# Predictive Analytics for Accounting Fraud Detection: A Study Protocol based on Integrating Corporate Governance and Underpinning Theories

# Abstract

Accounting fraud is a major problem in today's dynamic financial world, particularly for stock exchange listed companies in Bangladesh. Accounting fraud undermines investor faith in the market, affects financial stability, and deteriorates market integrity, posing a major threat to the nation's economic growth. Traditional methods of detecting fraud, which depend primarily on hand audits, have proved ineffective in detecting rapid fraudulent transactions. This paper argues for the use of predictive analytics as a forward-thinking approach to detect accounting fraud before it occurs. Predictive analytics use statistical models and data mining techniques to discern patterns and anomalies in financial data, facilitating the early detection and prevention of fraudulent activity.

This study aims to create a predictive analysis model that employs essential financial indicators—namely profitability ratios, liquidity ratios, leverage ratios, and cash flow metrics—and assess their efficacy in identifying probable fraud in publicly listed companies in Bangladesh. The study also examines the mediating function of corporate governance disclosures, such as audit committee effectiveness and board independence, in improving fraud detection. This study uses a quantitative research method to turn fraud detection practices from simple compliance requirements into a strategic advantage, which improves financial transparency and strengthens investor confidence in Bangladesh's financial markets.

**Keywords:** *Accounting fraud, Predictive analytics, financial indicators,* corporate governance

# Introduction

## Background of Study

Accounting fraud represents a significant challenge within the financial sector, impacting stakeholders globally and undermining the integrity of financial markets. Often, for personal benefit or to satisfy market expectations, it entails intentional modification or distortion of a company's financial statements to show a more favorable financial situation than is the case (Al-Dhubaibi & Sharaf-Addin, 2022). Accounting fraud is widespread around the world. It has caused significant economic losses, hurt investor trust, and made regulators more careful. Many people are having this trouble, as shown by high-profile cases in several countries. This makes it even more important to have good detection and protection systems to protect financial interests and stabilize the market (Al-Dhubaibi & Sharaf-Addin, 2022).

The Bangladesh Securities and Exchange Commission (BSEC) is in charge of checking that the financial information given is correct and honest. That said, regular checks and other common ways of finding fraud do not always work well at catching fraud before it happens. One only finds out about scams after much damage has been done most of the time in these ways. In light of this, it is even more important to use a strategic method based on data, such as predictive analytics.

Using statistical algorithms, machine learning and historical data to find trends and outliers that may point to fraud is one way that predictive analytics can help solve these problems (Sadasivam et al., 2016; Uddin et al., 2024). This research looks at how well predictive analytics can find accounting fraud in Bangladeshi public companies by focusing on critical financial signs and the part that good corporate governance plays in lowering fraud risks (Al-Dhubaibi & Sharaf-Addin, 2022).

## Problem Statement

The problem addressed in this study is the lack of efficient, early-stage detection mechanisms for accounting fraud in publicly listed companies in Bangladesh. Until significant financial harm has been done, traditional fraud detection methods—primarily dependent on manual audits and compliance checks—have been insufficient for spotting fraudulent activity (Aboud & Robinson, 2022; Junaidi et al., 2024). The complexity and sophistication of financial fraud have evolved, outpacing the capabilities of conventional methods, especially given rapid advancements in technology and the increasing intricacy of financial instruments.

Present detection tools in Bangladesh primarily use reactive, post-hoc analyses that only identify fraud after it has impacted financial statements. This delay in detection is very risky because it affects investor trust, market stability, and the health of the national economy as a whole. Moving from reactive discovery to proactive prevention is very important, especially in poor countries like Bangladesh where accounting fraud seriously threatens the integrity of the country's finances (Junaidi et al., 2024).

Predictive analytics is a promising option because it uses past data to find patterns and outliers that could be signs of fraud. Predictive analytics can turn fraud detection from a reactive process into a proactive one using statistical modeling and machine learning. This lets fraud stop before it worsens (Sadasivam et al., 2016; Singh et al., 2019). However, using such advanced methods is hard because data is only sometimes available, there are not enough experts, and it is not easy to add predictive analytics to current auditing methods (Aboud & Robinson, 2022).

In Bangladesh, publicly listed companies face unique challenges, including inadequate regulatory frameworks, limited technology uptake in auditing, and a need for skilled forensic accountants (Junaidi et al., 2024). Because of these problems, it is hard to find financial fraud early on. This research will deliver valuable thoughts into the effective integration of predictive analytics into fraud detection processes for publicly listed firms in Bangladesh by identifying and addressing existing gaps.

This research will develop a predictive analysis model or method using financial indicators to detect potential early fraud and the model will use advanced data analytics and statistical methods. This is how, in the long run this method will protect investors' interests and boost economic sustainability (Aboud & Robinson, 2022; Junaidi et al., 2024).

## Scope and Limitations of the Project

This research investigates the application of predictive analytics in identifying accounting fraud within publicly listed companies, addressing gaps in existing fraud detection systems. Specifically, it focuses on financial indicators including profitability ratios, liquidity ratios, leverage ratios, efficiency ratios, and cash flow metrics (for example, Net Profit Margin, Return on Assets, Current Ratio, Debt-to-Equity Ratio, and Inventory Turnover) to detect patterns indicative of accounting fraud.

The study employs logistic regression to evaluate these relationships, which is suitable for modeling binary outcomes (Fraud vs. no fraud). The dependent variable, Accounting Fraud Detection, is determined through indicators such as fraud occurrence (0 = No Fraud, 1 = Fraud Detected), restated financial statements, or relevant regulatory or legal actions.

The research centers on publicly listed companies emphasizing sectors that are more susceptible to accounting fraud (e.g., financial services, manufacturing). Analyzing these entities’ financial statements will help assess the effectiveness of predictive analytics in preventing significant financial damage.

**Scope**

* **Focused on Financial-Statement-Related Fraud:** The study concentrates on misrepresentations tied directly to financial reporting.
* **Exclusion of Certain Fraud Types:** Forms such as employee theft, supply chain fraud, and privately owned firms with limited data visibility are outside the study’s scope.
* **Applicability to Listed Entities:** Focuses on companies that have to follow stricter rules for regulation and exposure because they have to go public.

**Limitations**

* **Data Reliability:** The accuracy and completeness of financial data depend on the availability and quality of external databases, which may contain missing or erroneous entries.
* **Narrow Indicators:** Focusing on specific financial metrics excludes potential non-financial red flags (e.g., insider behavior, governance culture).
* **Overfitting and Bias:** Predictive models trained on historical data may not adequately capture evolving fraud patterns in rapidly changing economic landscapes.
* **Generalizability:** Researchers may not be able to fully apply their findings to businesses in areas or industries with very different rules and cultures.
* **Exclusion of Other Misconduct:** Only financial reporting fraud is covered, leaving out issues like insider trading or corruption that could also impact a company’s financial well-being.

Understanding these limitations guarantees a deliberate reading of the data. Future research could extend the spectrum of data sources, improve prediction models to lower overfitting, and include non-financial as well as financial variables, so improving the possibility for proactive fraud detection.

# Literature Review

This section's literature review includes an overview of previous studies on accounting fraud, predictive analytics, and literature GAP

## Underpinning Theories

When looking at proactive methods for finding accounting fraud, it helps to use several theoretical frameworks that explain how organizational structures, decision-making processes, and the distribution of resources affect fraud-related outcomes. For instance, **Agency Theory** describes conflicts of interest between principals (owners) and agents (managers), highlighting how information asymmetry and goal misalignment can foster unethical or fraudulent behaviors (Uddin et al., 2023). Regarding finding fraud, Agency Theory stresses the importance of strict oversight and governance measures, like independent audits or board groups, to stop managers from making decisions based on what is best for them (Xiangyu, 2021).

Likewise, the **Resource-Based View (RBV)** offers a lens for understanding how intangible resources (e.g., reputational capital, internal controls, and data analytics capabilities) shape a firm's ability to detect anomalies in financial reporting (Uddin et al., 2023). Firms with robust data infrastructure and skilled analytic teams may more quickly identify suspicious financial patterns, reducing opportunities for fraud to escalate. Taking RBV to a knowledge-based view emphasizes the importance of shared knowledge and the use of new technology in finding accounting fraud.

Moreover, **Stakeholder Theory** provides insight into corporate governance's broader ethical and social dimensions (Uddin et al., 2023). Organizations are more likely to use open reporting systems and predictive fraud detection tools to keep people trusting them if they know that fraud affects many people, such as investors, workers, regulators, and the public. Similarly, **transaction cost theory** reminds us that high monitoring costs can deter organizations from investing entirely in thorough fraud-prevention mechanisms (Schmidt & Wagner, 2019). At the same time, **Strategic Choice Theory** highlights how managerial discretion and power relationships can influence commitment to fraud detection technology and corporate governance reforms (Uddin et al., 2023).

Using these theoretical perspectives helps us learn why and how companies find (or do not) financial fraud. These theories show how fraud can happen in many different ways, by focusing on governance structures (Agency Theory), valuable in-house capabilities (RBV), or the interactions between different stakeholders (Stakeholder Theory). integrating them into a predictive analytics context supports a more **holistic** explanation of how internal controls, data-driven insights, and managerial decision-making intersect to prevent fraudulent activities

## Accounting Fraud

Accounting fraud refers to altering or distorting a company's data to present a misleading picture of its financial status to stakeholders such as investors and creditors (Isa et al., 2022). This deceptive behavior can manifest in ways such as inflating revenues or downplaying expenses and asset values while hiding liabilities (Akinbowale et al., 2023).

The reasons for committing accounting fraud are diverse and usually stem from the need to achieve goals or boost company worthiness to attract funding or earn rewards based on performance outcomes. Often, accounting fraud occurs due to the need to meet the expectations of investors or the market (P. Li & Yang, 2019).

Accounting fraud has bad affects that last a long time, like setbacks, investors losing trust, and people being afraid of what will happen. It might make people less likely to trust businesses and resources, and if it gets really bad, it might even wreck the economy. Because of the way regulations are set up, fighting financial fraud is very important in places like Bangladesh. The importance lies in safeguarding individual enterprises alongside the overall financial network (Li & Yang 2019).

IFRS and GAAP have standards that aim to ensure transparent and ethical financial reporting practices are followed globally. IFRS focuses on presenting information and implementing internal controls. On the other hand, GAAP provides guidelines for preventing and detecting activities. Moreover, the National Association of State Boards of Accountancy monitors the conduct of CPAs to maintain integrity in the field of accounting (Deloitte, 2013; KPMG, 2016).

Dealing with accounting fraud is essential to protect companies and keep the integrity of financial markets, which is a key part of promoting economic growth and stability, especially in developing countries like Bangladesh.

## Type of Accounting Fraud

Accounting fraud includes a wide range of dishonest actions meant to change financial data for personal or business gain. Some common types are tax fraud, theft of assets, and false financial statements. Financial statement fraud is when someone knowingly lies or leaves out information to make the financial picture look better than it really is. This is usually done by lying about income, spending, or asset values (Isa et al., 2022). Theft of company resources is called misappropriation of assets. This can be done through theft, fake vendor schemes, or payroll scams. Tax fraud involves deliberately evading taxes by concealing income or inflating deductions to reduce tax liabilities (Isa et al., 2022).

Other tactics include channel stuffing, expense manipulation, and lapping schemes. In publicly listed companies, particularly in developing markets like Bangladesh, financial statement fraud and tax fraud are prevalent due to pressure to meet market expectations and regulatory loopholes. Financial markets are messed up and people don't believe financial reports because of this kind of fraud (Omar et al., 2014; Rambola et al., 2018). This shows how important strong controls and moral standards are to protect financial integrity.

## Accounting Fraud Detection and Prevention Tools

Detecting and preventing accounting frauds are very important for keeping financial systems safe. In order to reach these goals, people often use a mix of old and new tools. Strong internal controls, like separation of duties and authorization procedures, as well as regular audits and forensic accounting are examples of traditional methods. Adding more levels of scrutiny to financial processes and making sure they meet regulatory standards (Anghel & Poenaru, 2023; Isa et al., 2022) are important ways to stop fraud.

These days' tools use technology to make them better at both finding things and stopping them. More and more, advanced data analytics, machine learning, and artificial intelligence (AI) are being used to look at huge amounts of financial data, find trends, and spot outliers that could be signs of fraud. Multi-factor authentication and biometric verification are two important types of authentications that help keep banking systems.

## Corporate Governance

Corporate governance is the set of guidelines, practices, and policies a company applies to be run and controlled (Latan et al., 2019; Whittington, 1993) safe. Accounting fraud risks can be reduced by combining these new and old methods by making a complete plan to find and stop fraud (Akinbowale et al., 2023; Mehta & Bhavani, 2019). For example, it makes sure that a company's relationships with shareholders, management, customers, and regulators are open, honest, and accountable. Good corporate governance helps protect the interests of all parties and lowers risks, such as accounting fraud.

Legal systems and cultural practices in Bangladesh shape how businesses are run. The Bangladesh Securities and Exchange Commission (BSEC) sets standards by looking at what other countries do and what people in Bangladesh need (Rizvan & Shuvo, 2020). But problems with enforcement make it less useful for finding financial fraud.

A key part of company governance is how the board is made up. BSEC rules say that to keep things fair and lower the chances of fraud, boards should have a variety of members, including independent directors (Rahman & Khatun, 2017). The BSEC's Corporate Governance Code requires the audit group to look over financial processes one more time. This lowers the risk of fraud even more (Rahman & Khatun, 2017).

Publicly traded companies are required by the BSEC to follow International Financial Reporting Standards (IFRS), but these standards don't have much of an effect on finding fraud because they are hard to enforce and take a lot of time (Siddiqui, 2010; Uddin & Choudhury, 2008). Cultural factors, like the prevalence of family-owned businesses, also create problems because these companies may have problems with impartiality and may not have their own management, which makes it harder to stop theft (Siddiqui, 2010).

According to research, people in Bangladesh are aware of the need for strong company governance, but it is still not always put into practice. Businesses that are run by families often have different effects on government than businesses that are not run by families, which can make it harder to spot fraud (Siddiqui, 2010). More general social and economic issues also affect how well governance systems find fraud (Islam et al., 2020).

To sum up, good corporate governance is important for reducing accounting fraud in Bangladesh, but it meets problems like insufficient enforcement, cultural factors, and a market that isn't fully developed yet. To make financial information more clear and lower the risk of fraud, these problems must be fixed by stepping up governmental oversight, teaching people better about governance, and being consistent with enforcement.

## Predictive Analytics

Statistical methods, machine learning, and data mining are some of the tools used in predictive analytics to look at past and present data and guess what might happen or how people will act in the future (Uddin et al., 2024, 2025). When it comes to finding accounting fraud, predictive analytics helps find trends and oddities in financial data that could point to fraud before it gets worse (Handoko & Rosita, 2022; Isa et al., 2022). Companies can switch from a reactive strategy of finding fraud to a proactive one by taking this proactive approach. This makes it easier for them to handle the risks that come with accounting fraud.

Regression techniques, machine learning models like decision trees and neural networks, and time series analysis are all common tools used in prediction analytics. These models give companies information that isn't obvious at first glance, which lets them deal with possible fraud risks before they happen. Companies can make better decisions, handle risks better, and cut costs by finding problems early on with predictive analytics. This turns data into useful information that keeps their finances safe (Isa et al., 2022; Sun et al., 2021).

## Predictive Analytics in Accounting Frauds

The literature illustrates how important it is to use data-driven methods, complex analytics, and technological tools to make auditing better and lower the risk of fraud. Data-driven auditing uses prediction models to find theft much more quickly, make audits more efficient, and keep auditors' independence (Singh et al., 2019). Perols et al. discuss challenges in fraud prediction, emphasizing the need for effective data preprocessing to address data scarcity, which can be valuable for regulatory agencies and auditing firms (Perols et al., 2017).

Ahmed Aboud and Barry Robinson (2022) found that data analytics, machine learning, and data mining are underutilized in Irish organizations for fraud prevention and detection. They emphasized the necessity for broader adoption of sophisticated analytical techniques while addressing financial constraints and knowledge gaps (Aboud & Robinson, 2022). Jofre and Gerlach's study utilized forensic data analytics and machine learning techniques to distinguish between fraudulent and non-fraudulent organizations, showing the effectiveness of industry-specific risk indicators in improving model performance (Jofre & Gerlach, 2018).

Sadasivam et al. studied how to use big data analytics to find fraud in corporate governance. They came up with an automated way to look at yearly reports that was 90% accurate, which is pretty amazing. According to their study, switching auditing methods to big data analytics would help find fraud more easily (Sadasivam et al., 2016). He Li et al. used the Technology Organization and Environment (TOE) framework to investigate factors that influence the use of audit analytics, finding that these tools improve the internal audit process (Li et al., 2018).

Predictive analytics in accounting fraud detection uses statistical models, data mining, and machine learning to uncover anomalies that might signal fraudulent activities. For instance, machine learning models like neural networks and decision trees can be applied to predict suspicious transactions based on past data (Akinbowale et al., 2023). In relation to publicly listed companies in Bangladesh, predictive analytics can provide practical applications such as anomaly detection in financial statements, identifying patterns linked to tax fraud, and monitoring unusual financial activity within corporate governance disclosures.

Using predictive analytics lets one find theft before it happens, instead of just after it happens like with traditional methods. Logistic regression models can help figure out how financial factors might be linked to fraud, and systems that look for oddities in financial data can find issues before they get too big. Fraud can be found more quickly and correctly when these prediction tools are used together. This makes the financial system more open and honest (Handoko & Rosita, 2022; Sun et al., 2021).

## Literature Gap

The research that has already been done on finding fraud using predictive analytics and data analysis in financial indicators shows that there are some important gaps. One typical flaw is that they only look at a few data sources. Studies like Sadasivam et al. (2016) mostly use annual reports to look for fraud, but they do not look at the benefits of adding other data sources, like external audits or non-financial indicators, which could make fraud detection models more reliable (Sadasivam et al., 2016). Singh et al. (2019) also talked about the problems with dataset size and using data from just one company. They said that we need more diverse and representative datasets to make models more accurate and useful in real life.

Perols et al. (2017) also pointed out that the suggested models cannot be used again and again because of the lack of transparency in several studies about the data preprocessing methods and feature extraction. Also, it is clear that qualitative variables and other types of data are not being used enough. Many studies only look at quantitative data, which means they might miss important factors that could help find scams more easily (Jofre & Gerlach, 2018). The small sample size and closed-question survey format were also called out as problems by Aboud and Robinson. These make the results less deep and less applicable to other situations (Aboud & Robinson, 2022).

There is a big hole in the way publicly traded businesses in Bangladesh use predictive analytics for certain financial indicators, like profitability ratios, liquidity ratios, and efficiency metrics. Previous research has mostly focused on old-fashioned methods or broad predictive models, not fully exploring how these financial indicators can be used to find fraud in a developing country like Bangladesh. To make predictive analytics for fraud detection more reliable and useful, problems like bad data, the fact that fraud changes over time, and the fact that more advanced machine learning methods are not used enough need to be fixed.

To sum up, the study that has been done so far doesn't have a complete approach that uses a variety of data sources, representative samples, and advanced analytical methods that are specifically designed for Bangladeshi publicly traded companies. Filling in these gaps will help make fraud detection models more accurate, which will eventually support financial integrity and openness in developing markets.

# Conceptual Framework and Hypothesis Development

# Conceptual Model

The conceptual model (Figure 1) illustrates the relationship between financial indicators—such as profitability ratios (PR), leverage ratios (LevR), liquidity ratios (LR), efficiency ratios (ER), and cash flow ratios (CFR)—and accounting fraud detection (AF). The study aims to assess how predictive analytics can effectively utilize these indicators to identify fraudulent activities within publicly listed companies in Bangladesh.

Corporate Governance Disclosure (CGD) acts as a mediating variable in this relationship. It records the transparency, and accountability measures that businesses reveal, which can change how financial health factors affect the chances of fraud being found. Some examples are that good reporting should lower the chance of accounting fraud even when financial signs point to trouble. On the other hand, weak governance disclosures may make fraud more likely, even if the financial signs are stable.

The Return on Assets and Current Ratio are two examples of financial numbers that are used to figure out how profitable a business is and how liquid it is. These measures show how healthy a company's finances are and where problems might arise. As the study goes on, the exact financial metrics will be tweaked to make sure the analysis fits the data that is available and the needs of all stakeholders.

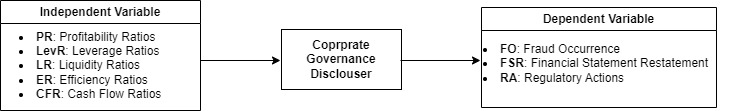


Figure 1: Conceptual Framework

# Hypotheses Development

Based on the literature review, two main hypotheses and three sub-hypotheses have been developed to explore the relationships between financial indicators, corporate governance disclosures, and accounting fraud detection.

**H1: Financial indicators are significantly associated with accounting fraud detection.**

Financial ratios like profitability, debt, liquidity, efficiency, and cash flow can show how financially healthy a company is. These ratios can also show early warning signs of possible fraud. A higher risk of financial manipulation to show a better picture to stakeholders is often present when financial performance is going down, there is a lot of debt, or there are problems with liquidity. Therefore, it is hypothesized that financial indicators are significantly related to accounting fraud detection, with signs of distress increasing the likelihood of fraud (Cecchini et al., 2010b, 2010a; Marais et al., 2023).

**H2: Corporate governance disclosure mediates the relationship between financial indicators and accounting fraud detection.**

The link between financial indicators and fraud detection can be changed by the quality of corporate governance statements (CGD). These details include things like audit committees, independent directors, and how the company is run. Better governance disclosures encourage openness and responsibility, which might weaken the link between bad financial signs and fraud. The idea behind this study is that telling the truth about bad corporate governance makes fraud less likely, even when money signs point to trouble (Beasley, 1996; Farber, 2005).

**Sub-hypotheses related to Corporate Governance:**

* **H2a (H3):** The effectiveness of the audit committee has a significant impact on accounting fraud detection.
* **H2b (H4):** A higher proportion of independent directors is negatively associated with accounting fraud detection.
* **H2c (H5):** The quality of corporate governance disclosures is negatively associated with accounting fraud detection.

Accounting fraud can be mitigated a lot with corporate governance. Financial reporting is more accountable and transparent when there are good governance systems in place. The chance of fraud going on is lower when there is a robust audit group, a lot of independent directors, and full disclosures about corporate governance. High standards for financial reports are upheld by these systems, which also stop management from lying (Farber, 2005; Islam et al., 2020; Rahman & Khatun, 2017).

**Summary of Hypotheses:**

**H1:** Financial indicators are significantly associated with accounting fraud detection.

**H2:** Corporate governance disclosure mediates the relationship between financial indicators and accounting fraud detection.

* **H2a (H3):** The effectiveness of the audit committee has a significant impact on accounting fraud detection.
* **H2b (H4):** A higher proportion of independent directors is negatively associated with accounting fraud detection.
* **H2c (H5):** The quality of corporate governance disclosures is negatively associated with accounting fraud detection.

# Research Questions & Objectives

1. **Research Questions**

Based on the literature gap analysis and conceptual framework, the following research questions are proposed to guide this study on predictive analytics and accounting fraud detection in publicly listed companies in Bangladesh:

1. **To what extent are financial indicators associated with the likelihood of accounting fraud detection in publicly listed companies in Bangladesh?**

Focusing on the part financial indicators, such as profitability, leverage, liquidity, efficiency, and cash flow ratios play in determining the existence of accounting fraud, this question answers H1. It underlines how closely the financial situation of a corporation determines the possibility of spotting dishonesty.

1. **How does corporate governance disclosure mediate the relationship between financial indicators and accounting fraud detection?**

This question corresponds to H2, focusing on how the quality of corporate governance disclosures mediates the link between financial indicators and accounting fraud detection. The goal is to understand how effective governance practices can mitigate the risks associated with unfavorable financial conditions.

1. **What are the specific effects of different elements of corporate governance such as audit committee effectiveness, the proportion of independent directors, and overall governance disclosures on accounting fraud detection?**

This question fits H2a, H2b, and H2c and explores how specific corporate governance elements such as audit committee performance, the existence of independent directors, and disclosure quality affect the likelihood of accounting fraud discovery.

# Research Objectives

In order to address the research questions, the following objectives have been formulated:

1. **Assess** the relationship between financial indicators and the likelihood of accounting fraud detection in publicly listed companies in Bangladesh.

This objective directly supports Research Question 1 and H1 by evaluating how financial ratios, such as profitability, leverage, liquidity, efficiency, and cash flow metrics, serve as indicators of accounting fraud.

1. **Investigate** the mediating effect of corporate governance disclosures on the relationship between financial indicators and accounting fraud detection.

This objective addresses Research Question 2 and H2, focusing on the role of corporate governance disclosures in influencing the connection between financial indicators and fraud detection.

1. **Analyze** the specific roles of corporate governance components—such as audit committee effectiveness, the proportion of independent directors, and overall governance disclosures—in accounting fraud detection.

Aiming to investigate the effects of individual governance factors like audit committee effectiveness, board independence, and the quality of disclosures on fraud detection, this objective corresponds with Research Question 3 and H2a, H2b, and H2c.

1. **Evaluate** the challenges and opportunities in utilizing predictive analytics to transform traditional reactive fraud detection methods into a proactive, data-driven approach.

This objective focuses on addressing the practical aspects of adopting predictive analytics in the context of publicly listed companies, aiming to transition from reactive to proactive fraud detection.

1. **Provide** actionable recommendations for organizations to effectively adopt predictive analytics, focusing on enhancing fraud detection strategies and overcoming implementation challenges.

In line with discovered research gaps and study results, this purpose is to solve the practical consequences by guiding companies on the adoption and integration of predictive analytics for accounting fraud detection.

**Methodology**

## ****Design****

With an emphasis on the manufacturing and financial services sectors, this study will use a quantitative research approach to methodically evaluate the impact and efficacy of predictive analytics in identifying accounting fraud inside publicly listed companies in Bangladesh.

## ****Data Collection Methods****

The main sources of data for this study will be financial statements taken from Bangladeshi publicly traded companies. Additionally gathered will be historical financial data to enable a longitudinal study and offer understanding of trends and patterns spanning a lengthy period. The emphasis will be on supporting the predictive analysis by means of quantitative data taken from financial records (Vasudevan et al., 2013).

## ****Sampling Strategy and Sample Size****

The study will use a method called "purposive sampling," which means that it will only look at publicly traded companies in industries like manufacturing and financial services that are known to be more likely to commit accounting fraud (Listiarti et al., 2022). This choice was made to make sure that it fits directly with the research goals and that the group is useful for the study of using predictive analytics to find fraud.

The sample size will depend on how much complete financial data for these companies is available, with a focus on making sure that the dataset is both broad and deep. The goal is to get a subset that is representative and big enough to allow for useful statistical analysis and results that can be used in other situations. Businesses with detailed financial statements from more than one year will be given priority. This is because longitudinal analysis, which is needed for predictive analytics, is easier to do with these kinds of businesses (Nabrawi & Alanazi, 2023; Schmid & Morschett, 2023).

In selecting the companies, criteria such as market capitalization, industry representation, and transparency in financial reporting will be considered. By making sure that the companies that were selected are representative of the whole market and keeping the focus on areas with a high risk of fraud, this method will improve the reliability of the results (Vasudevan et al., 2013).

## ****Data Analysis Techniques****

Data analysis will be conducted using predictive analytics models and statistical techniques to assess their efficacy in spotting fraudulent behavior in the chosen industries. Descriptive statistics, logistic regression, and predictive modeling techniques will be used to get important understanding of the data. In some cases, different machine learning techniques, such as Random Forests or Gradient Boosting may provide better accuracy. But especially when auditor or regulatory buy-in is crucial, logistic regression's combination of interpretability, resilience, and direct probability estimates usually makes it the first choice for fraud detection. The longitudinal feature of the study will enable trend analysis and the identification of abnormalities across time, therefore strengthening the knowledge of fraud detection possibilities (Uddin et al., 2025)

# Evaluation of Results

The findings will be evaluated by closely reviewing historical data from Bangladesh's publicly traded corporations together with financial records. Regression analysis and predictive modeling algorithms among other statistical methods will be used to identify patterns suggestive of fraud (Sun et al., 2021). While correlation analysis will investigate interactions between financial indicators and fraud detection, the outcomes will be compared against initial financial data and industry standards to find anomalies.

A sensitivity analysis will be performed to make sure the predictive analytics model is reliable in a range of situations (Pallant, 2020). The goal of this evaluation is to make some observations about how well predictive analytics works at finding lies, which will help with both academic study and real-world applications.

# Significance of the Study

The main focus of this study is to enhance our understanding and knowledge in the field of detecting accounting fraud using predictive analytics technology. The results, from this research, are anticipated to benefit groups such as academic researchers’ financial institutions, regulatory authorities and organizations that are faced with the widespread issue of fraud.

1. **Academic Contribution**

This study contributes to the academic discussion by looking at predictive analytics in a broader manner to find financial fraud. Its goal is to improve theoretical frameworks and methods, which will add to the current academic discussion on how to stop fraud (Deloitte, 2021; Jofre & Gerlach, 2018; Pwc, 2020).

1. **Practical Application for Financial Institutions**

Financial institutions should gain useful information about how to use predictive analytics tools to find scams early on. Financial institutions can improve their security by learning about the effects of these technologies (Perols et al., 2017; Sadasivam et al., 2016). This will protect their funds and stakeholders.

1. **Regulatory Implications**

Regulatory authorities will discover the findings valuable, in shaping regulations and recommendations concerning preventing fraud in the industry. The knowledge gained from predictive analytics effectiveness could help improve frameworks and create a financial landscape (KPMG, 2016).

1. **Organizational Impact**

Businesses facing the complexities of accounting deception can acquire guidance on using analytics as a strategic asset to tackle this issue effectively and enhance their financial robustness (Jofre & Gerlach, 2018).

1. **Resolution of Issues**

The study intends to solve important problems including early identification of possible fraud schemes, lowering of false positives, and minimizing of financial and non-financial expenses connected to fraud investigations. This study aims to help to address these urgent problems in fraud prevention by means of solutions and tactics (Jofre & Gerlach, 2018; Perols et al., 2017; Sadasivam et al., 2016).

# Ethical Considerations

**A. Before and During Data Collection**

1. **Informed Consent:** Publicly listed companies whose financial data will be used will be informed of research objectives and procedures, with consent sought for voluntary participation (Artal & Rubenfeld, 2017; Yip et al., 2016).
2. **Privacy and Confidentiality:** Data will be anonymized, and identifying information removed to protect company-specific details (Artal & Rubenfeld, 2017; Yip et al., 2016).
3. **IRB Approval:** Institutional Review Board (IRB) approval will be obtained if human subjects are involved to make sure that ethical standards are met (Artal & Rubenfeld, 2017).

**B. After Data Collection**

1. **Data Security:** Encryption and password security will be used to keep the data safely stored (Artal & Rubenfeld, 2017; Yip et al., 2016).
2. **Debriefing:** Participants will be given a summary of the study results to make sure that the use of their data is clear (Artal & Rubenfeld, 2017; Yip et al., 2016).

**C. After Publication**

1. **Full Disclosure:** The research paper will clearly explain how the research was done, pointing out any problems or possible biases (Artal & Rubenfeld, 2017).

# ****Conclusion****

The research proposal will aim to look into how predictive analytics could help find accounting fraud in publicly traded companies. This will give the field new and useful information. A thorough review of relevant literature will highlight how predictive modeling, data preparation, statistical analysis, and big data analytics can be used to make it easier to spot fraud. Focusing on the situation of Bangladesh, the study will investigate the pragmatic effects, difficulties, and restrictions of applying predictive analytics.

The suggested quantitative method will lay a strong basis for empirical study. The study method will incorporate ethical issues all through to guarantee adherence to ethical norms. This work intends to offer a more proactive and efficient fraud detection technique by gathering financial and historical data for a longitudinal examination.

All things considered, this research will offer a well-organized strategy to improve knowledge of predictive analytics in fraud detection, so resolving present issues and providing a proactive means of financial transparency and integrity in developing sectors.

**Disclaimer (Artificial intelligence)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

Details of the AI usage are given below:

1.

2.

3.

# References

Aboud, A., & Robinson, B. (2022). Fraudulent financial reporting and data analytics: an explanatory study from Ireland. *Accounting Research Journal*, *35*(1), 21–36. https://doi.org/10.1108/ARJ-04-2020-0079

Akinbowale, O. E., Mashigo, P., & Zerihun, M. F. (2023). The integration of forensic accounting and big data technology frameworks for internal fraud mitigation in the banking industry. *Cogent Business and Management*, *10*(1), 1–23. https://doi.org/10.1080/23311975.2022.2163560

Al-Dhubaibi, A. A., & Sharaf-Addin, H. (2022). An analysis of external and internal auditors’ use of ISA 240 red flags: The impact of auditors’ estimation of fraud pervasiveness. *Cogent Business & Management*. https://doi.org/DOI:10.1080/23311975.2022.2118209

Anghel, G., & Poenaru, C.-E. (2023). Forensic Accounting, a Tool for Detecting and Preventing the Economic Fraud. *Valahian Journal of Economic Studies*, *14*(2), 87–100. https://doi.org/10.2478/vjes-2023-0018

Artal, R., & Rubenfeld, S. (2017). Ethical issues in research. *Best Practice and Research: Clinical Obstetrics and Gynaecology*, *43*, 107–114. https://doi.org/10.1016/j.bpobgyn.2016.12.006

Beasley, M. S. (1996). An empirical analysis of the relation between the board of director composition and financial statement fraud. *Accounting Review*, *71*(4), 443–465. https://doi.org/10.2469/dig.v27.n2.79

Cecchini, M., Aytug, H., Koehler, G. J., & Pathak, P. (2010a). Detecting management fraud in public companies. *Management Science*, *56*(7), 1146–1160. https://doi.org/10.1287/mnsc.1100.1174

Cecchini, M., Aytug, H., Koehler, G. J., & Pathak, P. (2010b). Making words work: Using financial text as a predictor of financial events. *Decision Support Systems*, *50*(1), 164–175. https://doi.org/10.1016/j.dss.2010.07.012

Deloitte. (2013). Optimizing the retail bank supply chain. *Deloitte*, 24. http://www2.deloitte.com/content/dam/Deloitte/global/Documents/Financial-Services/gx-fsi-ca-optimizing-the-retail-bank-supply-chain-2013-10.pdf

Deloitte. (2021). *Predictive analytics for fraud detection*. https://www2.deloitte.com/content/dam/Deloitte/tr/Documents/deloitte-analytics/tr-fraud-analytics.pdf

Farber, D. B. (2005). Restoring trust after fraud: Does corporate governance matter? *Accounting Review*, *80*(2), 539–561. https://doi.org/10.2308/accr.2005.80.2.539

Handoko, B. L., & Rosita, A. (2022). The Effect of Skepticism, Big Data Analytics to Financial Fraud Detection Moderated by Forensic Accounting. *ACM International Conference Proceeding Series*, 59–66. https://doi.org/10.1145/3537693.3537703

Isa, H., Rahim, M. E. A., Ariffin, N. A. M., Embran, R. A., Han, S. H. M. R., Subramanian, U., Kawi, F., & Abdullah, N. (2022). Study on the Different Types of Accounting Fraud and Tools to Detect and Prevent Fraud. *ICBIR 2022 - 2022 7th International Conference on Business and Industrial Research, Proceedings*, *May*, 627–631. https://doi.org/10.1109/ICBIR54589.2022.9786440

Islam, M. T., Rahman, M., & Saha, S. (2020). Corporate governance reform and overstatement of compliance: Illustrations from an emerging economy. *Business Strategy and Development*, *3*(4), 648–656. https://doi.org/10.1002/bsd2.129

Jofre, M., & Gerlach, R. H. (2018). Fighting Accounting Fraud Through Forensic Data Analytics. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3176288

Junaidi, J., Hendrian, & Syahputra, B. (2024). Fraud detection in public sector institutions: an empirical study in Indonesia. *Cogent Business & Management*, *11*. https://doi.org/DOI:10.1080/23311975.2024.2404479

KPMG. (2016). *Using analytics successfully to detect fraud*. *4*, 5. http://www.blog.kpmgafrica.com/using-analytics-successfully-to-detect-fraud/?utm\_campaign=57f76d81d4dbac5cf700744e&utm\_content=5811e771d4dbac64a60061ce&utm\_medium=smarpshare&utm\_source=linkedin%5Cnhttps://assets.kpmg.com/content/dam/kpmg/pdf/2016/07/using

Latan, H., Chiappetta Jabbour, C. J., & Lopes de Sousa Jabbour, A. B. (2019). Ethical Awareness, Ethical Judgment and Whistleblowing: A Moderated Mediation Analysis. *Journal of Business Ethics*, *155*(1), 289–304. https://doi.org/10.1007/s10551-017-3534-2

Li, H., Dai, J., Gershberg, T., & Vasarhelyi, M. A. (2018). Understanding usage and value of audit analytics for internal auditors: An organizational approach. *International Journal of Accounting Information Systems*, *28*(December 2016), 59–76. https://doi.org/10.1016/j.accinf.2017.12.005

Li, P., & Yang, Z. (2019). Accounting fraud and prevention in listed companies in China. *International Journal of Frontiers in Sociology*, *1*(1), 23–31. https://doi.org/10.25236/IJFS.2019.010103

Listiarti, A. A. N., Pratiwi, C. W., & Trimulyani, S. (2022). Comparison of Financial Performance During Covid-19 Pandemic: a Case Study At Transportation and Logistics Sector Listed in Idx. *Nominal: Barometer Riset Akuntansi Dan Manajemen*, *11*(2), 270–287.

Marais, A., Vermaak, C., & Shewell, P. (2023). Predicting financial statement manipulation in South Africa: A comparison of the Beneish and Dechow models. *Cogent Economics and Finance*, *11*(1). https://doi.org/10.1080/23322039.2023.2190215

Mehta, A., & Bhavani, G. (2019). Application of Forensic Tools to Detect Fraud: The Case of Toshiba. *THINK INDIA JOURNAL*, *9*(1).

Nabrawi, E., & Alanazi, A. (2023). Fraud Detection in Healthcare Insurance Claims Using Machine Learning. *Risks*, *11*(9), 160. https://doi.org/10.3390/risks11090160

Omar, N., Koya, R. K., Sanusi, Z. M., & Shafie, N. A. (2014). Financial Statement Fraud: A Case Examination Using Beneish Model and Ratio Analysis. *International Journal of Trade, Economics and Finance*, *5*(2), 184–186. https://doi.org/10.7763/ijtef.2014.v5.367

Pallant, J. (2020). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS*. https://books.google.com/books?hl=en&lr=&id=CxUsEAAAQBAJ&oi=fnd&pg=PP1&dq=related:y\_iI2Sgs78IJ:scholar.google.com/&ots=n38CyPEf4R&sig=u5TWaKO1Q\_55nlJCwz0w2K6CCvo

Perols, J. L., Bowen, R. M., Zimmermann, C., & Samba, B. (2017). Finding needles in a haystack: Using data analytics to improve fraud prediction. *Accounting Review*, *92*(2), 221–245. https://doi.org/10.2308/accr-51562

Pwc. (2020). *Combat fraud & economic crime*. https://www.pwc.com/gx/en/services/forensics/fraud.html

Rahman, M. M., & Khatun, N. (2017). A Comparative Analysis of Corporate Governance Guidelines: Bangladesh Perspective. *The East Asian Journal of Business Management*, *7*(2), 5–16. https://doi.org/10.13106/eajbm.2017.vol7.no2.5

Rambola, R., Varshney, P., & Vishwakarma, P. (2018). Data mining techniques for fraud detection in banking sector. *2018 4th International Conference on Computing Communication and Automation, ICCCA 2018*, 1–5. https://doi.org/10.1109/CCAA.2018.8777535

Rizvan, A., & Shuvo, H. (2020). Chronological Development of the Corporate Governance Guidelines in Bangladesh: A Comparative Analysis between CGG-2012 and CGC-2018. *European Journal of Business and Management*, *12*(27), 106–123. https://doi.org/10.7176/ejbm/12-27-13

Sadasivam, G. S., Subrahmanyam, M., Himachalam, D., Pinnamaneni, B. P., & Lakshme, S. M. (2016). Corporate governance fraud detection from annual reports using big data analytics. *International Journal of Big Data Intelligence*, *3*(1), 51. https://doi.org/10.1504/ijbdi.2016.073895

Schmid, D., & Morschett, D. (2023). Retailers’ foreign market exits over time: A strategic management perspective. *International Business Review*, *32*(5). https://doi.org/10.1016/j.ibusrev.2023.102164

Schmidt, C. G., & Wagner, S. M. (2019). Blockchain and supply chain relations: A transaction cost theory perspective. *Journal of Purchasing and Supply Management*, *25*(4), 100552. https://doi.org/10.1016/j.pursup.2019.100552

Siddiqui, J. (2010). Development of corporate governance regulations: The case of an emerging economy. *Journal of Business Ethics*, *91*(2), 253–274. https://doi.org/10.1007/s10551-009-0082-4

Singh, N., Lai, K. hung, Vejvar, M., & Cheng, T. C. E. (2019). Data-driven auditing: A predictive modeling approach to fraud detection and classification. *Journal of Corporate Accounting and Finance*, *30*(3), 64–82. https://doi.org/10.1002/jcaf.22389

Sun, Y., Ma, Z., Zeng, X., & Guo, Y. (2021). A Predicting Model for Accounting Fraud Based on Ensemble Learning. *IEEE International Conference on Industrial Informatics (INDIN)*, *2021*-*July*, 1–5. https://doi.org/10.1109/INDIN45523.2021.9557545

Uddin, M. S., Eltahir, O., Mohamed, B., Khan, Z. H., & Ebert, J. (2025). Mastering Statistics: A Journey from Data Science to Doctoral Excellence. *International Journal of Innovation Scientific Research and Review*, *07*(January), 7613–7621. http://www.journalijisr.com

Uddin, M. S., Habib, M. M., & Mohamed, O. E. B. (2023). Exploring the Interconnectedness of Supply Chain Management Theories: A Literature Review. *International Supply Chain Technology Journal*, *9*(4). https://doi.org/10.20545/isctj.v09.i04.03

Uddin, M. S., Mohamed, O. E. B., & Ebert, J. (2024). Artificial Intelligence-Powered Carbon Emissions Forecasting : Implications for Sustainable Supply Chains and Green Finance. *Energy Environment & Economy*, *2*(1), 1–13. https://doi.org/https://doi.org/10.25163/energy.2110154

Uddin, S., & Choudhury, J. (2008). Rationality, traditionalism and the state of corporate governance mechanisms: Illustrations from a less-developed country. *Accounting, Auditing and Accountability Journal*, *21*(7), 1026–1051. https://doi.org/10.1108/09513570810907465

Vasudevan, H., Yee, C. M., & Subramaniam, A. (2013). THE STEPS OF WRITING A GRADUATE THESIS. *UNIVERSITI TUN ABDUL RAZAK*.

Whittington, G. (1993). Corporate Governance and the Regulation of Financial Reporting. *Accounting and Business Research*, *23*(sup1), 311–319. https://doi.org/10.1080/00014788.1993.9729899

Xiangyu, Z. (2021). The Analysis of Agency Theory: A Research for Shuozhou Coal Economy Development. *Academic Journal of Business & Management*, *3*(9), 1–4. https://doi.org/10.25236/ajbm.2021.030901

Yip, C., Han, N. L. R., & Sng, B. L. (2016). Legal and ethical issues in research. *Indian Journal of Anaesthesia*, *60*(9), 684–688. https://doi.org/10.4103/0019-5049.190627