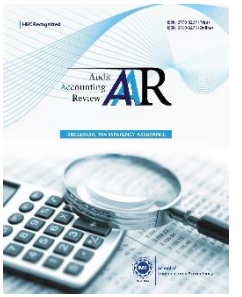
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Fraud Risk Management Practices in Emerging Markets: Empirical Evidence from Pakistan's Textile Sector

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Abstract

Fraud remains a persistent threat to firm performance, yet empirical evidence on the actual adoption of fraud risk management practices at the entity level is scarce, particularly in Pakistan. The current study administers the 51-item Risk Management Checklist of Singleton and Singleton (2010) to textile-sector organizations in Pakistan by using a survey design. Furthermore, the study also evaluates the compliance patterns using multiple correspondence analysis and Ward's hierarchical cluster analysis. Of the 5,049 responses, producing an average firm compliance score, and internal consistency was slightly above the threshold. The weakest practices were mandatory annual vacation, per-employee maximum opportunity levels, close supervision in smaller businesses, and management awareness of fraud. This indicates that opportunity-reducing controls lag behind awareness and policy measures. The association between checklist section and response category is statistically significant, and the high-compliance segment differs significantly from the moderate segment. The study provides the first entity-level baseline of fraud risk management adoption for the Pakistani textile sector. Moreover, it also demonstrates the checklist's value as a measurement instrument.

***Keywords*:** fraud risk assessment, fraud triangle, internal control, multiple correspondence analysis, Ward's hierarchical clustering

JEL Codes: M42, G32, D81, C38, L67

Introduction

Occupational fraud is one of the most persistent and costly problems facing organizations worldwide. The Association of Certified Fraud Examiners [ACFE] (2022, 2024) estimates that organizations lose approximately 5% of annual revenues to fraud. Additionally, recent collapses, that is, Carillion,

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Wirecard, NMC Health, and Evergrande, show that undetected fraud can still destroy large corporations (Tümmler & Quick, 2026). Financial statement fraud is the least frequent but costliest category (median loss USD 766,000), while asset misappropriation is the most common (ACFE, 2024). Since fraud evolves with digitalization, professional guidance and research must be continuously updated.

The response from the regulators is significant, The Public Company Accounting Oversight Board (PCAOB) Auditing Standard 2401 and American Institute of Certified Public Accountants (AICPA) AU-C Section 240 require auditors to identify, assess, and respond to fraud risks (American Institute of Certified Public Accountants [AICPA], 2023); ISA 240 was revised in February 2024, effective for audits of periods beginning on or after December 15, 2026 (International Auditing and Assurance Standards Board [IAASB], 2024). The Committee of Sponsoring Organizations of the Treadway Commission (COSO), (2013) reiterates on the entity side that an organization should consider fraud risk as part of its risk assessment over the risks to the objectives of the internal control framework, and the COSO-ACFE Fraud Risk Management Guide outlines a five-principle programme of fraud risk management as operationalization of this principle (Association of Certified Fraud Examiners [ACFE], 2023). The Fraud Risk Assessment is considered by many to be the bedrock of the anti-fraud programmes within all these: (Singleton & Singleton, 2010).

The context of Pakistan provides a very relevant setting. The Securities and Exchange Commission of Pakistan (SECP) has been increasingly reinforcing its Code of Corporate Governance (section 156 of Companies Act 2017). This mandates that boards and audit committees need to monitor the risk management and internal control systems of the companies. Non-compliance with the issued framework would result in the penalties for the management of company. This is because the companies have been experiencing a number of fraud cases, where the internal control frameworks are not operating as required. Khan et al. (2020) observed that only 96 fraud cases in total from five South Asian countries were included in the study by the ACFE, out of which only 13 were from Pakistan. Previously in Pakistan, studies have been limited to either the internal audit function (Khan et al., 2020) or fraud prediction models using data from secondary listed companies (Ishtiaq et al., 2025). However, no published study has ever attempted to measure the actual implementation of a

comprehensive suite of fraud risk management practices at organizations in Pakistan.

Research Questions

The current study aims to address five research questions mentioned as follows:

Research Question (RQ) 1. To what extent do textile firms operating in Pakistan comply with the fraud risk management practices contained in the Risk Management Checklist, both overall and within each of its three sections (fraud awareness and policies; adequacy of the internal control system; fraud prevention issues)?

Research Question (RQ) 2. Which checklist items and sections show the weakest adoption (the highest negative response rates) and therefore merit priority attention from management, internal audit, and external auditors?

Research Question (RQ) 3. Does the Risk Management Checklist exhibit adequate internal consistency reliability when administered at the entity level?

Research Question (RQ) 4. Do textile firms fall into distinct, interpretable segments (i.e., moderate-, upper-moderate-, and high-compliance profiles) based on the pattern of their Yes/No/Not-applicable responses, as revealed by MCA followed by cluster analysis?

Research Question (RQ) 5. How are not-applicable (NA) responses distributed across items and firms, and what do they reveal about the applicability of scale-dependent controls to smaller firms?

Research Objectives

Consistent with the research questions, the study aims to pursue five objectives: a) to compute item-, section-, and firm-level compliance rates for all 51 practices; b) to identify the weakest practices and rank them by priority; c) to assess the checklist's internal consistency reliability; d) to derive an empirical typology of organizations through MCA and Ward cluster analysis; and e) to formulate evidence-based recommendations for management, internal audit, the SECP, and standard setters in Pakistan and comparable emerging economies.

Literature Review

Fraud Triangle and its Extensions

The fraud triangle, created by Cressey (1953), is still the theoretical foundation of fraud risk assessment: trust violation takes place when the three elements of perceived non-shareable financial pressure, perceived opportunity, and rationalization come together. The formulation is included within the content of professional guidance. Moreover, most risk-assessment checklists, such as those included in the present instrument, contain opportunity levels per employee, catastrophic loss exposure, and individual risk factors in their items. Dorminey et al. (2012) made the point that opportunity is one of the elements that is most directly controlled by organizational design. Whereas, Wolfe and Hermanson (2024) added the fourth element, that is, 'capability' related to job description items and segregation of duties. This reinforces the focus that checklists give on fraud awareness and training. Additionally, Murphy and Dacin (2011) identified psychological pathways to fraud to support the focus on fraud awareness and training in the checklists.

Researchers have increasingly expanded earlier concepts into broader, multidimensional models, most notably transitioning into the Fraud Pentagon, which typically incorporates "arrogance" and "competence" (Biduri & Tjahjadi, 2024), as well as the Fraud Hexagon, which introduces "collusion" as a critical sixth element driving fraudulent financial reporting (Vousinas, 2019). Recent empirical studies, such as those by Achmad et al. (2022), had extensively applied the Fraud Hexagon to assess complex fraud risks and Earnings Management (EM) across state-owned enterprises and financial sectors. In comparison, some modern scholars have even proposed a Fraud Heptagon model to further capture the nuanced behavioral drivers of corruption. Furthermore, contemporary research from this period emphasizes combining these expanded theoretical frameworks with advanced data mining and artificial intelligence (AI), leveraging predictive analytics and anomaly detection systems to better operationalize these structural and psychological drivers within modern risk-assessment checklists (Bao et al., 2020).

Professional Frameworks and the Position of the Checklist

The most common tools used in the operational aspects of structuring fraud risk assessment within professional guidance are checklists and red-

flag inventories. The Risk Management Checklist of Singleton and Singleton (2010) contains 51 questions divided into three categories: a) Fraud awareness and policies; b) Adequacy of the internal control system; and c) Fraud prevention issues, and suggests that all answers of "No" be investigated and followed up. The COSO-ACFE Fraud Risk Management Guide is also based on the fraud risk assessment. This involves a scheme identification process, a likelihood and significance determination process, a controls process, and a residual risk process (ACFE, 2023).

However, some evidence suggests that the use of such instruments did not enhance fraud risk judgments: a red-flag questionnaire did not enhance auditors' probability judgments (Pincus, 1989); the use of decision aids had mixed results (Eining & Jones, 1997); and alternative instruments affected the comprehensiveness of planning judgments but not necessarily the accuracy of such judgments (Asare & Wright, 2004). All of this has also been reiterated in recent literature, the study of Bierstaker et al. (2022), which found that the traditional checklist approach is not as effective as the story-based approach in enhancing the fraud risk assessments of novice and experienced auditors. Based on a series of 37 experiments, Tümmler and Quick (2026) found that the use of checklists enhances the comprehensiveness and uniformity of information acquisition. However, there is no evidence that the use of these checklists enhances judgment accuracy. Brazel et al. (2024) reported that there is ample evidence supporting the use of checklists by auditors but virtually none supporting their use by entities. This discrepancy leads to the current study focusing not on a decision aid but on a measurement instrument, that is, the checklist.

Internal Controls, Tone at the Top, and Fraud Outcomes

The preventive role of internal controls is well-established. Donelson et al. (2017) showed that internal control weaknesses are strongly associated with financial reporting fraud. Cultural and leadership factors are at least as important as process-level controls: Onesti and Palumbo (2023) documented the central role of tone at the top'; Soltani (2014) showed that high-profile scandals share a common anatomy of weak ethical leadership; Donelson et al. (2017) reported that entity-level tone factors drive fraud outcomes more strongly than process-level controls, and Dewi et al. (2024) emphasized that a strong, ethical "tone at the top" fundamentally fosters transparency and accountability, significantly mitigating financial reporting fraud; governance outcomes diverge based on whether it functions as an

external monitoring constraint against opportunistic agents (agency theory; Jensen & Meckling, 1979) or as an internalized cultural commitment to fiduciary integrity by pro-organizational leaders (stewardship theory; Davis et al., 1997).

Moreover, new studies are continually reinforcing the criticality of entity-based factors as opposed to just the task-based checks. The tone of management is the very foundation of the internal control environment, as stated by Marais (2024) and Garrett et al. (2022). It directly affects both the risk of management override and the risk assessment of the external auditor. New leadership traits including behaviors and technology are also emerging, these are being incorporated into the modern control environment beyond traditional leadership measures. Demirović et al. (2021) demonstrated that personnel emotional intelligence significantly strengthens fraud control outcomes by enhancing proactive risk assessment. While, Fana and Villani (2023) highlighted that digital innovation and automated audit trails must be coupled with strong organizational governance to prevent the circumvention of process-level controls. Ultimately, this recent body of work universally concluded that internal control frameworks can only fulfill their preventive role when anchored by authentic ethical leadership and a pervasive, entity-wide culture of compliance.

Survey Evidence in Developing Economies

Survey-based studies in developing countries consistently report positive associations between internal control components and fraud prevention, although they are typically cross-sectional and rely on self-reports (Vutumu et al., 2025; Sanusi et al., 2025). The closest comparators survey the adoption of professional frameworks, Lawson et al. (2017) documented substantial variation in firms' implementation of the COSO framework (2013), and Zanzig et al. (2026) found strong consensus among CPAs on a core set of vital practices. Al-Dhubaibi and Sharaf-Addin (2022) surveyed auditors' use of ISA 240 red flags but their unit of analysis was the auditor. None of these studies administered a comprehensive, professionally-sourced checklist at entity level with the intention of deriving a typology of organizations.

Research Gap in the Pakistani Context

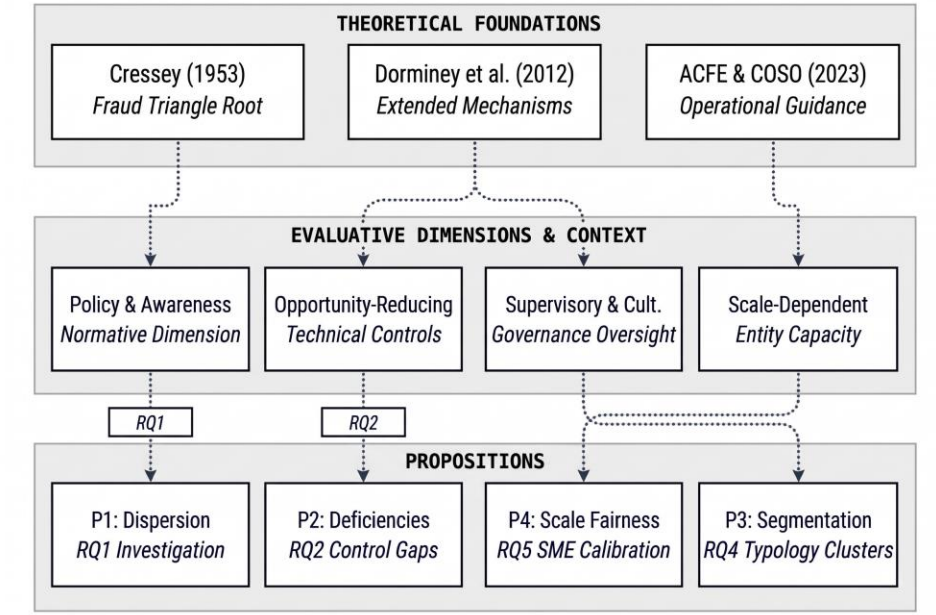
The gap is particularly acute in Pakistan, where corporate fraud research

is dominated by secondary-data prediction studies (Ishtiaq et al., 2025; Javaid et al., 2025) and narrow surveys of the internal audit function (Khan et al., 2020); the ACFE's South Asian study examined only 13 fraud cases from Pakistan, an inadequate basis for understanding the fraud landscape (Khan et al., 2020). No published Pakistani study measures, at the level of individual practices, the adoption of fraud risk management controls; none identifies which practices are systematically absent; and none derives an empirical typology of organizations by fraud risk management profile. The current study filled this three-fold gap by applying the Risk Management Checklist (Singleton & Singleton, 2010) to textile-sector firms.

Conceptual Framework and Research Propositions

Figure 1

Conceptual Framework based on Propositions



The study's expectations derive from the fraud triangle (Cressey, 1953) and the COSO-ACFE Fraud Risk Management Guide (ACFE, 2023) and map one-to-one into the research questions. The first research proposition (P1) based on RQ1: overall compliance will be moderately high but

dispersed, with awareness and policy practices adopted more widely than opportunity-reducing controls. The second research proposition (P2) based on RQ2: the weakest practices will concentrate on opportunity-reducing, supervisory, and cultural mechanisms (Dorminey et al., 2012). The third research proposition (P3) based on RQ4: organizations will separate into distinct, interpretable compliance segments rather than a single homogeneous distribution. The fourth research proposition (P4) based on RQ5: NA responses will concentrate in scale-dependent practices, so that compliance indices on applicable items will not systematically penalize smaller organizations. Since the design was descriptive, the propositions were evaluated descriptively, and no causal claims were made as shown in Figure 1.

Methodology

Research Design

This study uses a cross-sectional survey design (quantitative in nature) with a descriptive and typological character. This design measures the extent to which a fixed set of fraud risk management practices are adopted, identifies the least-adopted practices, and draws an empirical typology of organizations based on their response patterns. Specifically, the quantitative cross-sectional approach is well-suited for capturing a standardized snapshot of internal control systems across a broad spectrum of entities. This enables a systematic comparative analysis and statistical generalization (Karim & Kudapa, 2022). The descriptive component specifies a granular baseline of adoption rates, helping to determine systemic implementation gaps, institutional vulnerabilities, and underutilized control mechanisms among corporate governance structures (Boyle et al., 2015; Kassem, 2023).

Additionally, the typological dimension uses pattern-oriented empirical categorization, shifting the focus from isolated practice evaluations to holistic organizational configurations (Hair et al., 2021). By grouping organizations based on shared response vectors, this taxonomical methodology accounts for organizational heterogeneity and governance maturity, an approach progressively highlighted in recent anti-fraud and risk management literature within emerging markets (Rustiarini et al., 2019). The design aligns with the survey literature regarding fraud risk management at the entity level (Lawson et al., 2017; Zanzig et al., 2026) as well as previous research in Pakistan (Khan et al., 2020).

Instruments

The instrument adopted by the current study is the Risk Management Checklist of Singleton and Singleton (2010). This is a structured questionnaire with Yes/No/NA response options and a documentation cross-reference column, comprising 51 items in three sections. Section A, fraud awareness and appropriate policies (17 items): covers generic risk factors, that is, per-employee opportunity levels, catastrophic exposure, dismissal and fraud-reporting policies, evaluation of past frauds; the management of individual risk factors, that is, mission statement, code of ethics, training, management example, corporate culture, hiring, screening, counselling, fair relations and grievance mechanisms, exit interviews; and management awareness of fraud.

Section B, adequacy of the internal control system (31 items): covers the explicit consideration of fraud prevention in the design and maintenance of internal controls (B.1-B.2); physical and logical access controls (B.3-B.9); job descriptions and segregation of duties, including mandatory annual vacations (B.10-B.17); regular accounting reconciliations and analyses (B.18-B.23); supervision, including close supervision where segregation is impossible and the prohibition of override (B.24-B.27); and the audit function (B.28-B.31). Section C, that is, fraud prevention issues (3 items), assesses the promotion of an ethical environment and risk financing. According to the checklist's authors, all No answers require investigation and follow-up, with results documented in the reference column (Singleton & Singleton, 2010).

Sample and Data Collection

The checklist was administered to 125 firms in Pakistan's textile sector; 99 questionnaires were returned, all complete and usable (effective response rate 79.2%). The questionnaire was administered during the year 2025 and the listing status was not recorded, so the sample covered firms irrespective of exchange listing. Responses were obtained from accounting, finance, internal audit, and management personnel designated by chief financial officer, one respondent per firm. The final dataset comprises of 99 firms, rows, and 51 checklist columns coded Yes, No, or NA (5,049 item responses). Consistent with the entity-level literature in developing countries (Sanusi et al., 2025; Vutumu et al., 2025), the sample is collected using a non-probability purposive sampling, and the results are generalized

with appropriate caution.

The five reasons as to why the textile sector was purposefully selected over the other major sectors, such as banking and financial services, cement, chemicals and fertilizers, pharmaceuticals, telecommunications, and food processing, in Pakistan have been mentioned below. First, it is the main pillar of the national economy, accounting for roundabout 8.5% of Gross Domestic Product (GDP), approximately 40% of industrial workforce and about 60% of merchandise exports. Thus, this makes it the biggest manufacturing sector in terms of export earnings, employment, and foreign exchange generation (Hamid et al., 2014; Hussain et al., 2020; Nazeer & Rasiah, 2025). Secondly, the non-banking sector as a whole is the most represented sector on the Pakistan Stock Exchange (PSX) and the SECP Code of Corporate Governance and its requirements for risk-management and internal control directly affect the firms of this sector. Thus, this makes it a legitimate population for an entity-level compliance assessment (Javed & Atif, 2021; SECP, 2019). Third, the operational profile of the sector means that the procurement of raw cotton is a cash-based process, with claims for export rebate and duty-drawback, thin margins, high inventory turnover and the extensive utilization of agents and commission arrangements, creates a variety of opportunity structures for fraud (ACFE, 2024; Singleton & Singleton, 2010). Fourth, the signs of governance and corruption in Pakistan reveal that the control environment is weak in most areas of the economy and the size of the textile industry makes the fraud in this sector a national issue (International Monetary Fund [IMF], 2025). Lastly, there have been examples of corporate failures in the sector. For instance, the Azgard Nine financial-reporting scandal highlights the actual fraud risks of companies in the textile industry. It also highlights the importance of entity-level fraud risk management in this sector (Khan et al., 2020). These attributes render it the most theoretically valuable and practically impactful industry for a baseline reading and benchmark of the level of fraud risk management that can be established at the entity level in Pakistan (McCartney, 2014).

Variables and Coding

Each checklist item was coded as a three-category nominal variable: Yes, No, or NA (not applicable). Firm compliance scores are the percentage of affirmative responses among applicable items (Yes or No), so that NA responses do not penalize organizations for practices that do not apply to

their context. Item-level compliance is the percentage of Yes responses among all responses; section-level compliance is the average of the item-level rates within each section.

Analytical Strategy

The analysis was done in five steps. The descriptive statistics were calculated at the item, section and firm level (RQ1 & RQ2), first. Second, internal consistency was calculated with Cronbach's alpha (KR-20 for binary items) by dichotomizing the Yes/No responses with NA coded as missing data and with the analysis for each section and for the total instrument including all constant items. Third, Multiple Correspondence Analysis (MCA), the categorical analogue of Principal Component Analysis (PCA), was applied to the retained items to summarize their association structure and position organizations in a reduced-dimensional space (Greenacre, 2017; Le Roux & Rouanet, 2010); items answered identically by all firms were excluded as carrying no discriminatory information. The trivial dimension was discarded, raw principal inertias are expressed as percentages of the total non-trivial inertia, and Benzecri-adjusted rates are additionally reported (Greenacre, 2017). Dimensional stability was assessed by bootstrap resampling (B = 500) of firms.

Fourth, Ward's hierarchical clustering was applied to the firm coordinates on the retained MCA dimensions, and the typology was interpreted by comparing cluster means of the section-level compliance indices; solutions for k = 2 to k = 6 were inspected before retaining the three-cluster solution. MCA transforms categorical variables into an orthogonal, noise-reduced Euclidean space, thereby satisfying the underlying metric assumptions required for Ward's criterion to minimize within-cluster variance (inertia) and maximize between-cluster heterogeneity (Murtagh & Legendre, 2014). Fifth, the distribution of NA responses was examined (RQ5). NA responses were treated consistently while preserving their dual nature: excluded as missing in the reliability computations, retained as an active third response category in the MCA, and excluded from the denominator of the firm-level compliance scores. All computations were performed in Python (pandas, NumPy, SciPy).

Results

Overall and Section-Level Compliance (*RQ1*)

Table 1 reports the distribution of responses across the three sections.

Out of the 5,049 item responses from the 99 firms, 3,474 (68.8%) were affirmative, 814 (16.1%) were negative, and 761 (15.1%) were not applicable. Compliance was similar in Section A (fraud awareness and policies; 66.6% Yes) and Section B (adequacy of the internal control system; 67.2% Yes), and substantially higher in Section C (fraud prevention issues; 98.0% Yes). The firm-level compliance score averaged 80.8% (*SD* = 6.3, Median = 80.0, range 55.6-96.0; 95% confidence interval [79.5, 82.1]), indicating moderately high and concentrated adoption (Table 2). The association between three checklist sections and response category was statistically significant (χ^2 (4) = 130.69, $p < 0.001$).

Table 1

Response Distribution Across Three Checklist Sections

Section	Items	Yes	No	NA	Yes %	No %	NA %
A. Fraud awareness and policies	17	1,121	310	252	66.6	18.4	15.0
B. Adequacy of internal control system	31	2,062	498	509	67.2	16.2	16.6
C. Fraud prevention issues	3	291	6	0	98.0	2.0	0.0
Total	51	3,474	814	761	68.8	16.1	15.1

Note. *N* = 99 textile firms; 51 items each. Percentages are of the total item responses in each section.

Table 2

Firm-Level Compliance Scores

Statistic	Value
Mean	80.8
Standard deviation	6.3
Median	80.0
First quartile	77.3
Third quartile	85.4
Minimum	55.6
Maximum	96.0
95% Confidence Interval	[79.5, 82.1]

Note. Compliance score = percentage of Yes responses among applicable (Yes/No) items per firm, *N* = 99

Weakest Practices (*RQ2*)

Table 3 lists the ten practices with the highest negative response rates. The weakest item was mandatory annual vacation specified in job descriptions (B.16; 94.9% No), followed by per-employee maximum opportunity levels (A.1; 72.7% No), close supervision where segregation of duties is not possible (B.26; 61.6% No), and management awareness of fraud manifestations (A.17; 54.5% No). Four of the ten weakest practices are opportunity-reducing controls (mandatory vacations, duplication of sensitive duties, segregation of the purchasing function, close supervision), while three concerns cultural and awareness factors. Notably, 6 of the 51 practices were affirmed by every firm, including ethical training (A.8), written job descriptions (B.10), bank reconciliations (B.18), internal audit functions (B.28), external audits (B.29), and management cooperation with external auditors (B.31). This indicates that policy-level awareness is nearly universal while opportunity-reducing controls are selectively implemented.

Table 3

The Ten Weakest Practices (Highest Negative Response Rates)

Item	Practice	Yes %	No %	NA %
B.16	Mandatory annual vacations specified in job descriptions	5.1	94.9	0.0
A.1	Per-employee maximum opportunity level assigned	27.3	72.7	0.0
B.26	Close supervision where duties cannot be segregated	30.3	61.6	8.1
A.17	Management awareness of fraud and its possible manifestations	45.5	54.5	0.0
B.15	Duplication of sensitive duties (e.g., double-signing of checks)	52.5	47.5	0.0
A.10	Corporate culture avoids characteristics promoting unethical behaviour	53.5	46.5	0.0
B.8	Adequate access controls observable to an impartial observer	55.6	44.4	0.0
B.14	Purchasing function properly segregated	58.6	41.4	0.0
B.12	Organization chart consistent with job descriptions	60.6	39.4	0.0
A.13	Employee counselling	38.4	35.4	26.3

Note. Practices ranked by percentage of No responses among all 99 textile firms.

Reliability of the Instrument (*RQ3*)

The internal consistency of the total instrument, Sections A, B and C were then evaluated for the final dataset using dichotomized responses (No vs Yes) with NA taken as missing, and the coefficient of alpha (Cronbachs α) were respectively computed as 0.72 (the total instrument; 38 variable items), 0.75 (Section A; 14 variable items), and 0.79 (Section B; 23 variable items); the coefficient was not computed for Section C due to only one item varying (3 variable items). These values denote tolerable internal consistency, slightly above the conventional threshold (i.e., 0.70), advocating a composite of related but heterogeneous facets rather than a single tight construct.

The coefficients signal content heterogeneity: Section A combines generic risk factors, individual risk factors, and management awareness, i.e., three conceptually distinct facets whose breadth internal consistency relative to the less homogeneous access-control and reconciliation items of Section B (0.79). The section-level indices in Section 4.1 should therefore be read at each section level, and the total-instrument coefficient (0.72) indicates a moderately coherent composite measure of overall fraud risk management.

Multiple Correspondence Analysis (MCA) (*RQ4*)

MCA applied to the items displaying sufficient variation: 6 of the 51 items were answered identically by all organizations (all affirmative) and were excluded; the remaining 45 items (88 response categories) were retained and Table 4 reports the adjusted (Benzecri) rates. The first-dimension accounts for 27.8% of the adjusted inertia, the second 23.6%, and the third 18.7%, so that the first three dimensions jointly explain 70.0%; expressed as raw percentages of the non-trivial inertia, the first dimension explains only 5.4%. No dominant dimension emerges: the association structure is diffuse, with the largest category coordinates on the first dimension small and spread across items, such as locking of doors, desks, and cabinets (B.3), corporate culture (A.10), mandatory annual vacation (B.16), fair compensation policies (A.14), variance analysis of general ledger accounts (B.21), and policies to report frauds to the authorities (A.4). Following Greenacre (2017), the inertia percentages are interpreted descriptively. Bootstrap resampling (B = 500; Section 3.5) confirms the flatness: the first-dimension share of the non-trivial inertia averages 7.6%

(95% CI [6.7, 8.7]).

Table 4

MCA Principal Inertias

Dimension	Inertia %	Cumulative %
1	27.8	27.8
2	23.6	51.3
3	18.7	70.0
4	17.2	87.2
5	12.8	100.0

Note. Adjusted (Benzécri) rates expressed as percentages of the total adjusted inertia of the MCA solution on 38 items with 88 response categories; raw percentages of the non-trivial inertia.

Cluster Analysis and Organizational Typology (*RQ4*)

Ward's hierarchical clustering on the firm coordinates of the first five MCA dimensions yielded three segments (Table 5). Cluster 1 comprises 52 firms (52.5%) with a mean compliance score of 79.3 (*SD* = 6.5), the moderate-compliance segment, characterized by strong adoption of fraud prevention issues (Section C, 98.1% Yes) but weaker adoption of fraud awareness and policies (75.7%) and internal control practices (78.8%). Cluster 2 comprises 36 firms (36.4%) with a mean of 81.1 (*SD* = 4.8), the upper-moderate segment (Section A 78.8%, Section B 80.5% & Section C 97.2%). Cluster 3 comprises 11 firms (11.1%) with a mean of 87.3 (*SD* = 6.2), the high-compliance segment (Section A 87.1%, Section B 86.0% & Section C 100.0%). The typology resembles a compliance continuum with a small high-performing minority rather than sharply separated quality classes.

The difference between the high-compliance segment (*M* = 87.3, *SD* = 6.2) and the moderate segment (*M* = 79.3, *SD* = 6.5) is statistically significant (Welch's t = 3.8, *df* = 15.0, *p* = 0.00), and the high segment also differs from the upper-moderate segment (*M* = 81.1, *SD* = 4.8; *t* = 3.03, *df* = 13.8, *p* = 0.00); the two majority segments do not differ significantly (*t* = 1.5, *df* = 85.6, *p* = 0.13). The typology therefore separates a small high-compliance minority from a broad moderate majority.

Table 5

Cluster Profiles of Organizations

Segment	*n*	%	Compliance *M* (*SD*)	Section A %	Section B %	Section C %
1.Moderate compliance	52	52.5	79.3 (6.5)	75.7	78.8	98.1
2.Upper-moderate compliance	36	36.4	81.1 (4.8)	78.8	80.5	97.2
3. High compliance	11	11.1	87.3 (6.2)	87.1	86.0	100.0

Note. Compliance scores are mean percentages of Yes among applicable items. Section percentages mean item-level Yes rates within each section.

Not-Applicable (NA) Responses (*RQ5*)

NA responses accounted for 15.1% of all item responses, and their distribution was highly uneven: the mean number of NA responses per organization was 7.7 (Median = 7, maximum = 18), and only one firm recorded none. NA responses were concentrated in Section B (16.6% of its responses) and, in particular, in scale-dependent practices: the highest NA rates were for the explicit consideration of fraud prevention in the design and maintenance of internal controls (B.1 and B.2; 55.6% each), fair grievance mechanisms (A.15; 52.5%), the overall adequacy of physical and logical access controls (B.9; 48.5%), the prohibition of supervisory or management override (B.27; 47.5%), access-restriction policies (B.6; 46.5%), and additional security and surveillance systems (B.7; 45.5%). This pattern is consistent with the interpretation that those practices marked NA by the firms made assumptions about scale-dependent structures, instead of that being a deliberate non-compliance.

Discussion

With respect to RQ1, the overall compliance rate (68.8%) reflects a moderate level of adoption which is less than widespread, though the mean firm score (80.8 at 95% CI [79.5, 82.1]) suggests generally high adoption rates. The affirmation of six (6) practices are claimed by all firms including ethical training (A.8), written job descriptions (B.10), bank reconciliations (B.18), internal and external audit functions (B.28, B.29), and management cooperation with external auditors (B.31), indicating that the policy level infrastructure to support fraud risk management systems is common

(ACFE, 2023; Lawson et al., 2017).

With respect to RQ2, the ten weakest practices reveal a clear pattern: the deficit lies not in awareness and policy documents but in opportunity-reducing controls and the cultural and supervisory practices that operationalize them. Mandatory annual vacation (94.9% No), per-employee maximum opportunity levels (72.7% No), and close supervision where segregation is impossible (61.6% No), all directly constrain the opportunity element of the fraud triangle (Cressey, 1953; Dorminey et al., 2012). This finding is theoretically significant because opportunity is the element most directly controllable by organizational design (Dorminey et al., 2012), and the data shows that it is precisely the element Pakistani textile firms most often fail to implement.

With respect to RQ4, the MCA solution and the three-segment typology show that firms differ along a weak, diffuse response dimension rather than a single dominant compliance dimension: the first MCA dimension accounts for 5.4% of the non-trivial inertia (27.8% adjusted), with the bootstrap 95% CI for the first-dimension share between 6.7% and 8.7%. The typology is moderate (52.5% M = 79.3), upper-moderate (36.4% M = 81.1), and high-compliance (11.1% M = 87.3), which, like compliance-quality differentiations in the literature on internal control (Donelson et al., 2017; Lawson et al., 2017), is a compliance continuum, with a small high-performing minority. Only the high compliance segment differs significantly from both majority segments ($t = 3.84$; $p < 0.01$ and $t = 3.03$; $p < 0.01$ respectively); both the majority segments are not significantly different ($t = 1.52$; $p = 0.133$). This is because there is not a predominant dimension, which emphasizes the descriptive and not the diagnostic use of entity-level compliance measure.

In terms of scale dependency on the practices included in the scales, with respect to RQ5, it is worth highlighting that firms with a high number of *NA* responses do not necessarily indicate low-compliance firms but rather firms where certain practices, e.g. layered IT access controls, are not applicable. This confirms the design of the checklist and suggests that compliance indices need only to be calculated on relevant items: otherwise, smaller firms would be wrongly underestimated.

The results not only expand the baseline literature at the entity level, but also by adding two additional factors. First, they provide organization-side

descriptive evidence besides auditor-side evidence summarized by Tümmler and Quick (2026) and Brazel et al. (2024) and show that a professional checklist can be adapted from a contested auditors' checklist decision aid as a measurement instrument (Pincus, 1989; Eining & Jones, 1997). Second, unlike the view of the importance of fraud risk management practices by their counterparts, they respond to such practices as they occur in reality, not as they appear to be important in the eyes of their counterparts (Zanzig et al., 2026; Lawson et al., 2017), for the first time of the textile industry of Pakistan.

Substantively, the study provides the first quantified evidence that Pakistani textile firms systematically under-implement opportunity-reducing controls relative to policy-level practices, the element of the fraud triangle most directly controllable by organizational design (Dorminey et al., 2012). The statistically significant difference between the high-compliance minority and the majority segments corroborates that the typology captures meaningful variation rather than arbitrary grouping, and the significant association between checklist section and response category confirms that adoption is not uniform across the three dimensions of the checklist.

Conclusion

This study measured the adoption of fraud risk management practices in Pakistani textile-sector firms using the Risk Management Checklist of Singleton and Singleton (2010). Adoption was moderately high overall (68.8% of responses affirmative; mean firm compliance 80.8%), moderately internally consistent as a measurement scale (dichotomized Cronbach's alpha = 0.72), diffuse response dimension on which firms are separated into three segments: moderate-compliance (52.5%, M = 79.3), upper-moderate (36.4%, M = 81.1), and high-compliance groups (11.1%, M = 87.3). The weakest practices concentrate on opportunity-reducing controls and cultural-supervisory mechanisms, which fraud theory identifies as most controllable and most consequential (Dorminey et al., 2012). This study extended the classic fraud frameworks by uncovering a critical structural disconnection in corporate practices. Additionally, it also demonstrated that entity-level risk checklists can be successfully repurposed from contested auditor decision aids into validated quantitative measurement tools capable of deriving nuanced organizational taxonomies via MCA.

Practical and Managerial Implications

By addressing the five research questions, this study is directly anchored in the empirical findings for the practical, regulatory, and standard-setting implications. The RQ1 proves that, for the management and internal audit teams, the contrast between near-universal policy infrastructure and severe deficits in opportunity-reducing controls, such as mandatory annual vacation and per-employee opportunity limits. The RQ2 proves that future risk-mitigation gains depend on operationalizing hard controls rather than adopting redundant policy documents that have only one role to depict the existence as not applicable. As per RQ4, from a regulatory standpoint, the three-cluster typology derived via MCA reveals that over half of the sampled entities reside in a statistically indistinguishable moderate segment. This provides regulators, such as the SECP, with a targeted benchmark for risk-based supervision and capacity-building instead of targeting the already high-performing minority. The RQ3 explains the high internal consistency of the checklist combined with the validation of "Not-Applicable" options as genuine applicability filters for scale-dependent controls. The RQ5 demonstrates that entity-level checklists can be repurposed from contested decision aids into reliable, quantitative measurement tools. Ultimately, this empirical baseline supplies audit standard setters with the exact actual-adoption evidence needed to refine risk-based audit planning standards, such as ISA 240 and AU-C 240, across emerging markets (Zanzig et al., 2026).

Research Limitations

To mitigate the limitations of potential common method bias, self-reporting bias, and cross-sectional sampling that are inherent in single-respondent surveys, the future studies should be continued with probability sampling techniques. More outcome variables, such as fraud detection, restatement, or regulatory enforcement action, and use of longitudinal designs, and/or international comparative studies and/or sector-wise should be conducted to determine if the Pakistani pattern is country-specific or typical of emerging markets. It is also encouraged to complement the quantitative data, self-reported checklists designed by international bodies with mixed methods approaches; and direct forensic audit data to assess the actual operational effectiveness of fraud controls beyond mere reported compliance as per audit standards.

Author Contribution

Muhammad Irfan Javaid: conceptualization, methodology, formal analysis, supervision, writing – original draft. **Muhammad Imran Farooq:** data curation, methodology, formal analysis, writing – review & editing. **Muhammad Yahya:** data curation, writing – review & editing**.**

Conflict of Interest

The authors of the manuscript have no financial or non-financial conflict of interest in the subject matter or materials discussed in this manuscript.

Data Availability Statement

Data supporting the findings of this study will be made available by the corresponding author upon request.

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