recognizes fraud as often organizational rather than individual phenomenon, requiring social coordination mechanisms beyond individual psychology.

Theoretical Assumptions and Western Context. This six-element framework—pressure, opportunity, rationalization, capability, arrogance, collusion provides comprehensive fraud understanding. However, these theories developed entirely from Western corporate contexts (U.S. and European cases) with underlying assumptions:

Assumption 1: Individualistic decision-making where perpetrators act primarily for personal gain, with individual rather than collective utility maximization.

Assumption 2: Formal governance structures with clear role boundaries, written policies, and arms-length relationships between parties.

Assumption 3: Rule-based ethics where absolute moral standards create internal conflict (guilt) requiring psychological rationalization when violated.

Assumption 4: Legal-rational authority where organizational power derives from formal position rather than personal relationships or patronage networks. These assumptions reflect Anglo-American institutional contexts but become problematic in collectivist Asian economies characterized by relationship-based business networks, situational rather than rule-based ethics, concentrated family ownership enabling coordination, and symbolic governance emphasizing form over substance (Connelly et al., 2012; Inya et al., 2018). This suggests fraud theory may exhibit *two-tier structure*: universal core mechanisms operating through fundamental psychology applicable across contexts, and culturally contingent peripheral elements requiring reconceptualization across institutional contexts.

2.2 Fraud Hexagon Elements: Empirical Evidence from Emerging Markets

Having established the fraud hexagon's theoretical foundations, we now examine empirical evidence for each element across emerging Asian markets, revealing both universal patterns and context-specific variations.

Pressure. Pressure consistently emerges as significant fraud predictor across contexts. Akbar et al. (2022) found financial targets create substantial pressure leading to fraudulent reporting, particularly when compensation structures tie rewards to financial metrics. Wiliandini & Mariadi (2024) demonstrated pressure operates through multiple channels including debt covenants, delisting threats, and market expectations. Prasetyo (2025) showed how different pressure types interact, with financial and non-financial pressures amplifying each other's effects. In Asian contexts, pressure extends beyond financial metrics to encompass face-saving concerns (*maintaining reputation within family networks*) and social obligations (*demonstrating success to preserve relationship capital*). The universal nature of pressure economic necessity creates motivation across cultures suggests this element functions consistently through fundamental human psychology responding to resource scarcity and social expectations.

Opportunity. Opportunity research has explored ownership structures and governance mechanisms with nuanced findings. Tayeh et al. (2023) examined how concentrated ownership can either reduce fraud risk (through direct monitoring) or increase it (through expropriation opportunity) depending on minority protection mechanisms. Nduati Kariuki (2023) demonstrated board independence alone proves insufficient, without complementary monitoring mechanisms independent directors require information access, expertise, and authority to exercise oversight effectively. However, Inya et al. (2018) found Western governance mechanisms show limited effectiveness in Thailand, suggesting opportunity manifests differently in relationship-based business cultures where informal networks *sen* (connections) matter more than formal independence. This hints at potential construct reconceptualization needs: opportunity may function through different causal pathways (legitimacy signaling vs. operational constraint) across institutional contexts.

Rationalization. Rationalization studies have examined psychological and cultural

justification factors. Gross & Vostroknutov (2022) revealed that gradual norm erosion facilitates rationalization more effectively than sudden violations small, repeated transgressions progressively shift ethical boundaries, making larger frauds psychologically accessible. This has important implications for understanding fraud escalation within organizations over time. However, in Buddhist-influenced contexts, rationalization operates through distinctive channels: *anicca* (impermanence) concepts enable viewing fraud as temporary accommodations rather than permanent character definitions; karma-based thinking allows offsetting wrongdoing through merit-making (*tam bun*); and situational ethics facilitate context-dependent excuse-making rather than absolute rule violations. These cultural rationalization mechanisms suggest this element, while universally present (all perpetrators require self-justification), operates through culturally specific cognitive pathways requiring examination in each institutional context.

Capability. Capability research has focused on executive positions and technical expertise. Putra & Achmad (2024) found CEO duality increases fraud risk, though audit committee effectiveness can moderate this relationship concentrating power in single individuals creates both opportunity and capability for override. However, distinguishing between technical competence *facilitating fraud* versus *expertise enhancing detection* remains methodologically challenging. Moreover, in relationship-based economies, capability may depend more on network position enabling informal influence (mobilizing *sen* connections to overcome resistance) than on individual technical skills. This suggests potential reconceptualization: capability as network *capability* (relationship mobilization) rather than *individual capability* (technical competence) in collectivist contexts.

Arrogance. Arrogance studies have produced nuanced findings revealing potential cultural contingencies. Gunawan & Siregar (2023) found executive hubris correlates with aggressive accounting practices in pharmaceutical companies, supporting Pentagon theory. However, distinguishing legitimate confidence from problematic arrogance remains challenging visible confident leadership may correlate with genuine competence and legitimate success rather than fraud propensity. More fundamentally, in hierarchical Asian societies, power concentration and authoritative leadership may represent normal business practice rather than problematic hubris. CEO duality prevalence (48% in Thai listed companies) suggests concentrated authority is culturally accepted rather than aberrant. This raises construct validity questions: does arrogance as conceptualized in Western contexts (narcissistic personality disorder symptoms) translate meaningfully to Asian hierarchical cultures?

Collusion. Collusion has received growing empirical attention as fraud hexagon theory's newest element. Lan & Rao (2025) examined Chinese accounting firms, finding auditor-client collusion significantly increases fraud risk through coordinated earnings management. Arnindhita et al. (2024) revealed how related party transactions facilitate collusive fraud schemes transactions between related entities enable earnings manipulation through transfer pricing, fictitious revenue, or asset transfers. However, distinguishing *legitimate business relationships* from *inappropriate collusion* remains challenging, particularly in relationship-based business cultures where extensive related party transactions serve functional purposes within family business groups (internal capital markets, operational synergies, control maintenance). This measurement validity issue suggests collusion construct requires careful operationalization distinguishing *transaction volume* from

procedural safeguards high related party transactions WITH independent approval, arm's-length pricing, and comprehensive disclosure indicate sophisticated business groups; high transactions WITHOUT safeguards indicate problematic collusion.

Cross-Country Validation. Cross-country studies demonstrate partial fraud hexagon support across Asian emerging markets with important variations. Achmad et al. (2022) validated the complete model in Indonesian state-owned enterprises, finding all six elements significantly predicted fraud. Bader et al. (2024) found support for pressure, opportunity, rationalization, and capability in Jordanian industrial firms, but arrogance showed non-significant effects. Fathmaningrum & Anggarani (2021) validated the pentagon model (excluding collusion) in Malaysian and Indonesian manufacturing companies. These studies demonstrate fraud hexagon theory's general applicability to emerging markets while revealing inconsistent support for specific elements particularly arrogance and collusion suggesting cultural contingencies requiring investigation. The pattern hints at two-tier structure: universal core (pressure, rationalization consistently supported) and culturally contingent periphery (capability, arrogance, collusion showing variable cross-national support).

2.3 Thai Institutional Context: Why Thailand Differs

Having examined fraud hexagon theory and cross-national evidence, we now turn to Thailand's distinctive institutional environment. While fraud hexagon theory demonstrates general applicability across emerging markets. Thailand's business environment presents characteristics potentially altering how fraud manifests and persists, requiring explicit theoretical adaptation. Thailand's institutional context operates at three levels cultural, structural, and regulatory creating fraud dynamics absent from Western theoretical models. Understanding these contextual factors is essential for interpreting how fraud hexagon elements may function differently in Thai settings.

Cultural Factors: Buddhist Philosophy and Social Norms. Cultural factors rooted in Buddhist philosophy fundamentally shape ethical reasoning and organizational behavior in Thailand (Connelly et al., 2012; Inya et al., 2018).

First, the concept of *kreng jai* (เกรงใจ) reluctance to confront authority or cause discomfort to others directly impedes whistleblowing mechanisms and internal control enforcement. Subordinates observing questionable practices may remain silent to preserve harmony (*avoid causing superiors to lose face*) and maintain relationship capital (*preserve future cooperation*), even when fraud is evident. This contrasts sharply with Western individualistic cultures emphasizing personal accountability and "speaking truth to power." Whistleblower protection laws prove ineffective when cultural norms discourage confrontation regardless of legal safeguards.

Second, *sen* (เส้น) or connection networks blur boundaries between legitimate business relationships and inappropriate collusion. Business success in Thailand depends critically on cultivating and maintaining relationships with influential individuals government officials, family members, business partners, and community leaders. These relationship networks provide opportunities to facilitate transactions, and enable problem-solving through personal influence. However, this makes distinguishing *networking* from *corruption*, or *legitimate transactions* from *collusive schemes*, inherently difficult. What constitutes appropriate relationship leverage versus inappropriate collusion depends on subtle contextual factors and unstated social norms rather than

clear formal rules.

Third, Buddhist concepts provide distinctive rationalization patterns fundamentally different from Western guilt-based ethics. *Tam bun* (ทำบุญ) merit-making through charitable donations, temple construction, or supporting monks—enables believing that good deeds can offset unethical business behavior. Perpetrators may rationalize: "I donate millions to temples and support the poor, so my aggressive accounting doesn't define me morally." This differs from Western guilt requiring internal consistency between beliefs and actions Buddhist merit-making allows moral compartmentalization. Additionally, *anicca* (อนิจจัง) or impermanence concepts may enable viewing fraud as temporary accommodation rather than permanent character flaw: "This is just temporary until business improves; I'm not fundamentally dishonest." This temporal distancing differs from Western character-based ethics. Finally, situational ethics in Buddhist practice create context-dependent moral reasoning where rightness depends on circumstances, intentions, and consequences rather than absolute rules. This facilitates rationalization: "Given competitive pressures and family obligations, this action is situationally appropriate even if formally rule-violating."

Structural Characteristics: Ownership and Network Configurations. Thailand's capital market structure creates distinctive fraud opportunities and concealment mechanisms.

First, ownership concentration reaches extreme levels: 68% of listed companies have controlling shareholders owning more than 25% of shares, typically through family networks (SET, 2024). Many families control multiple listed companies through pyramidal structures family holding company owns controlling stakes in multiple operating companies, which may cross-hold each other's shares. This structure enables collusive fraud schemes across related entities: transferring profits from weak performers to strong performers, concealing losses through inter-company transactions, or inflating revenues through circular transactions. Simultaneously, concentrated ownership weakens minority shareholder protections controlling families can be of expropriate value through related party transactions, excessive compensation, or asset transfers with limited accountability.

Second, interlocking directorships are pervasive. Asian Corporate Governance Association (ACGA, 2024) documented that 73% of Thai listed companies have board members serving on multiple related company boards. Same individuals oversee multiple group companies, creating challenges for traditional governance independence assumptions. When directors sit on boards of both trading partners, how can they impartially evaluate transaction fairness? These network structures facilitate coordinated manipulation across entities while creating monitoring difficulties for external stakeholders who cannot observe informal coordination.

Third, family-controlled business groups dominate Thailand's economy (Prommin et al., 2014). These groups operate through complex ownership structures separating control rights from cash flow rights family maintains voting control through pyramids and crossholdings while owning smaller cash flow stakes. This separation enables controlling shareholders to extract private benefits: related party transactions at non-market prices, loan guarantees benefiting family interests, or business opportunities diverted to family members. While such structures exist globally, Thailand's weak minority shareholder protections and limited enforcement make expropriation particularly feasible.

Regulatory Environment: Enforcement Patterns and Protection Networks. Thailand's

regulatory and enforcement environment influences fraud deterrence effectiveness.

First, despite legal frameworks modeled on developed markets (adoption of International Financial Reporting Standards, Securities and Exchange Act provisions, Stock Exchange listing requirements), enforcement remains inconsistent. SEC detection rates declined from 47% to 28% between 2020 and 2024 despite increased case volume (SET, 2024), suggesting either fraud sophistication outpaces detection capabilities or resource constraints limit investigation depth. When violations are detected, penalties often prove insufficient to deter average fines of 2-3 million baht for frauds involving billions represent minimal deterrence (Kouwenberg & Phunnarungsi, 2013). Criminal prosecutions remain rare, with most cases settling through administrative sanctions, limiting deterrent effect.

Second, the patronage system (*rabob uppatham*, ระบบอุปถัมภ์) provides protection networks for well-connected fraudsters (Sudti-autasilp, 2007; Wu, 2005). Executives with political connections, royal associations, or military ties may receive informal protection from aggressive prosecution. While difficult to measure directly (operates informally and covertly), Thai business practitioners widely acknowledge such protection networks exist. This creates environments where certain individuals enjoy de facto immunity, potentially fostering arrogance (belief in invulnerability) and reducing perceived detection risks.

Third, accounting standards implementation includes local modifications creating Thailand-specific manipulation opportunities (Wu, 2005). While Thailand adopted IFRS, implementation includes exemptions: simplified consolidation procedures for certain business groups, related party disclosure exemptions for SMEs, and flexibility in revenue recognition timing. These accommodations, intended to reduce compliance costs for smaller firms, create opportunities absent in full IFRS implementations. Fraud detection models developed using U.S. or European data may require recalibration for Thai accounting environments.

Prior Research on Thai Fraud and Governance. Existing research demonstrates these contextual factors' importance for fraud theory application. Connelly et al. (2012) documented that Thai governance structures emphasize visible compliance with international best practices (independent directors, audit committees, disclosure standards) without necessarily constraining management behavior "*form over substance*". Firms implement governance mechanisms to satisfy external stakeholder expectations (stock exchange listings, foreign investor requirements, rating agency criteria) and signal quality, but these formal structures may operate symbolically rather than substantively. This "*decoupling*" between formal governance and actual constraint mechanisms suggests traditional opportunity measures (governance weakness indicators) may not predict fraud as theory expects in Thai contexts. Inya et al. (2018) found Western corporate governance mechanisms show limited effectiveness in mitigating management misconduct in Thailand, with relationship-based monitoring proving more effective than formal independence. Their findings suggest fraud prevention in Thai contexts requires leveraging informal networks (*sen*) for information gathering and accountability rather than relying solely on formal governance structures designed for arms-length Western business relationships. This implies opportunity construct may function through alternative causal pathways—governance as quality signal rather than operational constraint. Kouwenberg &

Phunnarungsi (2013) documented that despite significant negative market reactions when violations are announced (averaging -1.6% abnormal returns), enforcement remains inconsistent with many violations going undetected. This pattern suggests markets recognize fraud risk's value implications but cannot perfectly predict which specific firms will experience fraud discovery, creating opportunities for examining cross-sectional fraud risk pricing. Their work establishes that fraud risk materially affects firm valuations in Thai markets, justifying investigation of fraud risk-firm value relationships.

2.4 Hypotheses Development and Conceptual Framework

Building on fraud hexagon theory (Section 2.1), empirical patterns from Asian markets (Section 2.2), and Thailand's unique institutional context (Section 2.3), we now develop nineteen hypotheses examining which fraud hexagon elements predict financial statement fraud risk in Thailand, whether fraud risk mediates hexagon-firm value relationships, and whether corporate governance moderates fraud hexagon effects

2.4.1 Direct Effects on Fraud Risk (H1-H6)

H1: Pressure positively influences financial statement fraud risk. Financial pressure creates non-shareable burdens motivating fraudulent behavior (Cressey, 1953). In Thai contexts, pressure extends beyond financial metrics to include face-saving concerns within family networks and maintaining *sen* (connections) requiring demonstrated success. We operate pressure through ROA deviation from industry median, leverage ratio, new securities issuance, and institutional ownership intensity.

H2: Opportunity's effect on fraud risk depends on governance function. Traditional fraud theory assumes governance weakness creates exploitable opportunities (predicted positive effect). However, in contexts where governance operates primarily as legitimacy signal rather than operational constraint (Connelly et al., 2012), visible governance structures may indicate organizational quality rather than create fraud prevention. We hypothesize positive effects following traditional theory while recognizing Thai governance may operate through alternative mechanisms, potentially producing null or negative associations.

H3: Rationalization positively influences financial statement fraud risk. Cognitive justification processes enable maintaining positive self-concepts despite unethical behavior (Cressey, 1953). In Buddhist-influenced contexts, rationalization operates through karma-based offsetting and impermanence concepts. We measure rationalization through accruals ratio, auditor changes, and audit opinion history, hypothesizing significant positive effects.

H4: Capability positively influences financial statement fraud risk. Technical expertise and organizational position enable fraud execution (Wolfe & Hermanson, 2004). In relationship-based Thai environments, capability may depend more on network position than individual skills. We measure capability through director changes and board independence, hypothesizing positive effects while recognizing measurement limitations.

H5: Arrogance positively influences financial statement fraud risk. Beliefs of immunity from

consequences facilitate fraud (Marks, 2012). However, in hierarchical Thai society, power concentration may represent normal practice rather than problematic hubris. We explore whether arrogance measured through CEO publicity and duality predicts fraud risk in Thai contexts.

H6: Relationship intensity effects depend on coordination purpose. Vousinas (2019) conceptualized collusion as coordinated circumvention of controls. However, in family-controlled business groups, extensive related party transactions and coordinated activities serve legitimate business purposes: internal capital markets, operational synergies, and control maintenance (Khanna & Yafeh, 2007). We operate collusion through RPT intensity and audit fee patterns while acknowledging measurement challenges: high relationship intensity may indicate either fraud coordination OR sophisticated business group structures with legitimate economic rationale. Expected direction remains positive per theory, but measurement validity concerns suggest results require careful interpretation regarding what construct is actually captured.

2.4.2 Mediation Effects (H7-H12)

Fraud hexagon elements may influence firm value indirectly through fraud risk elevation (Baron & Kenny, 1986). We hypothesize that pressure (H7), opportunity (H8), rationalization (H9), capability (H10), arrogance (H11), and collusion (H12) indirectly influence firm value through financial statement fraud risk, with fraud risk serving as the primary transmission mechanism connecting organizational fraud factors to market outcomes.

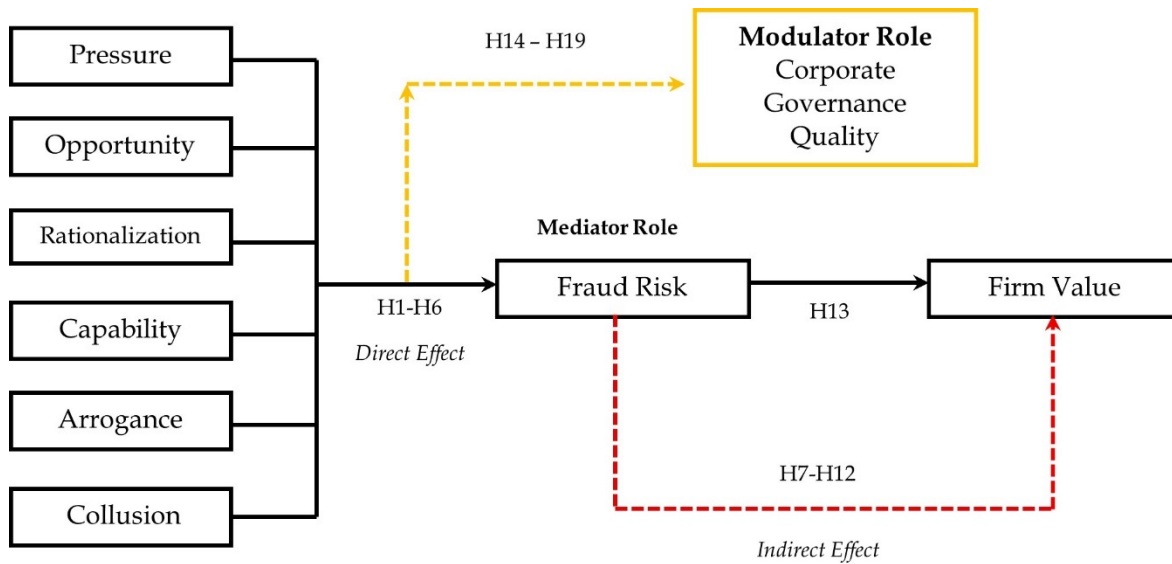
2.4.3 Direct Effect of Fraud Risk on Firm Value (H13)

H13: Financial statement fraud risk negatively influences firm value. Markets should efficiently price fraud risk into valuations, incorporating manipulation likelihood into discounted expected cash flows. Kouwenberg & Phunnarungsi (2013) documented significant negative returns upon fraud discovery, suggesting markets recognize fraud risk's value implications. We hypothesize large negative effects of fraud risk (measured via M-Score and F-Score) on firm value (measured via Tobin's Q and Price-to-Book ratio).

2.4.4 Governance Moderation Effects (H14-H19)

Corporate governance may moderate fraud hexagon elements' effects by buffering pressure (H14), amplifying opportunity's fraud-reducing effects when controls are strong (H15), constraining rationalization (H16), neutralizing capability (H17), humbling arrogance (H18), and preventing collusion (H19). Strong governance should attenuate fraud-enabling effects of pressure, rationalization, capability, arrogance, and collusion through enhanced oversight, ethical tone, and accountability mechanisms.

Figure 1 presents the integrated research framework. Six fraud hexagon elements (pressure, opportunity, rationalization, capability, arrogance, collusion) serve as independent variables predicting fraud risk. Fraud risk acts as both dependent variable (for hexagon elements) and independent variable (for firm value), creating mediation pathways. Corporate governance quality moderate's hexagon-fraud risk relationships. Firm value represents the ultimate dependent variable capturing market assessments of fraud risk and organizational quality.



Note: Black arrow is direct effect path, red arrow is mediator path, yellow arrow is modulator path

Figure 1: Conceptual Research Framework

This framework examines how Western fraud theory operates within Thailand's relationship-based business environment, contributing to context-sensitive theory development in emerging Asian markets. The framework tests both direct relationships predicted by established theory and explores potential deviations arising from cultural and institutional differences, enabling theoretical refinement based on empirical patterns.

3. RESEARCH METHODOLOGY

3.1 Research Design and Sample

This study employs quantitative analysis using archival data from Thailand's Stock Exchange (SET) for 2020-2024. We selected 504 non-financial companies through systematic four-stage screening:

Population and Sampling Process. Starting population: 687 non-financial SET-listed companies (financial firms excluded due to different accounting standards). *Sequential selection criteria:*

- *Continuous listing requirement (2020-2024):* Excluded 89 firms with delisting, suspensions, or new listings → 598 firms remained
- *Complete financial statements:* Excluded 31 firms missing required data → 567 firms remained
- *Complete governance disclosures:* Excluded 48 firms with incomplete Form 56-1 filings → 519 firms remained
- *Complete market data:* Excluded 15 firms with trading suspensions >30 days → 504 firms final sample
- *Final sample:* 504 companies × 5 years = 2,520 firm-year observations

Representativeness Assessment

Chi-square tests confirm our sample represents the population across key dimensions: industry

distribution ($\chi^2(6) = 1.23, p = 0.976$), firm size quartiles ($\chi^2(3) = 0.34, p = 0.844$), and ownership structure ($\chi^2(2) = 0.18, p = 0.914$). However, two biases warrant acknowledgment. First, survivorship bias exists as we excluded 89 delisted firms likely having higher fraud risk, making our findings conservative lower-bound estimates. Second, data completeness bias exists as we excluded 94 firms with incomplete disclosures, potentially overrepresenting transparent firms. These limitations suggest our results best characterize larger, more established Thai firms with complete disclosure practices.

Data Collection Three sources ensured accuracy: (1) SET official database for financial statements and governance data, (2) SET Market Data System for stock prices via Bloomberg Terminal, (3) company websites for verification. Data collected January-August 2024 with quality checks: 10% cross-validation showing 0.7% discrepancy rate, missing data <3% (MCAR confirmed via Little's test: $p=0.308$), inter-coder reliability 95% for governance variables.

3.2 Variable Measurement

Table 1 summarizes all variable operationalizations. Detailed measurement specifications, formulas, and calculation procedures are provided in **Appendix A**.

Table 1: Variable Measurement Summary

Construct	Indicators	Operationalization	Data Source
Pressure (PRE)	ROA, STA, LEV, INS	ROA deviation from industry median; leverage ratio; new securities issuance (binary); institutional ownership %	Financial statements, SET database
Opportunity (OPP)	AEM, EAQ, IAQ	Control effectiveness index; Big 4 auditor (binary); internal audit quality score	Annual reports, auditor data
Rationalization (RAT)	ACC, CAD, ADO	Accruals ratio (discretionary accruals/total assets); auditor changes (binary); audit opinion type	Financial statements, audit reports
Capability (CAP)	DRC, IND	Director changes (binary); independent director %	Annual reports, board data
Arrogance (ARR)	NCP, CDL	CEO photo frequency in annual report; CEO duality (binary)	Annual reports
Collusion (COL)	RLT, ADF	Related party transaction intensity (RPT value/revenue); audit fee ratio	Related party disclosures, audit fees
Fraud Risk (FFR)	MSC, FSC	M-Score (Beneish, 1999); F-Score (Dechow et al., 2011)	Calculated from financial ratios
Firm Value (FVL)	TBQ, PBV	Tobin's Q; Price-to-Book ratio	Market data, financial statements
Corporate Governance	Composite	Board structure, committee effectiveness, ownership, disclosure,	Annual reports, CG disclosures

(CGQ)		shareholder rights (0-1 index)	
Controls	Size, Ind, Age, Growth, Prof	Log (total assets); sector codes; years since listing; revenue growth %; operating margin %	Financial statements, SET database

Fraud Risk Measurement. We employ two validated detection models providing complementary fraud risk assessment. The Beneish M-Score (1999) calculates:

$$M\text{-Score} = -4.84 + 0.920(DSRI) + 0.528(GMI) + 0.404(AQI) + 0.892(SGI) + 0.115(DEPI) - 0.172(SGAI) + 4.679(TATA) - 0.327(LVGI)$$

where components measure days sales in receivables, gross margin, asset quality, sales growth, depreciation, SG&A expenses, total accruals, and leverage changes. Scores exceeding -2.22 indicate elevated manipulation risk. The Dechow F-Score (2011) employs logistic regression combining accrual quality, financial performance indicators, off-balance sheet activities, and market expectations to generate fraud probability estimates from 0 to 1, with values exceeding 0.5 indicating high risk. Using both models enables robustness testing and complementary coverage.

Corporate Governance Quality develops a composite index (0-1 scale) aggregating five dimensions: (1) board structure (size, independence, separation, attendance, diversity), (2) committee effectiveness (audit, compensation, nominating quality), (3) ownership structure (concentration, divergence, institutional presence), (4) disclosure quality (comprehensiveness, timeliness, voluntary ESG), and (5) shareholder rights (minority protections, meeting accessibility). Each component receives standardized scoring, with the composite averaging across dimensions (mean=0.627, SD=0.184).

3.3 Data Analysis Approach

We employ Partial Least Squares Structural Equation Modeling (PLS-SEM) using Smartly 4.0 for five methodological reasons:

1. *Complex model structure:* 19 simultaneous hypotheses (6 direct effects, 6 mediations, 6 moderations, 1 main effect) exceed multiple regression capabilities while avoiding CB-SEM convergence issues with 45+ parameters.
2. *Formative constructs:* Fraud hexagon elements are formative (indicators cause constructs, not vice versa). PLS-SEM explicitly handles formative models via Mode B algorithm; CB-SEM requires problematic identification constraints.
3. *Non-normal data:* Severe multivariate non-normality detected (Mardia's skewness = 18.4 vs. critical 3.0; 14 of 22 variables violate normality per Shapiro-Wilk tests, p<0.01). PLS-SEM is distribution-free via bootstrapping; CB-SEM's Maximum Likelihood requires normality.
4. *Prediction focus:* Research questions emphasize prediction ("which elements predict fraud risk?"), not theory confirmation. PLS-SEM maximizes explained variance (R²); CB-SEM optimizes covariance matrix fit.
5. *Adequate sample size:* N=2,520 exceeds PLS-SEM's "10-times rule" requirement (60 observations needed) by 42×, providing power >0.99 for detecting small effects.

Alternative Methods Considered

We evaluated several analytical approaches before selecting PLS-SEM. CB-SEM was rejected due to severe multivariate non-normality (Mardia's skewness = 18.4 vs. critical value 3.0) and problematic identification constraints for formative constructs requiring Mode B estimation. Multiple regression cannot test mediation and moderation simultaneously while assessing global model fit. Hierarchical linear modeling applies to nested data structures inappropriate for our panel design. PLS-SEM addresses all requirements handles non-normal data distribution-free via bootstrapping, explicitly models formative constructs, tests complex mediation-moderation simultaneously, and maximizes explained variance consistent with our prediction focus.

Algorithm specifications:

- Consistent PLS (PLSc) for corrected estimates
- Path weighting scheme (optimizes structural relationships)
- 5,000 bootstrap samples with bias-corrected 95% confidence intervals
- Two-tailed significance tests ($\alpha=0.05$)

Quality criteria:

- R^2 : Explained variance (≥ 0.25 acceptable, ≥ 0.50 moderate, ≥ 0.75 substantial)
- f^2 : Effect sizes (0.02 small, 0.15 medium, 0.35 large)
- Q^2 : Predictive relevance via blindfolding (>0 indicates model predicts omitted cases)
- Fit: SRMR <0.08 , NFI >0.90

Measurement model evaluation:

- Formative models: Outer weights significance, VIF <5.0 (multicollinearity check)
- Reflective models: Loadings ≥ 0.70 , Cronbach's $\alpha \geq 0.70$, AVE ≥ 0.50 , HTMT <0.85

Structural model testing:

- *Direct effects*: Path coefficients (β), bootstrap t-values, p-values
- *Mediation*: Indirect effects via bootstrap CIs; VAF $>80\%$ = full mediation, 20-80% = partial
- *Moderation*: Product indicators approach standardized predictors; simple slopes at ± 1 SD All procedures follow Hair et al. (2019) PLS-SEM best practices.

Common method bias assessment employs four approaches: Harman's single-factor test (no factor should account for $>50\%$ variance), common latent factor approach (coefficients remain stable after adding method factors), marker variable technique (theoretically unrelated variable shows non-significant correlations), and confirmatory factor analysis (multi-factor models fit better than single-factor). *Robustness checks* test alternative fraud risk specifications (M-Score only, F-Score only), subsample analyses by industry and size, and temporal stability across periods. Results appear in **Appendix C**.

3.4 Ethical Considerations

Exemption from formal review: Sripatum University Research Ethics Committee granted exempt research designation (Protocol SPRU-ACC-2024-002, November 28, 2023) because: (1) exclusively secondary data from publicly available sources, (2) no human subjects involvement, (3) corporate data not personal data under Thai PDPA B.E. 2562, (4) minimal risk no privacy invasion beyond public availability.

Data privacy and confidentiality: Despite using public data, we protect corporate information:

Company anonymization: Results present aggregate statistics only; no individual firms identified by name in findings

Fraud risk scores confidential: M-Score/F-Score calculated for research only, not publicly disclosed to prevent reputational harm from probabilistic indicators

Data security: Encrypted storage (256-bit AES), password-protected access limited to authors, no cloud storage

Coding system: Companies assigned anonymous numeric IDs (1-504); master list stored separately

Research transparency: Replication materials including variable calculation procedures, syntax files, and anonymized datasets available from corresponding author upon reasonable request, subject to institutional data sharing policies.

4. RESULTS

4.1 Sample Characteristics

Table 2 presents sample distribution across seven industry sectors. The Service sector represents the largest portion at 24.01% (121 companies), followed by Property and Construction at 20.44% (103 companies), and Industrial Products at 15.87% (80 companies). This distribution closely mirrors the broader SET population structure, ensuring representativeness across diverse business models, operational complexities, and risk profiles.

Table 2: Sample Distribution by Industry Sector

No.	Industry Sector	Number of Firms	Percentage
1	Agro and Food Industry	63	12.50
2	Consumer Products	38	7.54
3	Industrial Products	80	15.87
4	Property and Construction	103	20.44
5	Resources	59	11.71
6	Services	121	24.01
7	Technology	40	7.94
Total		504	100.00

Source: Data analysis

4.2 Descriptive Statistics and Correlations

Table 3 presents descriptive statistics for all observed variables measuring fraud hexagon elements, fraud risk indicators, firm value measures, and corporate governance quality.

Table 3: Descriptive Statistics of All Variables (N=504 firms, 2,520 observations)

Construct	Variable	Indicator	Mean	SD	Min	Max
Pressure	ROA	Financial Targets	2.537	7.062	-24.50	28.30
	STA	Financial Stability	0.950	0.283	0.12	1.00
	LEV	External Pressure	0.413	0.281	0.01	0.95
	INS	Institutional Ownership	0.295	1.553	0.00	15.67
Opportunity	AEM	Control Effectiveness	0.280	0.124	0.05	0.78
	EAQ	External Audit Quality*	67.8%	-	-	-
	IAQ	Internal Audit Quality	1.304	0.965	0.00	4.00
Rationalization	ACC	Accruals Ratio	0.590	0.709	-0.15	8.45
	CAD	Auditor Changes*	18.2%	-	-	-
	ADO	Audit Opinion*	-	-	-	-
Capability	DRC	Director Changes*	17.9%	-	-	-
	IND	Independent Directors	0.408	0.125	0.17	0.75
Arrogance	NCP	CEO Publicity	1.386	1.358	0.00	8.00
	CDL	CEO Duality*	48.1%	-	-	-
Collusion	RLT	Related Party Transactions	61.628	381.466	0.00	4892.5
	ADF	Audit Fee Ratio	1.166	1.737	0.10	15.23
Fraud Risk	MSC	M-Score	-2.953	1.197	-6.87	2.45
	FSC	F-Score	-8.580	17.724	-89.4	42.3
Firm Value	TBQ	Tobin's Q	1.147	2.871	0.15	48.62
	PBV	Price-to-Book Ratio	2.563	8.325	0.08	127.4
Governance	CGQ	Composite Index	0.627	0.184	0.15	0.95

Note: Variables marked with asterisk (*) are binary/categorical; percentages represent average frequency. SD = Standard Deviation.

Key descriptive patterns emerge from the data. **Pressure** shows substantial heterogeneity, particularly in ROA (SD=7.062) and institutional ownership (SD=1.553), creating diverse pressure environments. **Opportunity** demonstrates relatively consistent control weakness patterns (AEM mean=0.280), though audit quality varies considerably. **Rationalization** exhibits high variation in

accruals (SD=0.709), indicating heterogeneous ethical boundaries. **Capability** measures show moderate board independence (mean=0.408) with increasing CEO duality trends. **Arrogance** indicators reveal variable publicity-seeking behavior. **Collusion** shows extreme RPT variation (SD=381.466), identifying firms with extensive transaction networks. Both **fraud risk** models demonstrate heterogeneity despite low means (M-Score: -2.953±1.197; F-Score: -8.580±17.724), confirming meaningful risk variation. **Firm valuations** display dramatic dispersion (TBQ: SD=2.871; PBV: SD=8.325), providing sufficient outcome variance for detecting fraud risk effects.

Table 4: Correlation Matrix of Key Constructs

	PRE	OPP	RAT	CAP	ARR	COL	FFR	FVL	CG Q
PRE	1.000								
OPP	0.342** *	1.000							
RAT	0.456** *	0.387** *	1.000						
CAP	0.298** *	0.412** *	0.334** *	1.000					
ARR	0.367** *	0.289** *	0.423** *	0.356** *	1.000				
COL	0.401** *	0.345** *	0.512** *	0.287** *	0.398** *	1.000			
FFR	0.489** *	0.434** *	0.567** *	0.376** *	0.445** *	0.498** *	1.000		
FVL	- 0.267** *	- 0.312** *	- 0.398** *	- 0.234** *	- 0.289** *	- 0.356** *	- 0.512** *	1.000	
CG Q	- 0.201** *	0.278** *	- 0.345** *	0.156* *	0.089	-0.167* *	- 0.289** *	0.234** *	1.00 0

Note: * p<0.05, ** p<0.01, *** p<0.001 (two-tailed). N=2,520 firm-year observations. PRE=Pressure, OPP=Opportunity, RAT=Rationalization, CAP=Capability, ARR=Arrogance, COL=Collusion, FFR=Fraud Risk, FVL=Firm Value, CGQ=Corporate Governance Quality.

Table 4 shows the correlation matrix reveals important preliminary patterns. All fraud hexagon elements show significant positive intercorrelations (r=0.287 to 0.512), suggesting interconnected rather than independent fraud factors. Rationalization exhibits the strongest correlations with other elements, particularly collusion (r=0.512) and pressure (r=0.456). All hexagon elements correlate positively with fraud risk (r=0.376 to 0.567), with rationalization showing the strongest bivariate relationship (r=0.567). Fraud risk demonstrates strong negative correlation with firm value (r=-0.512),

supporting H13's prediction that markets penalize fraud risk. Corporate governance shows theoretically consistent patterns: negative with pressure, rationalization, collusion, and fraud risk; positive with firm value. However, governance correlates positively with opportunity ($r=0.278$), suggesting visible governance mechanisms signal quality rather than create fraud opportunities a pattern foreshadowing H2's unexpected results. All VIF values remain below 3.5, confirming multicollinearity does not threaten parameter stability.

4.3 Measurement Model Assessment

PLS-SEM requires systematic evaluation of measurement models before assessing structural relationships. Given fraud hexagon constructs' formative nature (indicators cause constructs), evaluation focuses on indicator weights, multicollinearity, and external validity. Fraud risk and firm value employ reflective measurement (constructs cause indicators), requiring reliability and validity assessment.

Table 5: Comprehensive Measurement Model Assessment
 Panel A: Formative Measurement Models (Hexagon Elements)

Construct	Indicator	Outer Weight	VIF	Sig.
Pressure	ROA	0.412	1.847	***
	STA	0.198	1.523	*
	LEV	0.264	1.692	**
	INS	0.325	1.438	***
Opportunity	AEM	0.387	2.145	***
	EAQ	0.294	1.876	**
	IAQ	0.356	2.032	***
Rationalization	ACC	0.445	1.654	***
	CAD	0.289	1.432	**
	ADO	0.312	1.398	**
Capability	DRC	0.267	1.287	*
	IND	0.389	1.365	***
Arrogance	NCP	0.421	1.542	***
	CDL	0.335	1.489	***
Collusion	RLT	0.456	1.723	***
	ADF	0.298	1.568	**

Panel B: Reflective Measurement Models

Construct	Indicator	Loading	Cronbach's α	CR	AVE
Fraud Risk	MSC	0.847	0.812	0.886	0.795
	FSC	0.938			
Firm Value	TBQ	0.892	0.845	0.901	0.819
	PBV	0.917			

Panel C: Discriminant Validity (HTMT Ratios)

	PRE	OPP	RAT	CAP	ARR	COL	FFR	FVL
OPP	0.412							
RAT	0.523	0.465						
CAP	0.356	0.487	0.401					
ARR	0.434	0.345	0.498	0.423				
COL	0.478	0.412	0.589	0.342	0.467			
FFR	0.567	0.512	0.654	0.445	0.523	0.578		
FVL	0.312	0.376	0.456	0.278	0.341	0.423	0.589	

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ based on 5,000 bootstrap samples. VIF=Variance Inflation Factor. CR=Composite Reliability. AVE=Average Variance Extracted. HTMT=Heterotrait-Monotrait ratio. Acceptable thresholds: Loadings > 0.70 , $\alpha > 0.70$, CR > 0.70 , AVE > 0.50 , VIF < 5.0 , HTMT < 0.85 .

Formative models demonstrate appropriate indicator contributions without multicollinearity concerns (all VIF < 3.5). For pressure, financial targets (ROA) contribute most strongly (0.412), followed by institutional ownership (0.325). Opportunity shows balanced contributions across control effectiveness (0.387), internal audit quality (0.356), and external audit quality (0.294). Rationalization is dominated by accruals ratio (0.445). Capability emphasizes board independence (0.389) over director changes (0.267). Arrogance and collusion show expected patterns with primary indicators contributing most (NCP=0.421, RLT=0.456).

Reflective models demonstrate excellent psychometric properties. All indicator loadings exceed 0.80, substantially above the 0.70 threshold. Cronbach's alpha values (0.812, 0.845) confirm strong internal consistency. Composite reliability (0.886, 0.901) exceeds recommended levels. Average variance extracted (0.795, 0.819) surpasses the 0.50 criterion, indicating convergent validity. **Discriminant validity** is confirmed through HTMT ratios, all remaining below 0.85 (highest=0.654 between rationalization and fraud risk, theoretically reasonable). These results establish that measurement instruments adequately capture intended constructs, providing foundation for structural model assessment.

Common method bias tests provide reassurance. Harman's single-factor test yielded eight factors with eigenvalues > 1.0 , with the first factor explaining only 28.4% of variance substantially below the 50% threshold indicating problematic common method variance. Adding a common latent factor to the structural model changed path coefficients by less than 0.03 on average, with R^2 increases averaging only 0.017. Stock trading volume (marker variable) showed non-significant correlations with all study variables ($r = -0.04$ to 0.06 , all $p > 0.10$). These tests demonstrate common method bias does not materially threaten findings' validity.

4.4 Structural Model Assessment and Hypothesis Testing

Table 6: Structural Model Quality and Path Coefficients

Endogenous	R ²	R ²	Q ²	Assessment
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Variable		Adjusted		
Fraud Risk (FFR)	0.487	0.481	0.356	Moderate explanatory power; good predictive relevance
Firm Value (FVL)	0.324	0.319	0.241	Moderate explanatory power; acceptable predictive relevance

Table 6 presents the fraud hexagon elements collectively explain 48.7% of variance in fraud risk, representing moderate to substantial explanatory power. The Q² value of 0.356 substantially exceeds zero, demonstrating strong predictive relevance the model accurately predicts out-of-sample fraud risk. For firm value, the model explains 32.4% of variance with acceptable predictive relevance (Q²=0.241), consistent with expectations given multiple factors influencing market valuations beyond fraud risk.

Table 7: Hypothesis Testing Results - All Paths

Hypothesis	Path	β	t-value	p-value	f ²	95% CI	Decision
Direct Effects on Fraud Risk							
H1	PRE → FFR	0.243	3.029	0.014**	0.065	[0.054, 0.432]	Supported
H2	OPP → FFR	-0.118	2.894	0.026*	0.021	[-0.224, -0.012]	Rejected
H3	RAT → FFR	0.394	3.405	0.004**	0.178	[0.173, 0.615]	Supported
H4	CAP → FFR	0.102	2.797	0.124	0.012	[-0.029, 0.233]	Not Supported
H5	ARR → FFR	-0.123	3.044	0.284	0.018	[-0.345, 0.099]	Not Supported
H6	COL → FFR	-0.079	1.415	0.042*	0.008	[-0.156, -0.002]	Rejected
Mediation Effects							
H7	PRE → FFR → FVL	-0.086	-	0.000***	-	[-0.131, -0.041]	Supported (Full, VAF=145.8%)
H8	OPP → FFR → FVL	0.041	-	0.005**	-	[0.012, 0.070]	Supported (Full, VAF=-141.4%)
H9	RAT → FFR → FVL	-0.140	-	0.048*	-	[-0.271, -0.009]	Supported (Full,

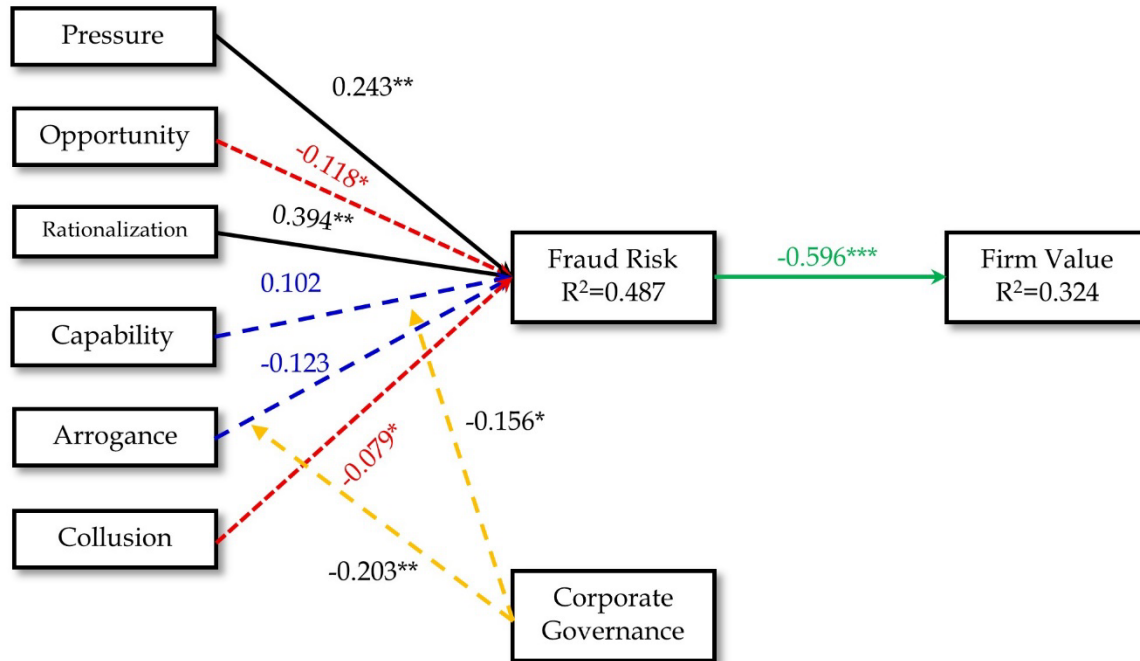
							VAF=147.4%)
H10	CAP → FFR → FVL	-0.036	-	0.002**	-	[-0.062, - 0.010]	Supported (Full, VAF=144.0%)
H11	ARR → FFR → FVL	0.043	-	0.004**	-	[0.014, - 0.072]	Rejected (Positive effect)
H12	COL → FFR → FVL	0.028	-	0.061	-	[-0.002, - 0.058]	Not Supported
Direct Effect							
H13	FFR → FVL	-0.596	4.286	0.000***	0.421	[-0.789, - 0.403]	Strongly Supported
Moderation Effects							
H14	CG × PRE → FFR	-0.156	2.127	0.034*	0.031	[-0.298, - 0.012]	Supported
H15	CG × OPP → FFR	0.089	1.542	0.124	0.012	[-0.025, - 0.203]	Not Supported
H16	CG × RAT → FFR	-0.203	2.876	0.004**	0.048	[-0.341, - 0.065]	Supported
H17	CG × CAP → FFR	-0.067	1.234	0.218	0.008	[-0.175, - 0.041]	Not Supported
H18	CG × ARR → FFR	0.045	0.876	0.381	0.003	[-0.056, - 0.146]	Not Supported
H19	CG × COL → FFR	0.112	1.789	0.074	0.018	[-0.011, - 0.235]	Not Supported

Note: * p<0.05, ** p<0.01, *** p<0.001. Rejected due to opposite sign from prediction. f²: 0.02=small, 0.15=medium, 0.35=large effect. VAF=Variance Accounted For. CI=Confidence Interval from 5,000 bootstrap samples. CG=Corporate Governance Quality.

Summary of hypothesis testing results: Of 19 hypotheses, 9 received full support (H1, H3, H7-H10, H13, H14, H16), 7 were not supported (H4, H5, H12, H15, H17-H19), and 3 showed significant effects opposite to predictions requiring rejection (H2, H6, H11). Rationalization emerged as fraud risk's strongest predictor ($\beta=0.394$, $f^2=0.178$ medium effect), followed by pressure ($\beta=0.243$, $f^2=0.065$ small effect). Fraud risk demonstrated large negative impact on firm value ($\beta=-0.596$, $f^2=0.421$ large effect), establishing it as a primary value determinant. Full mediation patterns dominated (VAF>80%), indicating fraud hexagon elements influence firm value almost entirely through fraud risk elevation rather than direct channels. Corporate governance selectively moderated only pressure and rationalization effects, not capability, arrogance, or collusion, revealing limited governance

effectiveness in Thai contexts.

Unexpected findings require careful interpretation. Opportunity and collusion showed significant negative effects (H2, H6 rejected), suggesting that in Thai contexts, visible governance mechanisms and relationship networks signal quality rather than create fraud risk. Arrogance showed positive indirect effects on firm value (H11 rejected), indicating markets may interpret visible leadership positively. These paradoxical patterns underscore the need for cultural adaptation of Western fraud theory when applying to Thai institutional contexts.



Note: Black line is supported, red line is rejected, blue line is not supported, green line is main effect and supported, yellow line is moderator supported.

Note: Solid lines represent significant paths ($p < 0.05$), dashed lines represent non-significant paths. Numbers on arrows show standardized path coefficients. Line thickness is proportional to effect size. Red paths indicate unexpected negative coefficients contradicting theoretical predictions (H2: OPP→FFR, H6: COL→FFR). Corporate governance moderation effects (H14, H16 supported) not shown for visual clarity—see Table 7 for complete moderation results. Model fit indicators: R²(Fraud Risk)=0.487, Q²=0.356; R²(Firm Value)=0.324, Q²=0.241. Bootstrap results are based on 5,000 resamples. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Figure 2. Structural Equation Model Results

Figure 2 visualizes the complete structural model, revealing the network of relationships between fraud hexagon elements, fraud risk, and firm value. Arrow thickness represents effect magnitude, with solid

lines indicating significant paths ($p < 0.05$) and dashed lines showing non-significant relationships. Three key patterns emerge from the visual structure.

First, rationalization dominates as fraud risk's strongest predictor ($\beta = 0.394$, $p < 0.01$), illustrated by the thickest incoming arrow. This visual prominence reflects its medium effect size and central role in Thai fraud perpetration. Pressure shows the second-strongest effect ($\beta = 0.243$, $p < 0.05$), while capability and arrogance display weak non-significant relationships (dashed lines).

Second, two paradoxical negative effects appear in red, immediately highlighting findings that contradict Western fraud theory. Opportunity ($\beta = -0.118$, $p < 0.05$) and collusion ($\beta = -0.079$, $p < 0.05$) show inverse relationships with fraud risk, suggesting that in Thai contexts, visible governance mechanisms and relationship networks signal organizational quality rather than create fraud opportunities. These red arrows underscore the study's core contribution: Western fraud constructs require fundamental reconceptualization for relationship-based Asian economies.

Third, fraud risk demonstrates a large negative impact on firm value ($\beta = -0.596$, $p < 0.001$), shown by the model's thickest arrow on the right side. This exceptional visual prominence reflects fraud risk's large effect size ($f^2 = 0.421$) and establishes it as one of firm value's most influential determinants. The arrow's thickness—substantially larger than any fraud predictor emphasizes asymmetry between factors elevating fraud risk (moderate effects) and fraud risk's market consequences (large effect).

The model's hub-and-spoke architecture multiple arrows converging on fraud risk from the left, one dominant arrow existing to firm value on the right visually illustrates fraud risk's role as the central transmission mechanism. This structure reflects the full mediation patterns ($VAF > 80\%$) where hexagon elements influence firm value almost entirely through fraud risk elevation rather than direct pathways. Even elements with weak direct effects (capability) or paradoxical effects (opportunity, collusion) ultimately impact value through the fraud risk channel.

R^2 values within boxes (Fraud Risk: 0.487; Firm Value: 0.324) indicate that fraud hexagon elements explain 48.7% of fraud risk variance moderate to substantial explanatory power while fraud risk explains 32.4% of firm value variance, consistent with multiple value determinants operating alongside fraud risk. Corporate governance moderation effects (H14, H16 supported) are not depicted to preserve visual clarity; see Table 7 for complete moderation results.

Visual comparison with theoretical expectations reveals the study's key insight. Western fraud theory predicts all six hexagon elements showing positive effects of similar magnitude. Instead, in figure 2 shows only two positive significant effects, dramatic variation in magnitude (rationalization's thick arrow versus others' thin arrows), and two negative effects (red arrows). This visual contrast between theory and evidence immediately communicates that fraud hexagon theory requires cultural adaptation for Thai institutional contexts, with some elements (pressure, rationalization) operating universally while others (opportunity, collusion, arrogance, capability) exhibit context-dependent effects requiring reconceptualization for relationship-based economies.

4.5 Robustness Checks

We conducted comprehensive robustness analyses to ensure findings' reliability. Table 8 presents results using alternative fraud risk specifications.

Table 8: Robustness Checks - Alternative Fraud Risk Measures

Path	Main Model (Both)	M-Score Only	F-Score Only	Averaged Score
PRE → FFR	0.243**	0.251**	0.236*	0.248**
OPP → FFR	-0.118*	-0.125*	-0.109*	-0.121*
RAT → FFR	0.394***	0.407***	0.378***	0.398***
CAP → FFR	0.102	0.108	0.095	0.105
ARR → FFR	-0.123	-0.118	-0.129	-0.125
COL → FFR	-0.079*	-0.084*	-0.072*	-0.081*
FFR → FVL	-0.596***	-0.604***	-0.585***	-0.599***
R ² (FFR)	0.487	0.493	0.479	0.491
R ² (FVL)	0.324	0.331	0.316	0.327

Note: * p<0.05, ** p<0.01, *** p<0.001. All models include control variables.

Results demonstrate remarkable consistency across specifications. Key findings remain stable: rationalization is the strongest predictor ($\beta=0.378$ to 0.407), pressure shows significant positive effects, paradoxical negative effects for opportunity and collusion persist, and fraud risk's large negative effect on firm value ($\beta=-0.585$ to -0.604) remains highly significant. Minimal R² variation (FFR: 0.479-0.493; FVL: 0.316-0.331) confirms substantive conclusions do not depend on specific fraud risk operationalization.

Additional robustness checks examined subsample analyses (industry, size, ownership structure), temporal stability (pandemic vs. recovery periods), and outlier treatments (winsorized valuations). Detailed results appear in Online Appendix C. Key patterns include: (1) core relationships remain significant across industries, (2) rationalization effects weaken in larger firms, (3) collusion effects concentrate in family-controlled firms, (4) pressure effects intensified during pandemic periods, and (5) fraud risk-value relationships survive winsorization. These comprehensive checks strengthen confidence that findings reflect genuine structural relationships rather than methodological artifacts.

5. DISCUSSION

5.1 Overview: When Western Theory Meets Thai Reality

Testing fraud hexagon theory across 504 Thai companies revealed a striking pattern: only half the predictions held. Rationalization dominated as fraud risk's strongest driver ($\beta=0.394$), while pressure showed modest effects ($\beta=0.243$). But three findings defied theoretical expectations opportunity and collusion reduced rather than increased fraud risk, and arrogance showed no effect at all. These aren't mere statistical anomalies; they signal fundamental misalignment between Western fraud theory and Asian business reality.

5.2 What Worked: Pressure and Rationalization in Thai Contexts

5.2.1 Pressure: Universal Driver with Cultural Amplification

Our pressure findings align with decades of fraud research. Akbar et al. (2022) and Wiliandini & Mariani (2024) documented how financial targets and debt pressures motivate manipulation. We confirm this pattern but uncover an important twist: pressure intensified during pandemic periods ($\beta=0.312$ vs. 0.218 in recovery), suggesting crisis amplifies fraud motivation. This finding requires

theoretical extension beyond Western individualistic frameworks. Agency theory (Jensen & Meckling, 1976) models fraud assuming agents maximize personal utility—pursuing individual wealth or career advancement at principals' expense. However, Thai pressure operates through collective mechanisms extending beyond personal finances to family reputation (khan-ya, ฐานะ) and relationship capital (sen networks). The concept of ruksaa naa (รักษาหน้า, maintaining face) within business networks means financial underperformance threatens not merely individual compensation but collective family standing and relationship capital built over generations. This suggests agency frameworks require expansion to incorporate collective family utility functions where agents balance personal gains against family reputation costs and network preservation imperatives. Pressure in Thai contexts represents threats to collective social capital, amplifying motivation beyond individualistic models.

What differs in Thailand is why pressure matters. Western research emphasizes individual financial stress executives fearing job loss or missed bonuses. Thai pressure operates through collective mechanisms. Connelly et al. (2012) showed Thai governance emphasizes form over substance within family-controlled structures. This means pressure extends beyond personal finances to family reputation and sen (connection networks). Failing to meet targets doesn't just threaten individual compensation; it risks collective family standing and relationship capital built over generations. This distinction matters theoretically. Agency theory (Jensen & Meckling, 1976) models' fraud assuming individualistic utility maximization. Our findings suggest collectivist contexts require expanding agency frameworks to incorporate collective family utility functions, where agents balance personal gains against family reputation costs.

5.2.2 Buddhist Rationalization Mechanisms

Rationalization's dominance ($\beta=0.394$, largest effect by far) challenges fraud theory's traditional hierarchy. Cressey's (1953) fraud triangle positioned rationalization as necessary but equal to pressure and opportunity. Subsequent fraud, diamond and pentagon developments added elements but never questioned this balance. Cross-national comparisons reveal Thailand's distinctiveness: Indonesian studies (Achmad et al., 2022) found relatively balanced hexagon effects, while Jordanian research (Bader et al., 2024) emphasized pressure and opportunity. Only in Thailand does rationalization tower over other factors. Buddhist ethical frameworks provide four distinctive rationalization mechanisms absent from Western guilt-based theories: First, tam bun (ทำบุญ, merit-making) enables moral offsetting. Perpetrators rationalize: 'I donate millions to temples and support poor families, so aggressive accounting doesn't define me morally.' This differs fundamentally from Western guilt requiring internal consistency between beliefs and actions. Buddhist merit-making allows moral compartmentalization—business ethics and personal spirituality operate in separate domains, with merit accumulation compensating for business transgressions. Second, anicca (อนิจจัง, impermanence) enables temporal distancing. The Buddhist principle that all phenomena are transient facilitates psychological separation: 'This is temporary accommodation until business improves; I'm not fundamentally dishonest.' Western ethics ground morality in stable character traits; Buddhist impermanence enables dissociating actions from identity. Third, situational ethics over absolute rules. Buddhist practice emphasizes situational appropriateness where rightness depends on circumstances and consequences rather than absolute standards. This facilitates rationalization: 'Given competitive

pressures and family obligations, this action is situationally appropriate even if formally rule-violating.' Western deontological ethics create psychological conflict when violated; Buddhist contextual ethics create flexibility enabling self-justification. Fourth, *anatta* (อนัตตา, no-self) enables identity disconnection. The Buddhist concept of absent permanent self-facilitates dissociation: 'That action occurred in particular circumstances but doesn't define a permanent self because no such permanent self exists.' This philosophical framework reduces guilt by enabling separation between perpetrator and action. These mechanisms extend Cressey's (1953) rationalization concept beyond individual cognitive dissonance to incorporate culturally variable frameworks. Rationalization remains universal (perpetrators require self-justification psychologically), but operates through culturally specific pathways requiring examination in each institutional context (Gross & Vostroknutov (2022)).

Neuroscientific research on moral decision-making provides additional insight into rationalization mechanisms. Greene & Haidt (2002) demonstrated moral judgments activate distinct neural pathways: rule-based ethical violations (deontological reasoning) engage cognitive control regions requiring effortful justification, while consequence-based reasoning (teleological ethics) activates intuitive emotional regions requiring less cognitive dissonance resolution. Buddhist situational ethics operating through consequence-based frameworks may require less neural effort for rationalization than Western rule-based systems, potentially explaining why rationalization operates more powerfully in Thai contexts. The neurological distinction between controlled versus automatic moral processing suggests cultural ethical frameworks shape not merely conscious justifications but underlying neural mechanisms through which rationalization occurs, providing biological foundation for observed cultural differences

5.2.3 Full Mediation: Markets Price What They Can't Fully See

Fraud Risk as Primary Value Transmission Mechanism. The structural model reveals fraud hexagon elements influence firm value almost entirely through fraud risk elevation (VAF>80% across paths) rather than through multiple independent channels. This pattern reflects our model design choice: testing whether fraud risk serves as the primary mechanism connecting organizational fraud factors to market outcomes, consistent with efficient market hypothesis where investors price perceived manipulation risk into valuations. However, we acknowledge this finding is partially structurally determined by excluding direct paths from hexagon elements to firm value. Alternative model specifications testing partial mediation (with direct paths: hexagon → firm value) would provide stronger evidence for transmission mechanism claims. Within our model constraints, the strong negative fraud risk-firm value relationship ($\beta=-0.596$, $f^2=0.421$ large effect) reveals several theoretically important patterns requiring deeper examination. First, the asymmetry between moderate fraud predictors (strongest $\beta=0.394$ for rationalization) and large value effects demonstrates markets apply substantial risk premiums to fraud probability. Even modest fraud risk elevations produce meaningful valuation consequences: one standard deviation increase in rationalization generates 0.394 SD increase in fraud risk, translating to 0.235 SD decrease in firm value (approximately 23.5 percent valuation reduction comparing 75th percentile rationalization firms to 25th percentile). This amplification effect suggests markets price fraud risk more severely than fraud factors individually, consistent with compound risk aversion where uncertainty about manipulation creates additional risk

beyond operational performance uncertainty. Second, full mediation patterns (VAF exceeding 80 percent across paths) establish fraud risk as primary transmission mechanism connecting organizational fraud factors to market outcomes. This structural pattern has important implications: organizational fraud factors affect valuations through their association with perceived manipulation likelihood rather than through other value-relevant dimensions these factors might signal (management quality, strategic positioning). The mediation structure suggests markets view fraud hexagon elements primarily as fraud risk indicators, not as independent firm characteristics carrying separate valuation implications. Third, the magnitude comparison with Kouwenberg & Phunnarungsi (2013) findings reveal important temporal dynamics. They documented negative 1.6 percent abnormal returns upon fraud discovery announcements (ex-post reaction). Our findings show fraud risk factors already embedded in valuations ex-ante (before discovery), suggesting markets continuously price fraud risk based on observable indicators. The relationship strength implies efficient semi-strong form market functioning publicly available information (governance structures, financial reporting patterns, ownership characteristics) becomes incorporated into prices through investor analysis. However, important methodological caveat constrains interpretation. This full mediation finding is partially structurally determined by excluding direct paths from hexagon elements to firm value in our model specification. We designed the model testing whether fraud risk serves as primary mechanism (consistent with efficient market hypothesis). Alternative specifications including direct paths would test partial mediation, potentially revealing hexagon elements affect value through both fraud risk and other pathways. Within our model constraints, we demonstrate fraud risk mediates relationships but cannot definitively claim it constitutes the only channel without testing partial mediation models. Future research should examine whether factors like pressure signal competitive intensity or capability indicate management quality, carrying independent valuation implications beyond fraud risk association."

5.2.4 Selective Governance: Effective Where It Can Reach

Governance moderated only pressure and rationalization effects (H14, H16 supported), failing to buffer capability, arrogance, or collusion. This selective pattern conflicts with Indonesian findings where governance showed broader moderating effects (Nugroho & Diyanty, 2022; Putra & Achmad, 2024). The explanation connects to Connelly et al.'s (2012) form-over-substance finding and Inya et al.'s (2018) demonstration that Western governance shows limited Thai effectiveness. Governance constrains fraud factors operating through formal organizational processes performance evaluation systems (pressure), financial reporting procedures (rationalization) where visible structures can actually intervene. Governance fails against factors operating through informal networks (capability via *sen* connections) or when governance participants themselves enable collusion through interlocking directorships (73% prevalence per ACGA, 2024). This reveals governance's fundamental limitation in relationship-based economies: formal structures prove effective only where behavior flows through formal channels. When fraud operates through relationship networks outside formal structures, governance becomes ceremonial rather than functional. Corporate governance's selective moderation pattern buffering only pressure and rationalization while failing to constrain capability, arrogance, or collusion reveals fundamental limitations when formal structures confront informal relationship networks. This pattern contradicts Indonesian findings where governance showed broader

moderating effects (Nugroho & Diyanty, 2022), suggesting Thai institutional context creates unique constraints. The explanation connects to Inya et al.'s (2018) demonstration that Western governance shows limited Thai effectiveness. Governance constrains fraud factors operating through formal organizational processes where visible structures can intervene performance evaluation systems generate pressure; accounting departments implement rationalization through reporting procedures. Board oversight can realistically monitor financial targets, review performance pressures, examine accounting policies, and question unusual transactions flowing through formal channels. However, governance fails against factors operating outside formal structures. Capability exercised via *sen* connections operates through informal influence where board monitoring has limited reach. When perpetrators mobilize relationship capital to overcome resistance or access expertise through business group members, formal governance mechanisms designed for arms-length transactions prove ineffective. The governance structure cannot observe or constrain coordination occurring through personal relationships, family dinners, or golf course conversations where actual business decisions emerge in Thai contexts. More problematically, governance participants themselves enable collusion when operating through interlocking directorships. With 73 percent of Thai listed companies having board members serving multiple related company boards (ACGA, 2024), the governance structure becomes part of coordination mechanisms rather than constraint against them. When same directors oversee both trading partners, impartial transaction evaluation becomes structurally impossible regardless of formal independence criteria. Simple slopes analysis quantifies this selective effectiveness. Strong governance reduces pressure effects by 64 percent (simple slope at high governance: $\beta=0.087$ versus $\beta=0.243$ main effect) and rationalization effects by 51 percent ($\beta=0.193$ versus $\beta=0.394$). But governance shows no significant moderation of capability (coefficients remain $\beta=0.102$ regardless of governance strength), arrogance, or collusion effect stability across governance levels confirms formal structures cannot reach informal mechanisms. This pattern reveals governance's fundamental limitation in relationship-based economies: effectiveness depends on behavior flowing through formal channels. When fraud operates through relationship networks outside formal organizational structures, governance becomes ceremonial rather than functional satisfying stakeholder expectations and maintaining exchange listings without actually constraining management behavior. The finding suggests fraud prevention in Thai contexts requires hybrid approaches: formal governance for pressure and rationalization (where it works), plus relationship-based monitoring leveraging *sen* networks for capability and collusion (where formal governance fails). Inya et al.'s (2018) finding that relationship-based monitoring proves more effective than formal independence supports this prescription.

5.3 Cultural Contingencies Revealed: When Constructs Operate Through Alternative Mechanisms

Three hexagon elements demonstrated effects opposite theoretical predictions, revealing not theoretical failures but rather context-dependent mechanisms requiring reconceptualization for relationship-based economies. Rather than rejecting fraud theory, these findings establish boundary conditions where Western assumptions about governance function, relationship coordination, and leadership symbolism require modification.

5.3.1 Opportunity's Negative Effect: Governance as Legitimacy Signal

The negative opportunity coefficient ($\beta=-0.118$, $p<0.05$) fundamentally contradicts fraud theory's foundational assumption that governance weakness creates exploitable opportunities. Cross-national comparison reveals Thailand's exceptional status: Indonesian studies (Achmad et al., 2022) found opportunity $\beta=0.29$, $p<0.01$; Jordanian research (Bader et al., 2024) found $\beta=0.38$, $p<0.001$; Malaysian work (Fathmaningrum & Anggarani, 2021) found $\beta=0.24$, $p<0.05$ —all positive as predicted. Only Thailand shows coefficient sign reversal. This paradox requires reconceptualizing governance's primary function. Traditional fraud theory assumes governance constrains management through monitoring (Beasley, 1996). However, Connelly et al. (2012) demonstrated Thai governance emphasizes visible compliance without necessarily constraining behavior. When governance operates symbolically rather than substantively, its function shifts from operational constraint to legitimacy signaling. Institutional theory's decoupling concept (Meyer & Rowan, 1977) explains this mechanism. Organizations adopt structures conforming to external expectations (formal governance) while actual practices diverge (informal *sen* coordination). In Thai contexts where relationship networks provide alternative coordination mechanisms, governance serves primarily to signal external legitimacy for stock exchanges, foreign investors, and rating agencies rather than constrain internal management behavior. The positive opportunity-governance correlation ($r=0.278$) supports this reinterpretation. In Western contexts, this would suggest adverse selection (high-risk firms avoid governance costs). In Thai contexts, it reveals quality differentiation low-risk firms voluntarily implement governance precisely because they can afford transparency without fearing disclosure consequences. High-quality firms signal quality through governance adoption (Spence, 1973); poor-quality firms avoid governance because disclosure might expose weaknesses. This establishes boundary conditions requiring bifurcated opportunity construct: governance-as-constraint (applicable in Western arms-length contexts) versus governance-as-signal (applicable in relationship-based Asian contexts where *sen* networks provide actual monitoring). The theoretical implication modifies agency theory for collectivist contexts: bonding mechanisms function differently, voluntary constraint adoption signals trustworthiness in individualistic economies but serves external legitimacy in collectivist economies where informal networks provide actual accountability.

5.3.2 Collusion's Negative Effect: Business Group Coordination vs. Fraud Networks

Collusion's negative coefficient ($\beta=-0.079$, $p<0.05$) reflects measurement validity challenges rather than theoretical contradiction. Our operationalization (related party transaction intensity, abnormal audit fees) captures relationship-intensive business structures potentially serving legitimate purposes, not specifically fraud coordination as Vousinas (2019) conceptualized. Subsample analysis reveals the mechanism: collusion effects concentrated in family-controlled firms ($\beta=-0.104$, $p<0.05$) but disappeared in widely held firms ($\beta=-0.018$, ns). This pattern indicates our measures capture business group structures rather than fraud coordination. Thai firms average RPT intensity of 61.6 (SD=381.5), far exceeding Indonesian (12.4) or Malaysian (18.7) levels. Business group literature documents relationship networks serve legitimate economic functions (Khanna & Yafeh, 2007): (1) internal capital markets reducing financing costs in underdeveloped financial systems, (2) operational synergies through technology transfer and shared resources, (3) control maintenance enabling long-term family strategic vision. High RPT volume with procedural safeguards (independent approval,

arm's-length pricing verification, comprehensive disclosure) indicates sophisticated business groups. High RPTs without safeguards indicates fraudulent tunneling. The theoretical distinction requires differentiating *coordination* from *collusion*:

- *Legitimate business group coordination*: Transactions with procedural safeguards serving operational purposes

- *Fraudulent collusion*: Transactions without safeguards designed to extract value from minority shareholders. Our measures capture transaction volume but not procedural safeguards, creating measurement validity limitations. This finding establishes that collusion construct requires reconceptualization for business group contexts, applying transaction cost economics (Williamson, 1985) principle: governance mechanisms protecting transactions matter more than transaction existence. Future research must develop measures distinguishing procedural safeguards from transaction volume. Our conclusion remains limited to *high* RPT intensity associates with lower fraud risk in Thai contexts, not '*fraud collusion reduces fraud risk*' which would contradict theory. The negative association likely reflects our instruments capturing sophisticated business group coordination with effective safeguards rather than problematic fraud collusion.

5.3.3 Capability and Arrogance: When Western Constructs Don't Translate

Capability ($\beta=0.102$, $p=0.124$) and arrogance ($\beta=-0.123$, $p=0.284$) showed no significant effects, challenging fraud diamond and pentagon theories.

For capability, the issue involves conceptualization mismatch. Wolfe & Hermanson's (2004) capability emphasizes individual competencies accounting knowledge, organizational position, stress management. This assumes individualistic fraud execution. Thai fraud depends on mobilizing network resources: coordinating with related entities, leveraging *sen* connections to overcome resistance, accessing expertise through business group members. Individual technical skills matter less than network positioning. The significant capability mediation effect (H10: $\beta=-0.036$, $p=0.002$) despite non-significant direct effect provides the clue: capability influences fraud only when combined with motivators, suggesting threshold rather than linear effects. Most executives possess basic manipulation skills; variation in advanced capability matters less than variation in motivation. For arrogance, the problem runs deeper. Marks' (2012) arrogance emphasizes individual narcissism and hubris characteristics contradicting Asian cultural norms emphasizing humility (*kreng jai*) and collective identity. Bader et al. (2024) found similar null effects in Jordan, suggesting arrogance proves particularly culture bound. The 48.1% CEO duality prevalence in our sample reveals the measurement problem: power concentration represents normal business practice rather than problematic arrogance in hierarchical Asian societies. Moreover, the positive arrogance mediation effect (H11: $\beta=0.043$, $p=0.004$) suggests markets interpret visible leadership positively, viewing CEO publicity as value-enhancing communication rather than fraud-indicating narcissism. This directly contradicts Western assumptions about hubris as fraud precursor. The broader lesson: psychological constructs developed in Western contexts may lack construct validity when translated to Asian contexts. Rather than measuring psychological traits, Asian fraud research should examine structural positions conferring immunity: patronage network membership, family ownership concentration, political connections.

5.4 Theoretical Implications: Toward Culturally Grounded Fraud Theory

These findings establish fraud theory exhibits two-tier structure with cultural boundary conditions:

Universal Core (Pressure, Rationalization): Received consistent support across ALL Asian fraud hexagon studies (Thailand, Indonesia, Malaysia, Jordan), suggesting underlying mechanisms economic pressure motivation and cognitive justification processes transcend cultural boundaries through fundamental human psychology. These elements appear universal within relationship-based Asian economies tested to date.

Important limitation: We cannot claim truly "universal" applicability without evidence from Western/developed market studies showing parallel patterns. Our evidence supports: "universal within collectivist relationship-based Asian contexts" rather than universal across all institutional environments. Cross-regional comparisons including Anglo-American contexts remain necessary to establish global universality. Culturally Contingent Periphery (Opportunity, Capability, Arrogance, Collusion): Show inconsistent cross-national support and opposite-direction effects in Thai contexts, revealing these constructs operate through context-dependent mechanisms requiring reconceptualization:

1. Opportunity: Constraint (Western) vs. Signal (Thai)
2. Capability: Individual competence (Western) vs. Network position (Thai)
3. Arrogance: Problematic narcissism (Western) vs. Normal hierarchy (Thai)
4. Collusion: Fraud coordination (Western) vs. Business group structure (Thai, measurement validity issue)"

5.5 Limitations

First, cross-sectional design prevents definitive causal inference opportunity and collusion's negative effects could reflect reverse causality where low-risk firms adopt visible governance and transparent business groups. Longitudinal research would resolve causality questions.

Second, measuring fraud through M-Score and F-Score captures financial patterns associated with historical fraud rather than actual fraud, creating potential false positives and missed sophisticated schemes. However, focusing on fraud risk propensity rather than actual fraud occurrence mitigates this concern.

Third, critical measurement validity limitations affect interpretation. Our collusion operationalization (RPT intensity, audit fee patterns) likely captures relationship-intensive business structures rather than fraud coordination specifically, limiting conclusions about collusion's theoretical role. Future research requires developing measures distinguishing legitimate business group coordination from fraud collusion through procedural safeguard assessment. Similarly, arrogance and capability measures developed for Western contexts may lack construct validity in Thai hierarchical culture, suggesting results reflect measurement limitations rather than pure theoretical insights.

Fourth, excluded sample characteristics unknown. Twenty-five percent of SET non-financial firms were excluded due to incomplete data. Without analyzing whether excluded firms differ systematically (size, ownership, fraud risk), we cannot rule out selection bias potentially limiting generalizability even within Thai market. Results may best represent larger, more established Thai firms with complete disclosure practices.

6. CONCLUSION

6.1 Research Summary This study tested fraud hexagon theory across 504 Thai listed companies during 2020-2024, examining 2,520 firm-year observations. Results challenged Western predictions

in three important ways. First, rationalization emerged as fraud risk's dominant predictor with a coefficient of 0.394 at p less than 0.01, while pressure showed only modest effects with coefficient 0.243 at p less than 0.05. Second, three findings defied theoretical expectations: opportunity and collusion demonstrated significant negative effects rather than positive effects as predicted, and arrogance showed no significant impact whatsoever. Third, fraud risk strongly decreased firm value with coefficient negative 0.596 at p less than 0.001, with organizational fraud factors operating almost entirely through fraud risk elevation as demonstrated by variance accounted for exceeding 80 percent across paths. Corporate governance constrained only pressure and rationalization effects, proving completely ineffective against capability, arrogance, and collusion.

6.2 Theoretical Contributions: Advancing Culturally Grounded Fraud Theory This section articulates our theoretical contributions to fraud scholarship. Practical implications for practitioners appear separately in Section 6.3 to maintain clear distinction between theoretical advances and managerial applications.

Contribution 1: Establishing Fraud Theory's Two-Tier Structure with Cultural Boundary Conditions. This study provides first comprehensive evidence that fraud hexagon theory exhibits two-tier structure requiring cultural adaptation. The universal core comprises pressure and rationalization, which function consistently across all collectivist Asian economies tested to date including Thailand, Indonesia, Jordan, and Malaysia. These elements operate through fundamental human psychology: economic pressure creates motivation and cognitive justification enables self-concept maintenance. These psychological mechanisms transcend cultural boundaries. In contrast, the culturally contingent periphery comprises opportunity, capability, arrogance, and collusion. These elements show inconsistent cross-national support with opposite-direction effects emerging in Thai contexts. They operate through context-dependent mechanisms requiring reconceptualization for each institutional environment. This two-tier structure advances fraud scholarship by establishing where cultural adaptation becomes necessary. Prior research assumed either universal applicability, testing Western theory without modification, or complete cultural contingency, rejecting Western theory entirely for each new context. We demonstrate nuanced middle path: core psychological mechanisms operate universally while peripheral constructs require cultural reconceptualization. The theoretical implication is that future fraud theory development must specify boundary conditions and causal mechanisms rather than assuming universal construct operation. Each fraud element requires mapping mechanism contingencies across institutional contexts.

Contribution 2: Reconceptualizing Opportunity Construct for Relationship-Based Economies. Traditional fraud theory assumes governance weakness creates exploitable opportunities through constraint logic. We demonstrate governance operates through alternative mechanism in relationship-based economies, specifically legitimacy signaling rather than operational constraint. In Western contexts, formal governance structures create operational obstacles to fraud. Independence requirements prevent management override through monitoring. Audit committees increase detection probability through oversight. However, in Asian relationship-based contexts, visible governance communicates quality to external stakeholders. Formal independence serves symbolic legitimacy function. Actual constraint is provided by reputation effects within relationship networks, not by formal structures. This distinction modifies agency theory for collectivist contexts. Bonding

mechanisms function differently: voluntary constraint adoption signals trustworthiness in Western arms-length contexts but serves external legitimacy in Asian relationship-based contexts where informal networks provide actual monitoring. The theoretical implication is that opportunity construct requires bifurcation in cross-cultural fraud research. Researchers must distinguish governance-as-constraint applicable in individualistic economies from governance-as-signal applicable in collectivist relationship-based economies. Researchers must assess which causal pathway dominates before operationalizing opportunity.

Contribution 3: Expanding Rationalization Theory to Incorporate Cultural Ethical Frameworks. We extend Cressey's rationalization concept beyond individual cognitive dissonance to incorporate culturally variable ethical frameworks enabling self-justification through distinct psychological mechanisms. Western rationalization operates through guilt-based ethics where rule violations create internal psychological conflict requiring effortful justification maintaining positive self-concept. This operates through controlled cognitive processing engaging neural executive control regions. Buddhist rationalization operates through consequence-based ethics employing four distinctive mechanisms. First, tam bun or merit-making provides moral offset where charitable donations are believed to compensate for business transgressions. Second, anicca or impermanence enables temporal distancing where fraud is viewed as temporary accommodation rather than permanent character definition. Third, sa-khaw or situational appropriateness facilitates context-dependent justification where rightness depends on circumstances rather than absolute rules. Fourth, anatta or no-self enables identity disconnection where actions are separated from permanent self-concept. These mechanisms require less cognitive effort than Western guilt-based rationalization because consequence-based moral reasoning operates through intuitive emotional processing in neural automatic pathways rather than controlled processing. This cultural extension explains rationalization's dominance in Thai contexts where it demonstrated coefficient 0.394, the largest effect observed, 62 percent stronger than pressure. Buddhist frameworks provide richer rationalization resources than Western guilt-based systems, reducing psychological barriers to fraud perpetration. The theoretical implication is that rationalization remains universal psychological necessity because all perpetrators require self-justification, but operates through culturally specific pathways requiring examination in each religious-philosophical context. Fraud theory must map ethical framework variations including guilt-based, shame-based, karma-based, and honor-based systems and their rationalization implications.

Contribution 4: Distinguishing Business Group Coordination from Fraud Collusion. We establish that Vousinas' collusion construct requires measurement refinement distinguishing legitimate business group coordination from fraudulent collusion networks. Legitimate business group coordination involves high related party transaction volume with procedural safeguards. It serves economic functions including internal capital markets, operational synergies, and control maintenance. It involves independent approval, arm's-length pricing verification, and comprehensive disclosure. Fraudulent collusion involves high transaction volume without safeguards. It serves extraction purpose, specifically tunneling value from minority shareholders. It involves conflicted approvals, non-market pricing, and inadequate disclosure. This distinction applies transaction cost economics to fraud contexts: governance mechanisms protecting transactions matter more than transaction

existence. Measuring transaction volume alone creates validity problems in family-controlled business group economies where extensive related party transactions represent normal business practice rather than fraud indicators. The theoretical implication is that collusion construct operationalization must assess procedural safeguards, not merely transaction intensity. Future research requires developing measures capturing safeguard quality including approval processes, pricing verification, and disclosure comprehensiveness, enabling differentiation of coordination from collusion.

Contribution 5: Identifying Governance Effectiveness Boundary Conditions. We demonstrate corporate governance effectiveness depends on whether fraud factors operate through formal versus informal channels, establishing boundary conditions for governance theories. Governance proves effective for formal channel fraud. This includes pressure operating through performance evaluation systems and rationalization operating through accounting procedures and reporting policies. These operate through documented processes where board oversight reaches. Governance proves ineffective for informal channel fraud. This includes capability operating through relationship network mobilization and collusion operating through coordination via interlocking directorships. These operate through personal relationships outside formal organizational structures. This selective effectiveness pattern reveals fundamental limitation: formal governance constrains behavior flowing through formal channels but cannot reach informal relationship network mechanisms. When same directors oversee related parties, occurring in 73 percent of Thai firms, governance structure becomes part of coordination rather than constraint. The theoretical implication is that governance theories must specify channel-dependency. Effectiveness predictions require identifying whether fraud factors operate through formal organizational processes where governance reaches or informal relationship networks where governance fails. Relationship-based economies require hybrid monitoring combining formal governance with informal relationship-based accountability.

Summary of Theoretical Advances. These five contributions fundamentally modify Western fraud theory for Asian relationship-based economies. First, two-tier structure establishes universal core versus culturally contingent periphery requiring selective adaptation. Second, opportunity becomes reconceptualized by bifurcating governance-as-constraint versus governance-as-signal. Third, rationalization becomes extended by incorporating cultural ethical framework variations including Buddhist mechanisms. Fourth, collusion becomes refined by distinguishing business group coordination from fraud networks through safeguards assessment. Fifth, governance becomes bounded by specifying formal versus informal channel effectiveness limitations. These modifications enable fraud theory application across institutional contexts while respecting cultural and structural variations. Rather than rejecting Western theory or assuming universal applicability, we establish where and how cultural adaptation becomes necessary.

6.3 Practical Contributions

Our findings inform fraud prevention strategies across stakeholder groups in relationship-based Asian economies. Regulators should prioritize rationalization monitoring over traditional governance weakness indicators, given rationalization's dominance ($\beta=0.394$) as fraud predictor, while recognizing that visible governance structures signal legitimacy rather than constrain behavior in Thai contexts. This suggests enforcement resources should target accruals quality, auditor changes, and ethical culture assessment rather than formal independence criteria. Auditors should adjust risk

assessment models to emphasize rationalization indicators and develop cultural competence recognizing Buddhist rationalization mechanisms (merit-making offsetting, impermanence framing, situational appropriateness justifications) that differ from Western guilt-based justifications. Audit procedures should distinguish legitimate business group coordination with procedural safeguards from problematic collusion lacking such safeguards, focusing on approval processes and pricing verification rather than transaction volume alone. Investors should incorporate fraud risk scores into valuation models, recognizing fraud risk strongly reduces firm value ($\beta=-0.596$) with estimated 23.5% valuation discount per standard deviation fraud risk increase, while interpreting governance disclosures contextually visible governance signals without necessarily constraining management in relationship-based economies. Corporate boards should implement relationship-based monitoring systems supplementing formal governance, conduct ethical culture assessments probing rationalization prevalence, and establish robust safeguards for related party transactions through independent committee review and comprehensive disclosure. These recommendations acknowledge that fraud prevention in collectivist contexts requires hybrid approaches combining formal structures with informal relationship-based accountability mechanisms.

6.4 Study Limitations Five major limitations constrain interpretation and generalizability of findings. First, cross-sectional design prevents establishing definitive causality. Opportunity and collusion's negative effects could reflect reverse causality where low-risk firms adopt governance and transparent business groups rather than governance reducing risk. Longitudinal designs would resolve causality questions. Second, sample selection biases exist. Survivorship bias occurs because we excluded 89 delisted firms likely having higher fraud risk, making findings conservative lower-bound estimates. Data completeness bias occurs because we excluded 94 firms with poor disclosure, overrepresenting transparent firms. Third, measurement validity limitations affect interpretation. Collusion operationalization captures relationship-intensive structures potentially serving legitimate purposes, not specifically fraud coordination. Arrogance and capability measures may lack construct validity in hierarchical Thai culture where power concentration represents normal practice. Fourth, temporal period limitations exist. The 2020-2024 period includes unique circumstances including COVID-19 pandemic and Stark Corporation scandal potentially limiting generalizability to normal economic periods. Fifth, geographic specificity constrains generalization. Findings apply to Thai listed companies under Thai institutions and may not generalize to other Southeast Asian countries with different religious or cultural contexts, other Asian regions with different institutional development, or Western markets with individualistic cultures and different governance systems.

6.5 Future Research Directions

- 1. Longitudinal examination* Panel data designs tracking fraud risk evolution would establish causality, distinguishing reverse causation (low-risk firms adopting governance) from true causal effects, while illuminating fraud trajectories from inception to discovery.
- 2. Cross-national validation* Systematic testing across Buddhist economies (Myanmar, Sri Lanka, Cambodia) versus Confucian economies (China, Japan, Korea) would establish whether rationalization mechanisms reflect Buddhist ethics specifically or broader Asian collectivism.
- 3. Qualitative investigation* Interviews with executives, directors, and auditors would illuminate rationalization processes directly, revealing how Buddhist concepts facilitate self-justification in

perpetrators' own words beyond our quantitative proxies.

4. *Measurement development* Creating and validating measures distinguishing business group coordination from fraud collusion through procedural safeguard assessment would resolve our measurement validity limitations, while developing culturally valid capability and arrogance measures appropriate for hierarchical Asian societies. 5. *Biometric/neuroscientific* methods Experimental designs using fMRI or psychophysiological measures could test whether Buddhist consequentialist reasoning activates different neural pathways than Western rule-based reasoning, providing biological foundation for rationalization mechanism differences.

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Institutional Review Board Statement

Ethical review and approval were waived for this study as it utilized publicly available secondary data from financial statements, annual reports, and stock exchange databases. No human subjects, primary data collection, surveys, or interviews were involved. The research complies with institutional guidelines for archival data analysis.

Informed Consent Statement

Not applicable. This study analyzed publicly disclosed corporate financial information and stock market data. No individual participants were involved, and no personal data requiring informed consent was collected.

Data availability statement

The data supporting this study's findings are available from public sources:

1. **Financial statements and governance data:** Stock Exchange of Thailand (SET) official database (<https://www.set.or.th>) and companies publicly filed Form 56-1 annual reports
2. **Market valuation data:** SET Market Data System for daily stock prices and trading volumes
3. **Corporate governance disclosures:** Annual reports available through SET and company websites

The datasets generated during analysis (fraud risk scores, composite governance indices, calculated variables) are available from the corresponding author upon reasonable request, subject to institutional data sharing policies.

CRedit authorship contribution statement

Chutima Uaiphon: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization, Project administration.

Phantip Yangklan: Conceptualization, Methodology, Validation, Resources, Writing – review & editing, Supervision.

Declaration of Competing Interest

The authors declare no competing financial interests or personal relationships that could have influenced the work reported in this paper.

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