STUDY ON THE APPLICATION OF FORENSIC ANALYTICS IN EARLY-STAGE OCCUPATIONAL FRAUD DETECTION[*]

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ABSTRACT

Occupational fraud is the most prevalent threat affecting developed and developing countries. According to the Association of Certified Fraud Examiners, India has the highest occupational fraud rate among Southern Asian countries. As technology advances, criminals are looking for innovative ways to commit crimes. The effects of fraud on companies include loss of reputation, weakening of investors' confidence, reduction of profit, and lowering moral values of employees. The study aims to evaluate the most recent preventative measures organizations have implemented to reduce occupational fraud. The researchers have highlighted the value of forensic analytics in detecting and preventing occupational fraud. This research is based on a mixed method. Results suggest forensic analytics is crucial for detecting occupational fraud at early stages.

Keywords: *Forensic analytics, Occupational fraud, Employee fraud, Forensic auditing*

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1. INTRODUCTION

Many reported cases include Enron, Satyam, PNB loan fraud, ABG shipyard, DFHL scam, etc. A global survey of fraud in 2022 by the Association of Certified Fraud Examiner (ACFE) estimated that over 3.6 billion dollars were lost through the 2110 occupational fraud cases analyzed from 133 countries. Fraud poses a significant problem, leading to substantial financial losses on a global scale. Fraud is an intentional action aimed at gaining unauthorized benefits through deception or unethical practices that others rely on.[5]

1.1 Conceptual Framework

Fraud Triangle

Manipulating financial reports undermines the credibility of financial statements, distorts financial performance, and endangers corporate sustainability (Rezaee & Davani, 2013)[6]. Despite its detrimental effects, fraudulent financial reporting remains a strategy some companies employ to maintain their survival and competitiveness in the global business environment. Even major fraud scandals in companies like Enron have failed to fully alert business leaders to the importance of eliminating fraudulent practices (Alleyne & Amaria, 2013)[7]. Therefore, understanding the root causes of fraudulent financial reporting is essential for minimizing its harmful effects.

Contrastingly, four broad types of pressures for corporate fraud have been identified: financial pressures, vice pressures, job-related pressures, and other pressures (Albrecht et al. 2008, 2010)[8]. Financial pressures and vice pressures alone constitute approximately 95% of these pressures. Additionally, various individual and corporate pressures serve as significant motivational factors for committing fraud, such as financial desperation, inability to meet obligations, and overwhelming debt burdens.

Fraud Diamond

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[5]   ORGANIZATIONS WORLDWIDE LOSE TRILLIONS OF DOLLARS TO OCCUPATIONAL FRAUD, https://www.acfe.com/about-the-acfe/newsroom-for-media/press-releases/press-release-detail?s=2022-RTTN-launch (last visited Jun.2, 2024).

[6] Zabihollah Rezaee & Hossein Davani, *Does Financial Reporting Fraud Recognize Borders? Evidence from Bank Fraud in Iran*, 5 JOURNAL OF FORENSIC & INVESTIGATIVE ACCOUNTING 224–238 (2013).

[7] Beverley Alleyne &Pesi Amaria, *The effectiveness of corporate culture, auditor education, and legislation in identifying, preventing, and eliminating corporate fraud*, 7 INTERNATIONAL JOURNAL OF BUSINESS, ACCOUNTING AND FINANCE (2013).

[8] W. Steve Albrecht, *Chad Albrecht & Conan C. Albrecht, Current trends in fraud and its detection*, 17 INFORMATION SECURITY JOURNAL: A GLOBAL PERSPECTIVE 2–12 (2008). & Chad Albrecht et al., *The relationship between South Korean chaebols and fraud*, 33 MANAGEMENT RESEARCH REVIEW 257–268 (2010).

The Fraud Diamond concept expands upon the fraud triangle by introducing "capability" as a fourth factor. This addition enhances the original model, which only included three elements (Wolfe & Hermanson, 2004)[9].The Fraud Diamond is an enhanced model for understanding and analyzing fraudulent behavior. It builds upon the original fraud triangle by incorporating a fourth element called "capability." While the fraud triangle focuses on pressure, opportunity, and rationalization as the key factors that lead individuals to commit fraud, the Fraud Diamond adds the dimension of an individual's capability to carry out the scam (Albrecht et al., 2010)[10]. This element considers the skills, position, and personal traits that enable a person to exploit their environment and commit fraudulent acts successfully. The fraud diamond provides a more comprehensive framework for identifying and preventing fraud by including capability.

Agency Theory

Agency Theory involves the concept that one or more principals employ an agent or agency to carry out tasks under a contract. This aims to achieve the outcomes desired by the principals. The principals compensate the agents for their work (Jensen & Meckling, 1976)[11]. However, the agent and the principal do not always have the same interests. If the principal needs more information and can effectively oversee the agent, the agent might act in ways that benefit themselves rather than the principal. This misalignment, which results in negative consequences for the principal, is an agency problem (Donaldson & Davis, 1991)[12].

Stewardship Theory

Stewardship Theory argues that the assumptions of Agency Theory about operators acting selfishly are incorrect. Instead, it claims that operators want to be excellent stewards, motivated by their dignity, beliefs, and satisfaction from their work. As managers stay longer with a company, they start to identify more with it, aligning their image with its reputation. They see their interests as closely tied to the company and its owners. This perspective is the foundation of Stewardship Theory.

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[9]Wolfe David T & Hermanson Dana R, *The Fraud Diamond: Considering the Four Elements of Fraud*, 74 THE CPA JOURNAL 38–42 (2004).

[10]Chad Albrecht et al., *The relationship between South Korean chaebols and fraud*, 33 MANAGEMENT RESEARCH REVIEW 257–268 (2010)

[11] Michael C. Jensen & William H. Meckling, *Theory of the firm: Managerial Behavior, agency costs and ownership structure*, 3 JOURNAL OF FINANCIAL ECONOMICS 305–360 (1976).

[12] Lex Donaldson & James H. Davis, *Stewardship theory or agency theory: CEO governance and shareholder returns*, 16 AUSTRALIAN JOURNAL OF MANAGEMENT 49–64 (1991).

Stewardship Theory suggests that managers are motivated not by self-interest but by a desire to be good stewards of their resources and responsibilities. According to this theory, managers derive satisfaction and motivation from their work, driven by personal values, integrity, and a sense of duty. Over time, as managers become more connected to the company, they begin to see their and its success as intertwined. This leads them to act in the company's and its owners' best interests rather than purely for personal gain.

According to the PricewaterhouseCoopers (PwC) Global Fraud Survey 2022, fraud and other forms of economic crime comprised 46% of all cases[13]. Although customer fraud and asset misappropriation are serious concerns, the detrimental impact of cybercrime is even greater. People created a digital occupation transformation due to the COVID-19 outbreak. The business has significantly reduced fraud by enhancing its technical capabilities and internal controls. Corporate fraud occurs when a company or an employee engages in dishonest or unlawful activities (Cohen et al.,2010)[14]. Sahara India Pariwar's financial accounting has been found to have falsified revenue and profit numbers in order to attract customers and investors. This internal fraud has had a significant impact on the company's ability to operate effectively. The role of internal auditors in assessing fraud risk and managing risk assessment is critical. Various fraud risk assessment methods have been developed by The Association of Certified Fraud Examiners (ACFE) defines Occupational fraud as "the use of one's occupation for personal enrichment through the deliberate misuse or misapplication of the organization's resource or assets" (ACFE,2022)[15].

Occupational fraud is different from other types of crime because the victims are unaware of their losses. Both public and private sector organizations have been affected by dishonest behavior from their employees. It's not surprising that the ACFE has reported the highest rate of occupational fraud. Occupational fraud can be categorized into three main types, as listed below.

Asset misappropriation: Employees or third parties sometimes take advantage of their positions to steal an organization's assets or resources for financial or personal gain. This type of fraud results in significant global losses, with 86% of cases being reported worldwide. Most

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[13]PwC's GLOBAL ECONOMIC CRIME AND FRAUD SURVEY 2022, https://www.pwc.com/gx/en/services/forensics/economic-crime-survey.html, (last visited Jun.2, 2024).

[14]Jeffrey Cohen et al., *Corporate fraud and managers' behavior: Evidence from the Press*, 95 JOURNAL OF BUSINESS ETHICS 271–315 (2010).

[15]OCCUPATIONAL FRAUD 2022: A REPORT TO THE NATIONS, https://acfepublic.s3.us-west-2.amazonaws.com/2022+Report+to+the+Nations.pdf (last visited Jun 11, 2024).

commonly, company directors, employees, or individuals entrusted with assets are found to be involved in these fraudulent activities.

Financial statement fraud occurs when an individual intentionally misrepresents an organization's financial statements to deceive users. High-ranking individuals, such as the company's Chief Financial Officer or Controller, may be involved in the fraud, allowing them to manipulate valuable company information. Notable examples of fraudulent financial statements include cases at Enron and Satyam. Corruption and bribery are other types of occupational fraud that offer consideration to a member of the organization to influence their judgment. Based on the types of occupational fraud, every region of the world is plagued by corruption. Assets misappropriation stands out as the least detrimental fraud scheme. "Financial statement misrepresentation is the least common but most costly type of fraud scheme." (Aghili, 2019)[16].The below table depicts that occupational fraud has been categorized based on the characteristics and level of fraud.

Types of Frauds	Description
Conflicts of Interest	Employees or managers have an undisclosed financial interest in transactions that negatively affect their organization.
Bribery	Money or gifts are given or offered to officials to fulfil their duties.
Illegal gratitude	A person who gives public officials by consideration of personal gain.
Economic extortion	Vendors or salespersons benefit the company's employees by making influential judgments.
Theft of cash on hand	Someone has stolen cash or cheques from safe deposits or vaults in the organization.
Theft Cash	Cash or cheques were stolen after preparing books of accounts while in transit before bank deposits.
Inventory all other assets	Someone involves the misappropriation of non-cash items such as inventory, company confidential information, and assets.
Net-worth/Net Income Overstatements	The higher officials or employees stated that the income was high enough to attract investors.
Net-worth/Net Income Understatements	The higher officials or employees report that the financial statement is less than the actual amount.

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[16]Shaun Aghili, *Fraud Auditing Using CAATT: A Manual for Auditors and Forensic Accountants to Detect Organizational Fraud* (2019).

Table 1: Types of Occupational Fraud[17]

1.2 Occupational Fraud Reports from ACFE

ACFE started the fraud survey in 1996 on mainstream occupational fraud and abuses, known as Report to the Nation. In 1996, Certified Fraud Examiners shared data regarding occupational fraud and abuse cases worth $15 billion. A global survey of fraud in 2022 by the ACFE estimated that more than 3.6 billion dollars were lost through the 2110 incidents analyzed from 133 countries (ACFE,2022). Certified fraud examiners estimate that fraud costs organizations approximately 5% of their annual revenue. The most prevalent type of occupational fraud globally is asset misappropriation. Corruption was the most common scheme in every part of the world. The organization with the lowest number of employees suffered the highest losses ($150,000). According to the data, real estate companies are more vulnerable to fraud than other businesses.

Year	Data Collection	Number of occupational fraud cases	Amount of Loss
1996	2608 Certified Fraud Examiners (CFEs)	1498	$15 billion(total)
2002	2500 Certified Fraud Examiners (CFEs)	663	$7 billion(total)
2004	Not mentioned	508	$761 million(total)
2006	Not mentioned	1134	$15.9 million
2008	Not mentioned	959	$17.5 million
2010	106 Countries	1843	$16.0 million
2012	98 Countries	1388	$14.0 million
2014	More than 100 Countries	1483	$14.5 million
2016	114 Countries	2410	$15.0 million
2018	125 Countries	2690	$6.3 billion(total)
2020	125 Countries	2504	$3.6 billion(total)

[17]Shaun Aghili, *Fraud Auditing Using CAATT: A Manual for Auditors and Forensic Accountants to Detect Organizational Fraud* (2019).

| 2022 | 133 Countries | 2110 | $3.6 billion(total) |

Table 2: Occupational Fraud Cases and Amount of Loss[18]

1.3 Victims of Occupational Fraud

The majority of reported frauds (69%) happened in non-profit organizations, with 44% in private companies and 25% in public companies. Private and public companies lost approximately $120,000 and $118,000, respectively. The ACFE estimates that non-profit organizations have a median loss of $60,000 and are only responsible for 9% of reported fraud occurrences (ACFE,2022). Smaller businesses will suffer extensive losses due to a lack of fraud control, untrained employees, and an inability to acquire other resources (Peltier, 2009)[19]. There are more cases of occupational fraud in the banking and financial industries. Different victims and perpetrators can be found in the list of fraud categories (Singleton & Singleton, 2013)[20]

Perpetrator	Victim	Types of Fraud
Corporate Owners and Managers	- Customer - Stockholders - Creditors - Competitors - Bankers - Company/Employer - Insurance carriers - Government agencies	- False financial statement - False representations - Embezzlement - Insider trading - Conversion of assets - Corruption of employees
Corporate Vendors, Suppliers, and Contractors	- Customers - Vendors	- Overbilling - Double billing - Corruption of employees - Fraudulent checks

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[18]OCCUPATIONAL FRAUD 2022: A REPORT TO THE NATIONS, https://acfepublic.s3.us-west-2.amazonaws.com/2022+Report+to+the+Nations.pdf (last visited Jun 11, 2024).

[19]Dominic Peltier-Rivest, *An analysis of the victims of occupational fraud: A Canadian perspective*, 16 JOURNAL OF FINANCIAL CRIME 60–66 (2009).

[20]Aaron J. Singleton & Tommie W. Singleton, *Fraud auditing and forensic accounting* (2013).

Corporate Employees	• Employers	• False employment application
		• False expense claims
		• Theft
		• Corruption
		• Embezzlement

Table 3: List of perpetrators, victims, and types of fraud (Source: Author's Compilation)

1.4 Detection of Occupational Fraud

The detection of fraud is the first step to a successful investigation. It is also essential to prevent fraud since fraud examiners can take action to enhance their capacity to detect fraud. As a result, an employee may be motivated to keep ethics so that fraud will be detected and possibly prevent further misconduct. Despite the growing number of fraud detection measures available to companies, tips remain the most prevalent way occupational scams are identified. Most fraud cases uncovered were detected by tips (42%), nearly three times more than any other method (ACFE,2022). Internal audits have played a significant role in reducing fraud and maintaining profitability for all corporations. Compared to the previous year, the internal audit's efficiency in detecting deceptive practices increased by 16 percent in 2022.
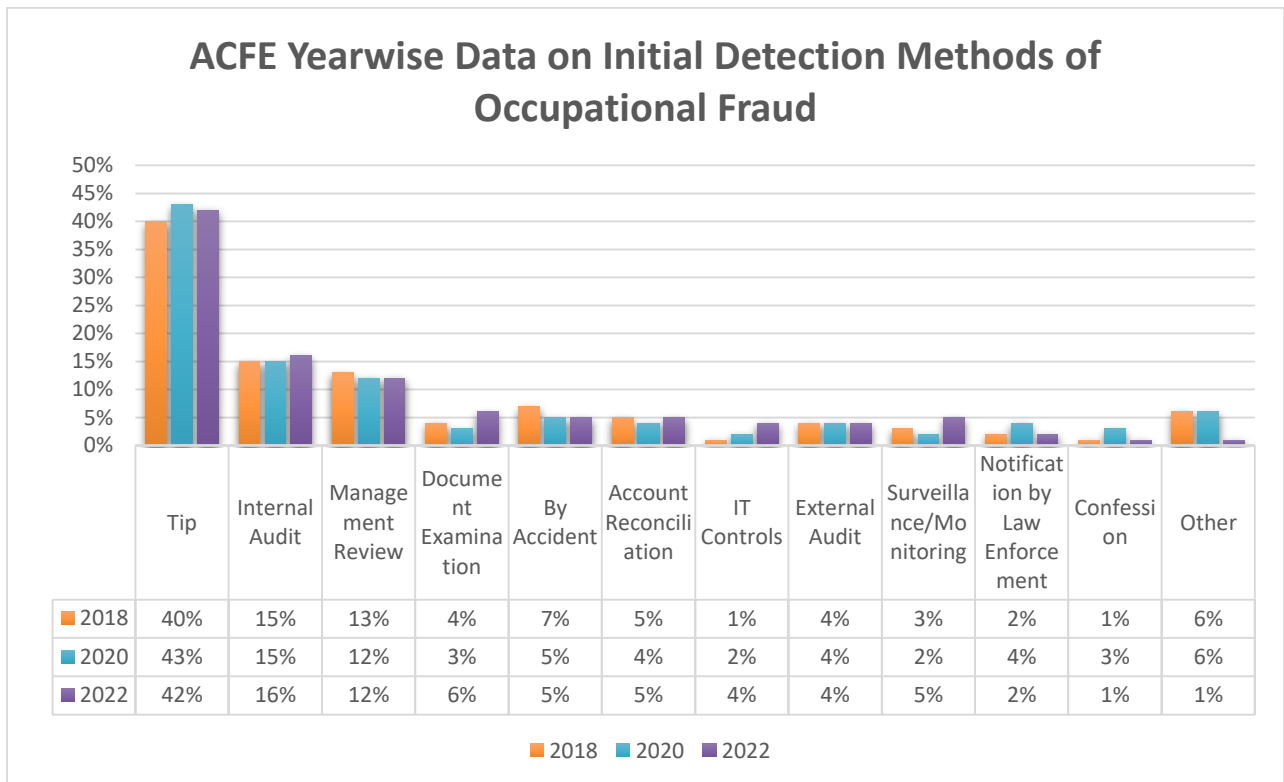
ACFE Yearwise Data on Initial Detection Methods of Occupational Fraud

	Tip	Internal Audit	Management Review	Document Examination	By Accident	Account Reconciliation	IT Controls	External Audit	Surveillance/Monitoring	Notification by Law Enforcement	Confession	Other
2018	40%	15%	13%	4%	7%	5%	1%	4%	3%	2%	1%	6%
2020	43%	15%	12%	3%	5%	4%	2%	4%	2%	4%	3%	6%
2022	42%	16%	12%	6%	5%	5%	4%	4%	5%	2%	1%	1%

2018   2020   2022

Figure 1: Initial Detection Methods[21]

1.5 Forensic Analytics

The investigator may observe symptoms and red flags of fraud. Once fraud has been detected, the investigator determines whether it is fraud. There might be a false positive when investigating fraud. This is because there should be many data to analyze. An investigator might then overlook some key facts (Gee, 2015)[22]. The company is continuously on the lookout for unusual occurrences. ACFE reported 53 percent of fraud incidents in 2018, and hotlines have helped boost employee reporting (ACFE, 2022)[23].

"Occupational fraud differs from other crimes in that the victim is unaware of the loss until the crime is found" (Nigrini, 2020)[24]. **"The acquisition and analysis of electronic data to recreate or discover fraud, inaccuracy, or biases are known as forensic analytics. "Forensic Data Analytics(FDA) is used to find patterns and communicate through structured and unstructured data analysis using advanced statistical methods. Forensic analytics can quickly determine some types of fraud, such as financial statement fraud, embezzlement, and corruption. The role of forensic analytics lies in investigating, treating, and examining financial crime offences, which means that the development of appropriate fraud detection techniques is of great importance. Forensic accounting procedures are applied to reduce the possibility of account failure and review vital information. Forensic accounting combines accounting, auditing, and investigation expertise to support legal arguments. We can consider someone who has detective and financial management talents as a forensic accountant. After the incident of fraud, a forensic accountant will be engaged with the company. The purpose of an occupational fraud investigation is to ascertain the existence, type, and scope of the fraud, as well as the identity of the perpetrator (Okoye,2009)[25]. They are also called upon to analyze the business accounting system and suggest guidance based on their experience strengthening internal control and internal check processes to minimize theft and fraud.

We have a list of fraud symptoms that data can do meaningful analysis to accomplish the audit objectives for forensic analytics testing. A basic test, such as Benford's Law, is used in the

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[21]OCCUPATIONAL FRAUD 2022: A REPORT TO THE NATIONS, https://acfepublic.s3.us-west-2.amazonaws.com/2022+Report+to+the+Nations.pdf (last visited Jun 11, 2024).
[22]Sunder Gee, *Fraud and fraud detection: A data analytics approach* (2015).
[23]OCCUPATIONAL FRAUD 2022: A REPORT TO THE NATIONS, https://acfepublic.s3.us-west-2.amazonaws.com/2022+Report+to+the+Nations.pdf (last visited Jun 11, 2024).
[24]Mark J. Nigrini, *Forensic analytics: Methods and techniques for forensic accounting investigations* (2020).
[25]Emmanuel Ikechukwu Okoye, *The role of forensic accounting in Fraud Investigation and Litigation Support SSRN* (2009), https://ssrn.com/abstract=1788822 (last visited Jun 11, 2024).

analytics part.

The essential steps that are focused on the forensic analytic task are: -

1.Establish the analytics test objectives

2.Determine what data type would be relevant for the test.

3.Choose the test that is best suited to the objective

4.Selecting the right tool

5.Data collection

6.Data preparation

7.Performing the data analysis tests

8.Evaluation of results

9.Report and decision making

Figure 2: Basic Steps of Forensic Analytics[26]

Gathering valuable data for analysis is critical before deciding on an analytics test. To fix inherent faults and be helpful, the data must be clean. Data can be found in various forms, as a single file or in a database. The sound data is almost ready for analysis to begin. Forensic data requires familiarity with statistics and summaries. The test's objectives will be met only through data gathered from the organization. To do so, look for asset theft schemes, significant financial statement misstatements, bribery schemes, and questionable transitions[27].In addition

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[26]Mark J. Nigrini, *Forensic analytics: Methods and techniques for forensic accounting investigations* (2020)
[27]Mark J. Nigrini, *Forensic analytics: Methods and techniques for forensic accounting investigations* (2020)

to the data types relevant to the test, such as financial, structured, or unstructured data and historical data, other types of data may not be appropriate, such as non-financial, budget, and statistical.

1.6 Forensic Analytics Tools

Excel: This is a basic spreadsheet that's popular for use in fraud analysis. Excel offers an essential Excel add-in called Excel Analyser for auditing and erasing hidden data errors. However, it took much time, and the accuracy was imperfect.

IDEA: When a forensic audit has an issue to address, IDEA is the most effective data analysis tool. It is also utilized for substantive testing. IDEA enables audit professionals to collect evidence, analyze risk, find patterns, and deliver knowledge to help them make better decisions based on facts (Gee,2015)[28]. It will always be advantageous if the subject can assess data volume and the expense of gathering the necessary electronic data. IDEA plays a significant part in the investigation of duplicate transactions, the extraction of anomalous transaction items, the analysis of complex data, and the creation of audit transaction samples.

ACL (Audit Command Language) Analysis 10: One of the best analytical tools available for fraud analysis is this one. It is used to identify illegal transactions by converting meaningless data into reports. ACL Analytics 10 is powerful and quicker than the previous version. It can access, examine, and keep track of transactions from any source using ACL. It categorizes data patterns and unusual entries. Applying Benford's Law locates unexpected occurrences of digits in naturally occurring data sets. The tool checks for missing values and duplicate transactions, including payment claims and expenditure reports.

Raytheon's VisuaLinks: It is analytical software designed to link entities and associations in data to reveal suspicious transactions through graphical representation. It provides information about concealed fraud irregularities. Collecting numerous fields of data can reveal the strategies criminal organizations use. VisuaLink examines money laundering patterns, shows the severity of financial crimes, improves counterintelligence's capacity to detect terrorist plots, and supports all strategic and tactical initiatives.

Centrifuge Visual Network Analytics: This software application is frequently used in businesses to analyze fraud. It focuses on identifying the connections between particular entities and using statistical methods to find hidden red flags. This tool analyses the data quickly and is user-friendly.

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[28]Sunder Gee, *Fraud and fraud detection: A data analytics approach* (2015)

1.7 The Use of forensic Analytics to detect Occupational Fraud

Organizations often experience their most significant financial losses due to occupational fraud. According to the Global Fraud Survey 2020, 37% of fraud was committed by people within the organization, making it challenging for firms to detect and immediately take preventative measures against it. More than one-third of Intellectual Property theft was committed by both employees and contractors, according to the 2020 Kroll Global Fraud and Risk Report. Every company is exchanging a significant amount of information. Missing values, concealed data, fraudulent transactions, etc may be present in the dataset. The organization receives a vast amount of data that touches all elements of the operations. As a result, it is getting tough to commit without leaving some electronic footprint. The FDA's steps must be examined in order to search for fraudulent activity. To find hidden patterns and anomalies that point to fraudulent behavior after training the model. The researcher focuses on identifying occupational fraud with the help of forensic analytics at the initial stage.

2. REVIEW OF LITERATURE

Holtfreter (2005)[29]Research found that top-level employees are the most likely to commit occupational fraud**.** The author argued that occupational fraud should not be classified as white-collar fraud since it does not require any particular skill or vast knowledge to perform asset misappropriation. Corruption was found to be a common practice of fraud across the world, and employees in higher positions can quickly understand financial statements and alter them for monetary gain. The study's significant findings suggested that companies should create anonymous reporting mechanisms for their employees to detect fraud better.

In their research, Bierstaker et al. (2006)[30]suggested that each organization develop and maintain a fraud policy to guide their employees. Fraud hotlines are considered not an effective tool, but they enhance fraud deterrence and getting the confidence to share information without fear. Using analytics techniques can help detect fraud, whether it changes the trends and ratios of the financial statement. It covers the categories of fraud within non-profit organizations and the characteristics of victims and offenders, using data from a certified fraud examiner. By analyzing data, it has been highlighted to trace possible ways fraud losses may be prevented or

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[29]Kristy Holtfreter, *Is occupational fraud "typical" white-collar crime? A comparison of individual and organizational characteristics*, 33 JOURNAL OF CRIMINAL JUSTICE 353–365 (2005).
[30]James L. Bierstaker, Richard G. Brody & Carl Pacini, *Accountants' perceptions regarding fraud detection and prevention methods*, 21 MANAGERIAL AUDITING JOURNAL 520–535 (2006).

mitigated.

Singleton et al. (2011)[31] highlighted in their book that the fraud cycle starts with the fraudster's preparations before completing the fraud act. Fraud auditing is a specialized methodology and strategy to identify fraud. Risk management serves as a mechanism to prevent fraud in the company, and the three fundamental phases of the anti-fraud program are prevention, detection, and reaction.

Sharma et al. (2012)[32]Reported that an organization's internal auditing system failed to identify accounting fraud, and forensic accounting procedures were used to determine the company's financial fraud. Data mining techniques have proven helpful in fraud detection due to the significant hurdles in dealing with massive data quantities and the intricacies of economic data. Regression analysis is a commonly applied method for fraud detection since it is a highly effective instrument. Data mining tools have become crucial for detecting financial crime in recent years.

Umar et al. (2015)[33] recommended reducing occupational fraud using fraud hotlines, whistle-blowing, effective internal control, and forensic accounting. Occupational fraud has caused severe economic and non-economic harm because of occupational fraud. The author summarizes the estimated cost of the Water Management and Enron corporate scandals.

Gelder et al. (2016)[34] This study aimed to predict workplace crimes by examining individuals' characteristics and proximate variables operating now of decision. Based on the hypothesis that the decision to commit a crime is influenced by factors beyond cognitive factors, individuals with lower scores are more likely to commit crimes. The choice to do the act is heavily influenced, if covertly, by how individuals feel about the circumstance—the felt attraction and perceived danger impact professional criminal choice for both conscientiousness and honesty-humanity.

Mustafa Bakri et al. (2017)[35] The authors observed the impact of fraud risk and asset theft integrity using data from the Royal Malaysian Police. One goal was to find the link between

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[31]Aaron J. Singleton & Tommie W. Singleton, *Fraud auditing and forensic accounting* (2013).
[32]Anuj Sharma & Prabin Kumar Panigrahi, *A review of financial accounting fraud detection based on data mining techniques*, 39 INTERNATIONAL JOURNAL OF COMPUTER APPLICATIONS 37–47 (2012).

[33]Ibrahim Umar, Rose Shamsiah Samsudin &Mudzamir Mohamed, *The types, costs, prevention and detection of occupational ...* (2015), https://core.ac.uk/download/pdf/42984298.pdf (last visited Jun 11, 2024).

[34]Jean-Louis van Gelder & Reinout E. de Vries, *Traits and states at work: Lure, risk and personality as predictors of occupational crime*, 22 PSYCHOLOGY, CRIME & LAW 701–720 (2016).
[35]Haniza Hanim Mustafa Bakri, Norazida Mohamed & Jamaliah Said, *Mitigating asset misappropriation through integrity and fraud risk elements*, 24 JOURNAL OF FINANCIAL CRIME 242–255 (2017).

the components of the fraud triangle and the occurrence of fraud cases.

Ngozi (2018)[36] This paper introduced occupational fraud as a crime that is hard to detect due to the lack of fraud detection methods in the United States of America's private and public businesses. Based on qualitative research, he provided the reason behind the impact of the lack of detection methods.

Suh et al. (2018)[37]they have investigated the effect of ethical culture and monitoring control in mitigating the link between organizational investment and professional fraud. The researcher collected the sample from 392 Korean banking personnel to develop structural equation models. It was discovered that ethical culture and monitoring control, two moderating variables, were linked to higher expenditure in countering occupational fraud.

Ortiz (2018)[38] This study discusses occupational fraud and makes strategies to mitigate it. Several Puerto Rican restaurant owners took part in face-to-face, semi-structured interviews for this study to share their effective methods for reducing occupational fraud.

Suh et al. (2019).[39] This paper expressed the opinion that some studies had found that the banking crises were primarily caused by workplace fraud and abuse. The main goal of this study is to explore risk management as a way of safeguarding financial institutions from internal vulnerabilities caused by occupational fraud. The analysis highlights that efforts to combat fraud should focus on eliminating opportunities for fraud through effective deterrence and prevention techniques.

Abu Amuna et al. (2020)[40] This study states that it is essential to create specialist training programs for employees in important departments, especially those in internal audit and internal control, because they are more closely connected to noticing indications of occupational fraud.

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[36]Ngozi D Queenchiku, *The Effectiveness of Detection Measures Against Occupational Fraud In The United States* (2018).

[37]Joon Bae Suh, Hee Sub Shim & Mark Button, *Exploring the impact of organizational investment on occupational fraud: Mediating effects of ethical culture and monitoring control*, 53 INTERNATIONAL JOURNAL OF LAW, CRIME AND JUSTICE 46–55 (2018).

[38]Angel Ortiz Garcia, *Strategies to reduce occupational fraud in small restaurants*, https://scholarworks.waldenu.edu/cgi/viewcontent.cgi?article=6520&context=dissertations (last visited Jun 11, 2024).

[39]Joon B. Suh, Rebecca Nicolaides & Richard Trafford, *The effects of reducing opportunity and fraud risk factors on the occurrence of occupational fraud in financial institutions*, 56 INTERNATIONAL JOURNAL OF LAW, CRIME AND JUSTICE 79–88 (2019).

[40]YOUSSEF M. ABU AMUNA& FRIS ABU MOUAMER, IMPACT OF APPLYING FRAUD DETECTION AND PREVENTION INSTRUMENTS IN REDUCING OCCUPATIONAL FRAUD: CASE STUDY: MINISTRY OF HEALTH (MOH) IN GAZA STRIP SSRN (2020), https://ssrn.com/abstract=3643587 (last visited Jun 11, 2024).

Omair et al. (2020)[41] The study defined fraud detection and prevention techniques as essential for fraud risk management. Fraud reduction or prevention is the goal of fraud prevention. Since it is impossible to control every occurrence of fraud, fraud detection techniques must be used constantly to safeguard against cases that were not stopped. Examining corporate procedures to find potential fraud sources is part of a good fraud detection strategy.

John et al. (2020)[42] The paper deals with detecting and preventing refund fraud in online retail shopping. Fraud detection techniques are divided into 1. Proactive and reactive techniques 2. Manual and automated methods. The development of the computerized system and data collection has led to vast structured and unstructured data databases.

(Nigrini, 2020)[43]In his book, he defined the process of forensic analytics, which proactively identifies fraud and other anomalies and provides various helpful tools.

Saluja (2021)[44] described that the internal audit process has a prominent role in detecting fraud. A complete internal audit check is impossible if it shows signals of fraud. By training employees, they will be much more dedicated and create a positive approach to their work. Experts suggested more training methods to create a better working environment in the organization, which are as follows:

- Having an idea of vigilance

- Focus more on behavioral red flags of fraud.

- Creating a proper reporting method

- Appoint fraud examiner

3. RESEARCH METHODOLOGY

The study of the research approach requires a systematic research method. Typically, researchers outline the procedures used to investigate a specific research subject in this field. The term "methodology" describes the approach taken when conducting research. A methodical approach to solving the research problem is known as research methodology (Sileyew, 2020)[45]. According to Clifford Woody, conducting research comprises describing

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[41]Badr Omair & Ahmad Alturki, *Multi-dimensional fraud detection metrics in business processes and their application*, 11 INTERNATIONAL JOURNAL OF ADVANCED COMPUTER SCIENCE AND APPLICATIONS (2020).

[42]Shylu John, Bhavin J. Shah & Pradeep Kartha, *Refund fraud analytics for an online retail purchases*, 3 JOURNAL OF BUSINESS ANALYTICS 56–66 (2020).

[43]Mark J. Nigrini, *Forensic analytics: Methods and techniques for forensic accounting investigations* (2020).

[44]Shefali Saluja, *Detection and Prevention of Occupational Fraud An Ex post analysis of selective frauds* (2021).

[45]K J Sileyew Goh et al., *Forensic analytics using cluster analysis: Detecting anomalies in Data*, 32 JOURNAL OF CORPORATE ACCOUNTING & FINANCE 154–161 (2021).

and redefining issues, creating hypotheses or suggested solutions, accumulating, organizing, analyzing data, generating conclusions, and testing those deductions to see whether the formulating hypothesis is supported.

According to this study, companies are aware of internal fraud within their walls. When delving into the business, it becomes apparent that occupational fraud poses a significant challenge for the organization. This paper explores the importance of forensic analytics techniques and forensic accountants in organizations. Forensic analytics is vital in identifying suspicious transactions that can bring businesses down.[46].

3.1 Objectives of the study

1. To Focus on understanding and identifying occupational fraud.

2. To Evaluate the most recent actions taken by private and public organizations to prevent fraud.

3. To find the value of using forensic analytics to detect and prevent occupational fraud.

3.2 Research Design

This research is based on Mixed Research methods. Mixed research is a type of study that collects both quantitative and qualitative data. The first section of the research is based on secondary data collection, collected from the most recent reports published by organizations like ACFE, PWC, EY, etc., to understand the general trends in occupational fraud.

Two questionnaires have been prepared. The first questionnaire was prepared for employees of public sector and private sector enterprises. The second questionnaire was prepared for forensic accounting professionals, fraud examiners, and chartered accountants. For questionnaire preparation, the researcher sent the questionnaire to practising Forensic Accountants for review before finalizing it.

3.3 Data Collection

The collection of data is a crucial step in the research process. This study primarily utilizes survey research for qualitative analysis. Data was gathered via email distribution and the sharing of survey links on social media. The researcher distributed the survey link to convenient respondents via LinkedIn and WhatsApp. The researcher's LinkedIn posts are accessible to

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[46] *Forensic analytics in fraud investigations Identifying rare events that can bring the business down*, https://www2.deloitte.com/us/en/pages/advisory/articles/forensic-analytics-in-fraud-investigations.html (last visited Jun.2, 2024).

everyone.

Secondary Data

Data from diverse secondary sources have been gathered through a desk examination. Reports and project materials from each manufacturing sector are included. Regarding the research objectives, the primary source is ACFE- Report to the Nation. In addition, the research has gathered information about occupational fraud.

- Websites- National Crime Record Bureau (NCRB), Price Waterhouse Chopper (PWC), Deloitte, EY (Ernest Young), Shodhganga, J store, Z-library, Google Scholar, Research gate. etc
- Reports- NCRB, PWC, EY, Deloitte, KPMG
- E-books- Fraud Analytics strategies and methods, Fraud Auditing and Forensic Accounting...etc
- Books- Forensic Analytics, Fraud Audit using Computer Assisted Auditing Tools and Techniques (CAATT), New Era of Forensic Accounting...etc

Primary Data

It came directly from the information source. With trusted analyses that had a direct link to the occurrence of the events, the primary data were more trustworthy and gave decision-makers a higher degree of confidence. The primary data gathering focused on two groups: fraud examiners and employees.

The researcher has developed two survey forms that encompass the concepts of occupational fraud and forensic analytics. One of the forms is sent around among the organization's recognizable employees. Both governmental and commercial (Private) entities provided the data collection. The other type focuses on information gathered by forensic accountants, chartered accountants, and fraud investigators in India. The researcher chose a group of people who work in India. Respondents have shared their views and provided their opinions on forensic analytics approaches.

3.4 Sample Size

This research aims to collect 20 responses from public and private sector employees and 10 responses from forensic accounting professionals, fraud examiners, and Chartered

Accountants. The questionnaire includes questions related to Forensic Analytics and occupational fraud.

3.5 Sample Collection Method

Data have been collected through convenience sampling and snowballing sampling. The researcher distributes the survey form and shares a link on social media platforms like LinkedIn.

4.   RESULTS AND DISCUSSION

This section discusses the results from the online survey collected based on the study. The researcher distributed the questionnaire via email and social media sites like LinkedIn, and based on convenience sampling, data was collected.

4.1 Analysis of Ideas and Indicators of Occupational Fraud in the Organisation

In this research, 20 employees from the public and private sectors have responded. Questions like name, email ID, occupation, satisfaction level, salary, pressure in the organization, etc., have been asked in the questionnaire. Out of 20 respondents, 19 belong to private sector enterprises, and only one response was received from employees of public sector enterprises.
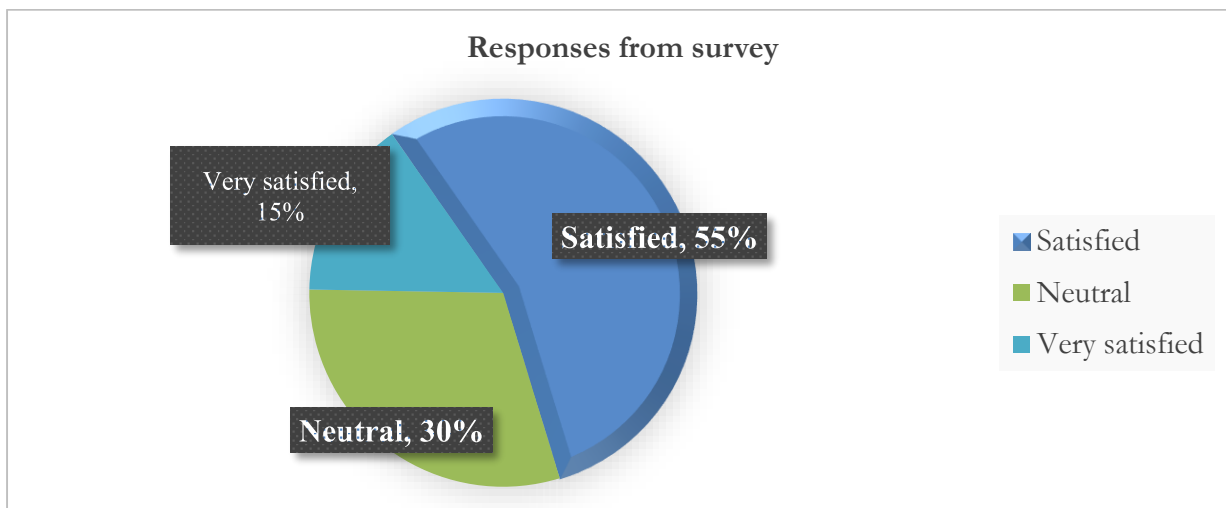

Figure 3: Level of job satisfaction

Figure 3: The pie chart depicts that the employees are satisfied with their jobs. Respondents' job satisfaction is reported to be around 55%. Here, 30% of respondents provided a neutral opinion, while 15% expressed extreme satisfaction. This level of job satisfaction results in a good salary, a favorable working environment, promotions, remuneration, and other benefits.
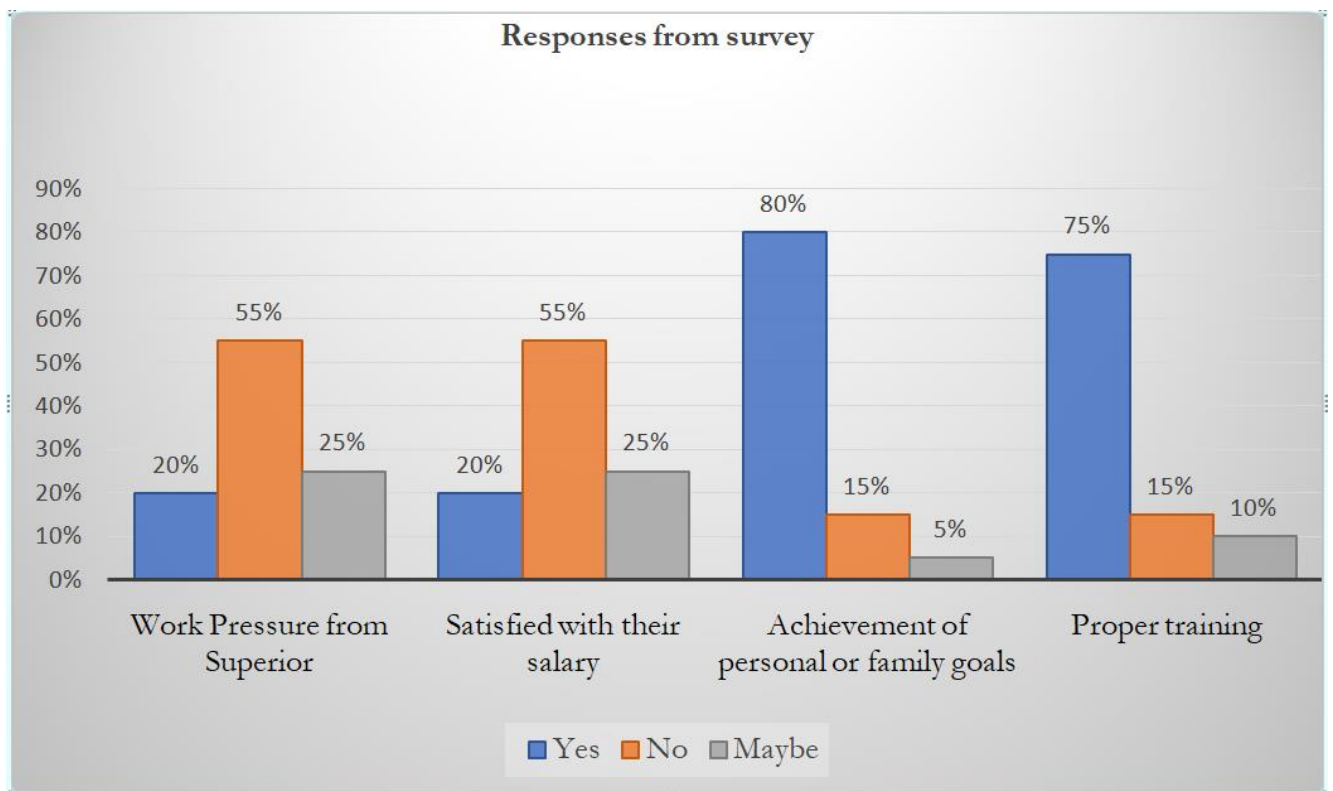
Figure 4: Responses of the survey from four questionnaire

Figure 4: The bar graph shows aggregated responses to four questions circulated among the employees. It shows that 55% of respondents claim not to have felt pressure from superiors. Twenty percent of respondents said they occasionally felt pressure from their superiors, and twenty-five percent said they did. It could happen due to work overload, challenging tasks, etc. Another part shows whether the employees are meeting their salary expectations or not. The majority of them (55%) are respondents whose salaries fall short of their expectations. Twenty percent of respondents said they were happy with their salary, and the remaining responses needed clarification.

Also, the employee's income will allow them to attain their family's or personal goals. Eighty percent of respondents said they could accomplish their individual or family goals better. Others cannot achieve their goals because they are unhappy with their salary. Everyone has different demands; sometimes, corporations cannot meet their salary expectations. In another case, the company should intentionally pay employees a fair wage for their work. The majority of them respond that the business offers appropriate training. Employee skill development improves performance and productivity. Only 15% of employees in their company need proper training. Training has a significant role in reducing employee turnover and enhancing employee

retention. The employees do not want to work in an area in which they have no skills. It creates work pressure, stress, employee turnover, fraud, etc. It will be a hardship for the business environment.

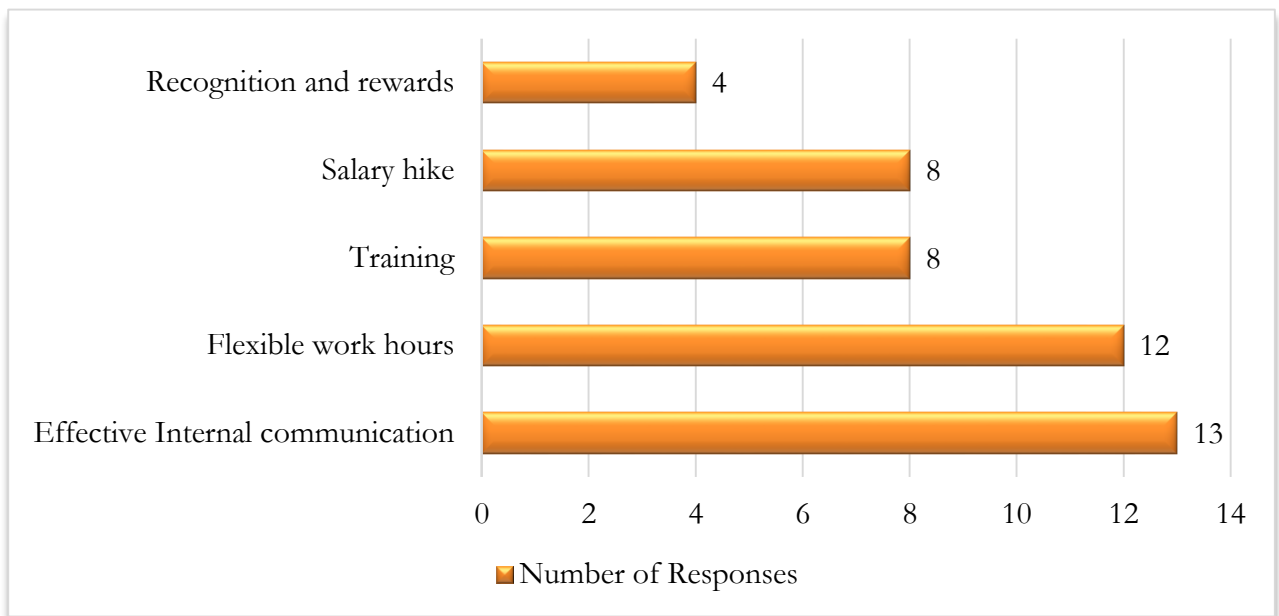### 4.1.1 Factors that determine a good working environment

Figure 5: Good Working Environment

Fig 5 shows that the researcher is interested in understanding what a good working environment means to the employees. Effective internal communication gets results from most of them (68.4 percent). The following three choices are flexible working hours (63.2%), training (42.1%), and salary increase (42.1%). The organization has to maintain a good working environment to reduce fraud.

4.1.2 Track of Attendance

Biometric attendance tracking is used by 70% of the respondents. The attendance register is used by 20% of responders. The organization measures its attendees, productivity, and working hours through attendance. While some organizations employ specialized software, others do not use an attendance system. The organization should keep proper attendance to identify payroll fraud, ghost employees, etc., through forensic audits.

4.1.3 Occupational Fraud

Occupational fraud is known to 45% of the respondents. Most of those surveyed (35%) are unaware of occupational fraud. Due to reputational damage and the difficulty of detecting fraud, most occupational fraud cases are not disclosed to the public. It demonstrates how the organization's proper fraud prevention strategy is ineffective.
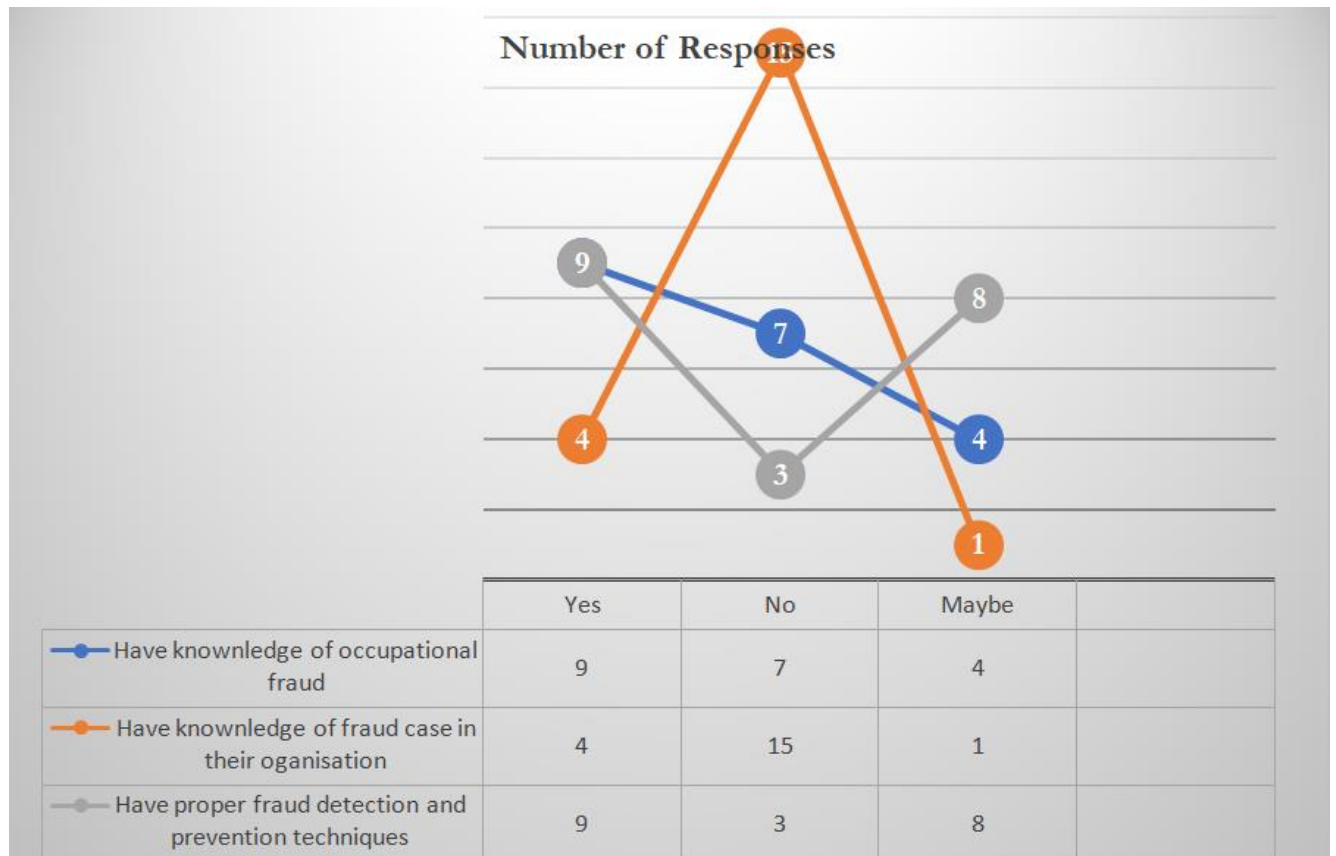

Number of Responses	Yes	No	Maybe
—•— Have knownledge of occupational fraud	9	7	4
—•— Have knownledge of fraud case in their oganisation	4	15	1
—•— Have proper fraud detection and prevention techniques	9	3	8

Figure 6: Occupational fraud

Figure 6 conveys that most respondents do not know about the fraud incident reported in their organization. Most respondents do not know their organizations' fraud detection techniques and tools. The business level will drop if the organization doesn't have proper techniques to mitigate the fraud. Listening and monitoring employees can be used to reduce the level of fraud. Every employee within the company should have known about the fraud risk policy, including the different types of fraud and the associated penalties. The strategies and processes adopted by a corporation to protect its assets, guarantee the accuracy of its accounting records, and prevent and identify fraud and theft are known as internal controls. Internal control measures and the segregation of workers' duties are crucial in lowering the risk of fraud. Regularly reviewing and updating fraud detection tactics is essential to ensure the staff is productive.

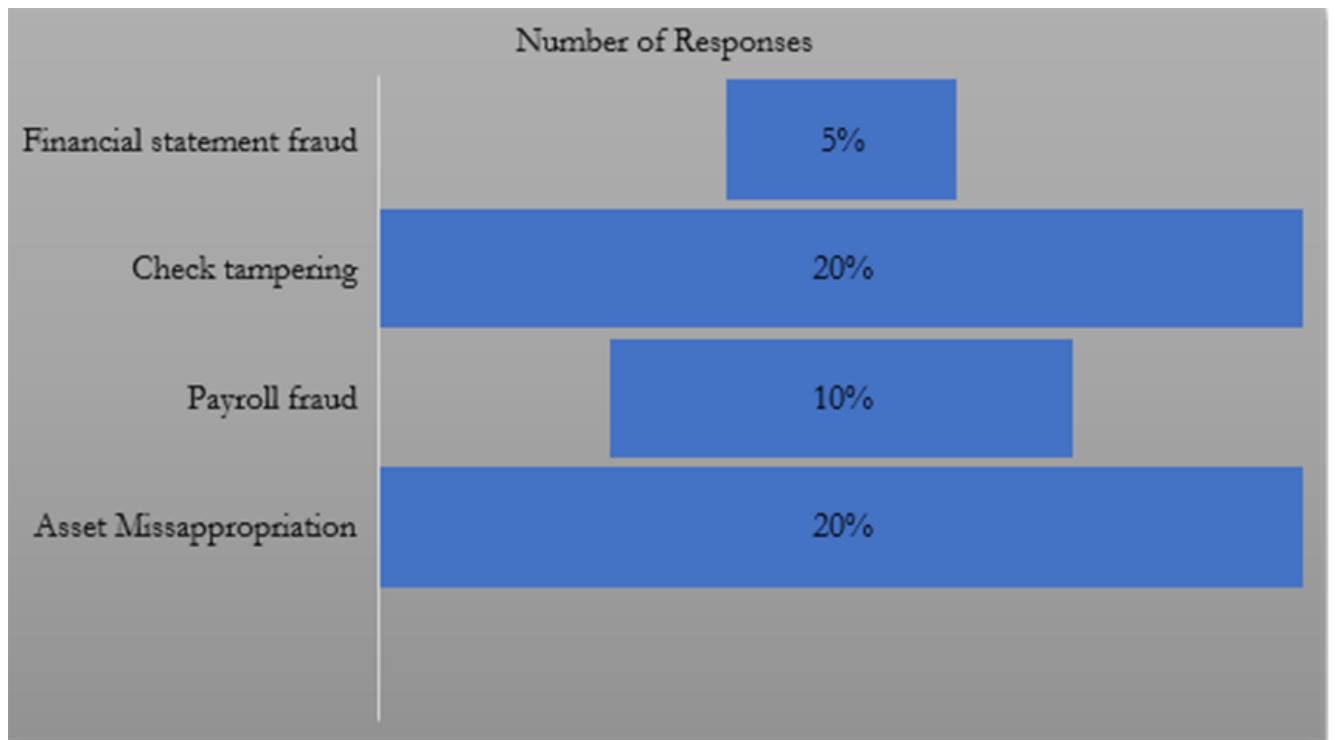### 4.1.4 Aware of types of fraudulent reporting in their organization

Figure 7: Types of occupational fraud

Figure 7 displays the type of occupational fraud reported in their organization. The two most common types of fraud reported by the organization are check tampering and asset misappropriation.

According to this survey, employees may be unaware of the fraud prevention measures in place at their company. Only a tiny portion of the respondents responded to this question. Organizations should have a good understanding of effective internal control systems, updated business software, and yearly security system changes.

4.2 To analyze the value of forensic analytics

The following respondents provided information to the researcher.

- Chartered Accountant (60%)
- Forensic Accounting Professional (20%)
- Certified Fraud Examiner (10%)
- Chartered Accountant and Certified Fraud Examiner (10%)

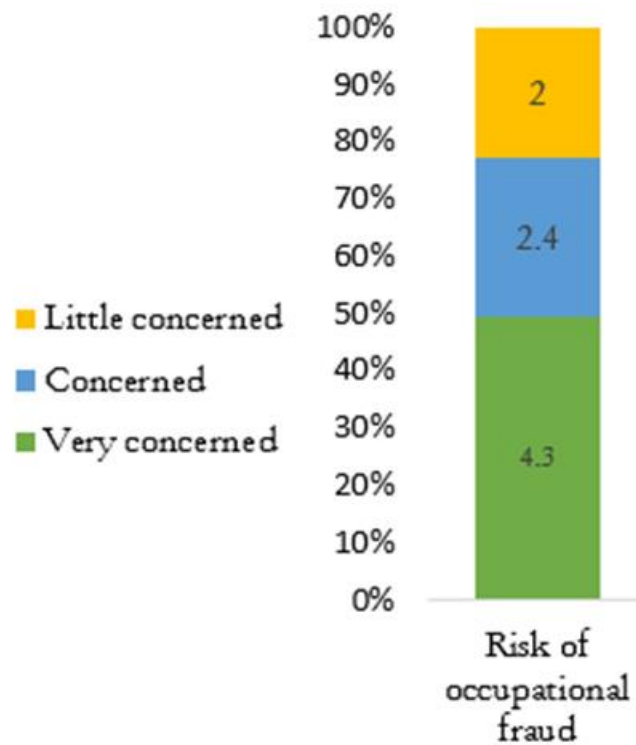**4.2.1 Concerned about the risk of occupational fraud in the organization**

Figure 8: Risk of occupational fraud in the organization

Figure 8 shows that most organizations are concerned about the possibility of occupational fraud. 60% of Organisations are apprehensive about occupational fraud.

4.2.2 Steps to Prevent Occupational Fraud

Occupational Fraud
- Gather or preserve evidence
- Use forensic analytics tools for taking necessary steps
- Seek legal
- Engage a forensic accountant
- Communicate with key individuals in the organisation

Figure 9: Points in the questionnaire

Figure 9 indicates the steps that are taken by the organization when the fraud signs are visible. Eighty percent of respondents said they collect or keep evidence. When they discovered red flags, gathering and preserving the evidence for future legal purposes was essential. They will then communicate with higher officials in your organization and appoint a forensic accountant.
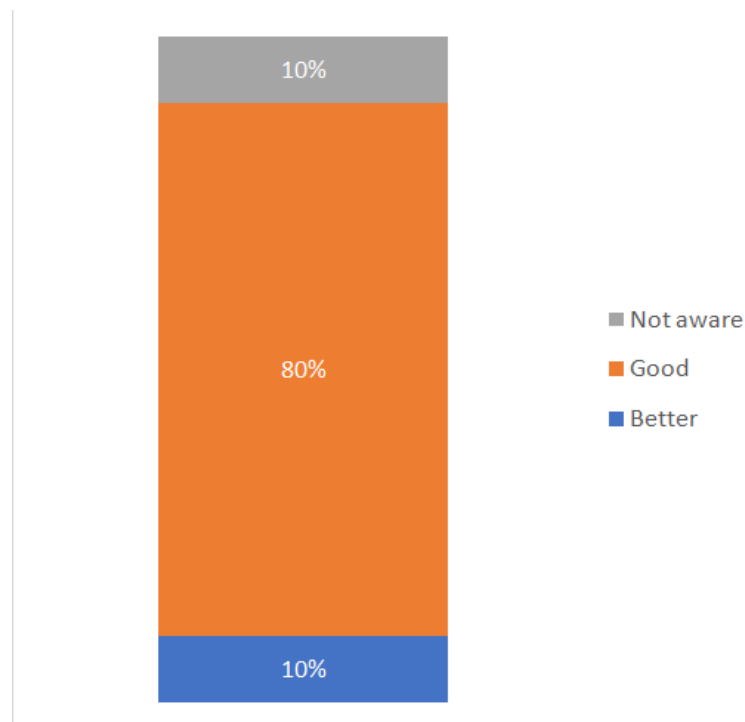
4.2.3 Usage of Forensic Analytics Tool

Figure 10: Use of forensic analytics tool in the organization

Figure 10 shows that the respondent has been knowledgeable about forensic analysis software. The forensic analytics tool is well known by 80% of respondents. Only 10% of those surveyed needed to be made aware of the forensic analytics tool. The use of forensic tools for fraud detection and prevention received overwhelmingly positive responses from the respondents. It is a proactive tool businesses use to reduce risk and become more reactive to fraud.

4.2.4 Methods and tools used to detect fraud

		Responses
Methods	Data mining	4

	Data Science	1
	Big data analysis	5
	Business Intelligence	6
	Forensic audit	6
	Deep learning algorithms for precision over mined data	1
Tools	Interactive Data Extraction and Analysis	4
	Statistical Package for Social Sciences	1
	Audit Command Language	3
	Excel	7
	Python	3
	Amazon Redshift	1

Table 4: Tools and techniques

Table 4 illustrates the tools and techniques used to identify occupational fraud. Business intelligence and forensic audit were highlighted by 60% of respondents. Following this, extensive data analysis and data mining are further strategies used to uncover fraud.

The above analysis shows that 70% of respondents use Excel software for fraud data analysis. Excel has a free version and a user-friendly interface. Fraud examiners and forensic accountants use Excel software at the initial stages of analysis. Excel will give accurate results and make the results a visualized form. IDEA software is used by 40% of respondents. Nowadays, IDEA is one of the practical tools that fraud investigators and forensic accountants use in the organization. IDEA can give quick report generation.

4.2.4 Effective Forensic Analytics Tool

Excel is the most common response type from respondents. If the available data is analyzed, it is pretty effective. Excel spreadsheets have long been the standard for data security. Following this, the respondents bring up IDEA and ACL. Any firm may successfully monitor all of its transactions to find fraud using ACL technology. IDEA is most helpful when there is an audit, financial investigation, or financial statement fraud issue. IDEA can import a wide range of data types, conduct sophisticated comparisons of many data sources using Benford's Law, and quickly analyzeenormous amounts of financial data to provide insights. It can also quickly find data gaps and duplication.

4.2.5 The importance of forensic analytics tools at the early stage of detection

In response to this open-ended question, the respondent stated that the selection of an analytical

tool depends on the organization, industry, business vertical, the format of data available, and desired outcome, and all of these factors are compared to the services offered by different analytical tools to determine which is best for the specific organization. The most effective investigative and compliance insights to limit increasing risk levels concerning data breaches, data privacy, insider threats, fraud, loss, and wastage are provided by forensic data analytics (FDA) services. According to the ACFE, organizations that adopt proactive data monitoring may cut their fraud costs by an average of 54% and identify scams in half the time. Forensic accountants can use Forensic Data analytics technology to identify trends and anomalies that may help detect real-time fraud. Large amounts of data from inside and outside a corporation may now be reviewed to discover patterns, links, correlations, anomalies, and other insights. This technology enables companies to monitor their operations in real-time or near to it, taking preventative action to notice high-risk or suspicious activity as soon as possible.

5. CONCLUSION

The organization cannot estimate the exact loss due to occupational fraud because the victim was unaware of the loss. The victim realizes their negligence once the loss occurs. Approximately 75 percent of respondents report fraud within their organization. According to the Global Fraud Survey 2020, 37% of fraud was committed by people within the organization, making it challenging for firms to detect and immediately take preventative measures against it. One of the methods that forensic accountants or fraud examiners employ to detect and prevent fraud is forensic analytics. Advanced forensic analytics and technology are far less prevalent in fraud investigation and risk management. According to the survey's findings, forensic analytics tools are particularly beneficial for conducting a quick investigation into occupational fraud. According to the EY Global Forensic report, the FDA has a crucial role in reducing money laundering, cyber breaches, and occupational fraud. The significant responses from chartered accountants, fraud examiners, and forensic accountants agree that forensic analytics benefits an organization. Excel is frequently utilized for forensic analytics methods. IDEA is viewed as a powerful forensic analytics tool. Nearly half of the respondents said raising management's awareness of the advantages of the FDA was necessary, even though more than 57 per cent of respondents said their board of directors engages in strategic decisions relating to the FDA. Forensic analytics plays a significant role in data protection and effective governance regulation in organizations. In the future, advancements in forensic analytics will have a leading role in the field of investigation. Organizations can enhance compliance

controls, minimize risk effectively, and adjust courses as needed after evaluating data and drawing appropriate conclusions. The study's results suggest that forensic analytics can effectively detect occupational fraud at an earlier stage.

Limitation:

- Due to time and resource constraints, data was collected from only 30 respondents.
- The researcher can access a few respondents in the geographical range.

Further Scope of Study:

- Further research can be conducted on various case studies using forensic analytics tools to reduce annual fraud by organizations.
- Further research can be conducted by the researchers to train organizational staff on whistleblowing and fraud auditing tools.
- In the future, research can be conducted on new technologies to assist forensic accountants in detecting fraud at an early stage.