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Research Article

Integrating Corporate Governance and XBRL Technology to Enhance Financial Crisis Prediction Models

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Abstract

The ability to accurately predict financial crises is of paramount importance for investors, regulators, and corporate management. Financial distress can have cascading effects throughout the economy, leading to significant losses and instability. Traditional financial crisis prediction models have primarily focused on quantitative financial ratios derived from accounting statements. While these models have provided valuable insights, they often fall short by neglecting the crucial qualitative aspects of corporate governance (CG). This research aims to study the impact of integration between corporate governance and Extensible Business Reporting Language (XBRL) technology on the efficiency of financial crisis forecasting models. Many large companies face financial crises due to poor financial disclosure and low governance, which leads to low confidence in the financial markets. The research provides a theoretical framework for the definition of XBRL and its importance in financial disclosure, achieving transparency and reducing the likelihood of errors. It also highlights the impact of corporate governance through indicators such as board independence, ownership of major owners, and institutional ownership, on the quality of financial reports published using XBRL, and shows how this technology can support governance principles, improve the transparency of financial information, enhance the accuracy of financial crisis forecasting models and increase the efficiency of stock markets.

Keywords

Corporate Governance, XBRL Technology, Financial Crisis Forecasting

1. Introduction

In recent years, monitoring global economic activity shows that there is financial instability and low confidence in the markets, as this period witnessed the collapse of major companies such as the American company (WorldCom) and the energy company (Enron), along with other global financial institutions. This is due to several main reasons, including: accounting errors, profit management, miscalculations, withholding of important accounting information, and poor performance of both corporate departments and global audit offices [10]. Despite the widespread application of corporate governance principles in many countries of the world, especially the United States, this did not prevent these collapses or mitigate their repercussions, raising questions about the effectiveness of relying on governance mechanisms alone.

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Therefore, it has become necessary to review and develop these mechanisms to become more flexible and effective, with the aim of restoring confidence and strengthening securities markets in the future [4].

Extensible Business Reporting Language (XBRL) is a versatile electronic system that allows companies to disclose financial and non-financial information, affecting a number of important issues such as the quality of electronic financial reporting, reducing information asymmetry, achieving transparency, supporting international compliance through integration with International Financial Reporting Standards (IFRS) and strengthening corporate governance principles and objectives (Ahmed, 2015). In this research, researchers seek to study the relationship between the rules and mechanisms of corporate governance in the Egyptian business environment and the quality of financial disclosure using XBRL, and their role in enhancing the efficiency of financial crisis prediction models. To achieve the objective of the research, it was divided into the following axes:

1) Theoretical framework and modern uses of XBRL.
2) The relationship between corporate governance indicators and the quality of financial disclosure of the XBRL language to increase the efficiency of forecasting models. Also see more details in the literature [24-32].

2. Theoretical Framework and Modern Uses of XBRL

2.1. Definition of XBRL

XBRL, or eXtensible Business Reporting Language, is an open, global standard for exchanging business information. It's built upon XML (eXtensible Markup Language), making it a powerful tool for structuring and tagging financial and non-financial data in a machine-readable format. Imagine it as a universal translator for business numbers, allowing computers to understand and process financial reports seamlessly.

This digital tagging process, where specific data points like "Net Income" or "Revenue" are assigned unique, standardized identifiers, is what truly sets XBRL apart. Unlike traditional reporting methods (e.g., PDF documents), where data is trapped in static, unreadable formats for machines, XBRL liberates this data, making it readily accessible for automated analysis. It's essentially a bridge between human-readable reports and computer-processible information, designed specifically for financial and accounting applications [1].

2.2. The Core Components of XBRL: Items and Taxonomies

To grasp XBRL's functionality, understanding its two fundamental building blocks is key:

Items (Facts): These are the actual pieces of data being reported, such as a company's sales revenue for a specific quarter, its total assets, or a descriptive note about its accounting policies. Each "fact" is reported with associated contextual information like the reporting entity, the period it covers, the currency, and the unit of measure. This context ensures that the data is interpreted accurately and can be compared meaningfully. For instance, "$500,000 in revenue" needs to be understood as "$500,000 in revenue for Q1 2024 for Company X, reported in USD."

Taxonomies: These are the backbone of XBRL, acting as comprehensive dictionaries or classification systems for business information. A taxonomy defines each financial concept (e.g., "Cash and Cash Equivalents," "Accounts Payable") with a unique, machine-readable tag and specifies its attributes (e.g., data type, whether it's an instant value or a duration, its typical balance type). More than just a list of terms, taxonomies include various "linkbases" that define the relationships between these concepts:

Presentation Linkbase: Dictates how financial items are typically displayed in a report, ensuring a logical and consistent layout for human readers.

Calculation Linkbase: Defines mathematical relationships (e.g., "Assets = Liabilities + Equity"), allowing for automated validation of reported figures.

Definition Linkbase: Establishes other semantic relationships between elements, providing deeper context and structure.

Label Linkbase: Provides human-readable names for concepts, often in multiple languages, for clear understanding.

Reference Linkbase: Connects taxonomy concepts to authoritative accounting literature or other external references, ensuring compliance and clarity [2, 3].

2.3. The Strategic Importance and Benefits of XBRL

XBRL's significance lies in its ability to transform how financial information is prepared, exchanged, and analyzed, offering substantial benefits to a wide range of stakeholders:

Enhanced Data Transparency and Comparability: XBRL liberates financial data from static documents, making it readily accessible and directly comparable across different companies, industries, and time periods. This empowers investors and financial analysts with near real-time access to structured data, enabling quicker, more accurate comparisons and ultimately leading to more informed investment decisions. Regulators, in turn, can efficiently monitor vast amounts of data to identify trends, detect anomalies, and enforce compliance, fostering market stability.

Improved Data Quality and Accuracy: By standardizing data entry and eliminating the need for manual re-keying, XBRL significantly reduces human error. Furthermore, built-in validation rules within XBRL taxonomies allow for immediate detection of inconsistencies or errors in financial data, rather than waiting for lengthy manual reviews. This proactive error detection ensures higher data integrity and

reduces reporting risks.

Significant Cost and Time Efficiencies: The machine-readable nature of XBRL data enables extensive automation of reporting and analysis processes. This translates to reduced manual effort and time spent on data collection, preparation, and dissemination for reporting entities. For businesses, it streamlines compliance with regulatory requirements, often leading to lower reporting costs by allowing data to be reused across various financial statements and filings.

Accelerated Decision-Making and Integration: Faster access to structured, validated financial data empowers businesses to gain insights more rapidly, supporting better strategic planning, performance tracking, and risk management. XBRL data can also be seamlessly integrated with other business intelligence, analytical, and accounting systems, creating a more cohesive and efficient data ecosystem within an organization.

2.4. Global Adoption and Impact: XBRL in Practice

The growing global adoption of XBRL by both companies and regulatory bodies underscores its practical effectiveness and increasing necessity in modern financial reporting:

Pioneering Corporate Adoption (e.g., Microsoft): Early adopters like Microsoft recognized the strategic advantage of XBRL. Their approach of meticulously reviewing XBRL requirements and leveraging their advanced internal technologies showcased how companies could effectively integrate XBRL into their existing reporting infrastructure, setting a precedent for others.

Regulatory Mandates and Standardization (e.g., U.S. SEC): The U.S. Securities and Exchange Commission (SEC) has been a pivotal driver of XBRL adoption. Their initial Voluntary Filing Program (VFP) in 2005 allowed companies to submit XBRL-tagged financial statements, serving as a crucial pilot program. This was followed by a landmark decision in 2008, mandating XBRL disclosures for registered public companies. This mandate fundamentally shifted XBRL from an optional tool to a regulatory requirement, ensuring widespread implementation and fostering consistency across financial disclosures in the U.S. Today, the move towards iXBRL (Inline XBRL), which embeds XBRL tags directly into a human-readable HTML document, further enhances usability and accessibility.

International Harmonization and Future Outlook: The momentum extends far beyond the U.S. The European Union's (EU) European Single Electronic Format (ESEF) regulation, which mandates iXBRL for listed companies, is another significant step towards global harmonization of digital reporting. Numerous other countries, including Japan, India, Australia, and many others, have either adopted or are in the process of adopting XBRL for various reporting purposes, ranging from corporate financial statements to banking supervision and tax filings. This global consensus highlights XBRL's role as a cornerstone of transparent, efficient, and machine-readable business reporting in the 21st century [6].

3. XBRL Language Features

What distinguishes the XBRL language is that it does not change the content of financial reports, but only changes how they are presented and read, as this language aims to issue unified financial reports whose contents can be compared globally, in addition to achieving communication between users of financial reports with different languages, as it is a system that focuses on standardizing terminology related to financial reporting [4].

The application of the XBRL language contributes to the unification and integration of financial and non-financial data in one platform, as it includes financial information such as financial statements and analytics, while non-financial information includes economic data, media releases, and internal data, with special symbols, signs and descriptions. This integration enhances the effectiveness of the use of XBRL, as it contributes to linking the accounting items included in the financial statements to produce accurate financial statements. XBRL also standardizes the form of disclosure in the financial statements of similar companies in the same industry, through two stages: the description of disclosure at a comprehensive level, and then the description of significant accounting tables, amounts and policies. In addition, XBRL standardizes historical data by providing it with a clear description, making financial statements more comparable, more accurate, and easier to understand, thereby increasing the benefit of their users [5, 7].

XBRL also solves the problems of different terminology by identifying each item of the financial statements, where a code is specified for each item in it. It also overcomes the problems of different accounting policies, by describing the accounting methods used, and solving comparable problems related to the level of compilation of accounts, by displaying the balances of unconsolidated accounts in consolidated balances, in order to facilitate the comparison process, so that all users can track the collected numbers to reach their original data, which reaches the depths (level of transactions. for example: Buying and selling), all of which increase the usefulness of the financial statements presented in XBRL [8].

Despite all these advantages, and the capabilities offered by the XBRL language in terms of being the first digital language for financing and integrating the Business System. As the language that will make the business world speak one language, and that its use is the only way to address the problem of information discrepancy that weakens the governance system, by improving the accounting disclosure environment. It also provides the future of online accounting disclosure, through the advantages and benefits it provides to all groups interested in accounting disclosure. In addition to its ability to avoid deficiencies in other accounting disclosure languages and techniques. Egypt is not yet even thinking about

its implementation. [9]

4. Modern Uses of XBRL

The development of accounting performance must keep pace with the surrounding technical developments to suit the increasing needs of growing users, in form and subject matter, and users are usually interested in the accounting performance outputs represented by reports and financial statements, and the interest in developing mechanisms for converting accounting reports used by accountants, auditors and financial analysts using the XBRL language as this language is able to bridge the technical gap in achieving global convergence by accepting international accounting standards because it facilitates and accelerates the transfer of financial statements through their classifications. (Taxonomies), to encode data in electronically readable formats, in a manner consistent with Financial Reporting Standards (IFRS). The XBRL language works on translating accounting data cards automatically, which contributes to solving the problem of multilingualism that hinders the development of the efforts of many users of financial reporting data, in addition to that, the XBRL language has become a crucial tool for re-engineering the process of financial reporting disclosure within companies and institutions and with these successive developments, there are many multiple uses of this language because it provides many techniques and tools [10].

Based on the above, the researchers believe that the most important accounting uses of the XBRL language are to build and develop classifications of accounting information, determine audit fees, predict financial crises, increase the quality of financial reports, and improve the efficiency of the stock market, each of which is presented as follows:

5. Use of XBRL in Developing the Classification of Electronically Published Accounting Information

Abdel Sadek's [2] clarified the scientific and practical requirements necessary for applying XBRL in the Egyptian business environment, indicating the need for concerted official and professional efforts to accelerate the creation of accounting classifications that support the electronic publication of accounting information and allow its acceptance at the local, regional and international levels, especially in the case of economic units whose shares are registered on the Egyptian or international stock exchange [11]. The study addressed how to link XBRL to these classifications during the electronic publication process, benefiting from international experiences in developing accounting classifications. This classification that supports XBRL is based on "hierarchical dictionaries" for financial reports, where tags are placed for financial items, such as net profit, total assets and equity. The research also indicated that governments often build classifications that reflect their accounting systems and legal requirements, while many organizations develop classifications that meet the needs of their sectors and suit the requirements of electronic publication. The construction and development of these classifications for electronic accounting information is considered a support for enhancing the use of XBRL, expanding its scope and developing it, in a way that ensures a standard and reliable means for exchanging business data between regulatory bodies and financial report preparers, as well as between public institutions in countries that develop these classifications [12].

6. Uses of XBRL in Forecasting Financial Crises

One study built a model by integrating the financial statements presented in XBRL with corporate governance indicators as they provide a high degree of disclosure and transparency of financial information published over the Internet. The experimental results showed that the proposed model, which was 85.48% accurate in predicting financial crises, outperforms other forecasting models that rely on one type of information - whether financial - or non-financial, and that this proposed model outperforms other traditional statistical methods used in forecasting [13].

6.1. The Role of XBRL in Improving the Efficiency of the Stock Market

Financial reports, with their accounting information, form the basis for the efficiency of the securities markets, as they contribute to the pricing of traded securities, directing investment decisions and allocating resources. XBRL is an advanced technological tool for the electronic preparation and publication of financial reports, providing accounting information with high quality, timeliness, and easy access to users, which contributes to reducing the problem of information asymmetry. XBRL also supports the application of IFRS standards to achieve the primary objective of producing internationally consolidated financial statements, which enhances the attractiveness of global investors and contributes to the revitalization and efficiency of stock markets [14].

XBRL helps improve the quality of electronic financial reporting by supporting the characteristics of the quality of accounting information, developing electronic accounting disclosure and adhering to accounting standards. On the other hand, requiring listed companies to follow governance rules enhances disclosure and transparency and supports the pricing of shares based on available information. XBRL also supports comparability thanks to its ability to consolidate current, historical and future data, facilitating financial analysis and allowing users to compare corporate data faster and accurately. The use of XBRL also contributes to reducing information asymmetries among investors, which improves

the level of liquidity and reduces the cost of financing in the market [15].

6.2. The Relationship Between Corporate Governance Indicators and the Quality of Financial Disclosure of the XBRL Language

High-quality financial reporting has become an important element within financial markets and a catalyst for sustained economic growth. All actors in financial reporting play a crucial role in the quality and reliability of financial information. This explains the need for concerted efforts towards increasing the degree of transparency and accounting disclosure. The principle of disclosure and transparency is one of the basic principles to achieve effective governance, the more there is a real commitment to the text of the governance rules - especially with regard to disclosure and transparency - the more this helps to improve the quality of the published financial reports of companies listed on the stock exchange, which results in the activation of the stock market. [16]

Whereas the traditional collection and preparation of financial data for the purpose of preparing reports and financial statements will take long periods of time, because preparing financial reports in this form is controlled by variables - some of which may be accounting and others administrative - and they are also exchanged and published via e-mail. Publishing such financial information in this form has faced many problems, the most important of which are the different formats for writing it, which differ from one company to another. Some use the PDF format, and others use the Excel, Word, or Html formats. Therefore, it is difficult to compare the information contained in these formats, in addition to their inefficiency, due to the insufficient degree of transparency and accounting disclosure in general - and electronic disclosure in particular - which has caused users of these reports to lose confidence in the quality of the information contained therein, as well as the difficulty of the decision-making process. Or they may be exchanged and published via printed copies, which in turn leads to an increase in the costs of preparing reports and financial statements [17]. Therefore, it was necessary to find a tool through which strictness, control, and uniformity in preparing financial reports could be imposed, and this is an important part From the rules and mechanisms of corporate governance, which is what XBRL can provide due to its advanced capabilities [18].

The Abu Dhabi Securities Exchange (ADX) has adopted best practices and technological standards in all its activities and operations, with the aim of achieving the benefit of all parties involved. Publishing financial statements using XBRL was seen as an advanced step in developing the presentation of financial information online rather than printed documents, helping companies manage their financial information more effectively. XBRL contributes to the principle of disclosure and transparency and provides a means of publishing financial statements more efficiently and at a lower cost, enabling investors to make their investment decisions on scientific and realistic bases [19].

XBRL also supports accountants and professionals in applying IAS and better adhering to financial reporting requirements, enhancing the quality and reliability of published financial statements. This approach not only contributes to supporting investment decisions but also enhances transparency and facilitates the application of accounting standards at the international level, which enhances the efficiency of the financial market [20].

There is no doubt that one of the most important and best developments that have occurred in the field of publishing and electronic financial disclosure is the XBRL language, due to its huge capabilities in the field of facilitating, publishing, and analyzing accounting information, because it enhances the accuracy and reliability of published accounting information. It also increases the efficiency of electronic delivery of accounting information, as it serves as an effective way to identify and compare information from one company to another, through the easy flow of information between different parties. It also reduces the variability and quality of information, improving the accuracy of financial analysts' forecasts [21].

As for the relationship between XBRL language and corporate governance: a study [22] found that companies that carry out the process of voluntary disclosure of reports and financial statements presented in XBRL, this is an indication of their commitment to the application of corporate governance rules and procedures within the company, as well as a study [23] that discussed the proposal that XBRL has the potential to significantly improve the degree of efficiency of corporate governance, and concluded that this will only happen if there is knowledge Users of this language have the role it can play, which is to detail, reclassify and evaluate financial statements, in a way that enables financial analysts to predict future events, so that more rational economic decisions can be made, which is what XBRL is based on in the first place.

The researchers believe that there is an complementary relationship - reciprocal - between both financial disclosure in XBRL language, and corporate governance indicators, the more good corporate governance indicators, the more transparent the accounting disclosure in XBRL language, because the application of corporate governance mechanisms improves the reputation and credibility of the company, and reduces the chances of an alliance within the company, which results in mitigating the conflict that arises between management and owners, and this is by increasing the degree of financial disclosure of financial reports presented in XBRL. On the other hand, relying on the XBRL language as a tool for electronic accounting disclosure leads to increasing the efficiency and effectiveness of the application of corporate governance mechanisms, because it works to increase

the degree of disclosure and transparency, and impose rigor, control and uniformity in the preparation of reports and financial statements, which is an important part of corporate governance mechanisms, and this is what XBRL language can provide to users, beneficiaries, and stakeholders due to its advanced capabilities. The researchers will present the relationship between corporate governance indicators and the quality of financial disclosure in XBRL, and demonstrate their role in increasing the efficiency of forecasting models.

7. Conclusion

In this paper, the researchers presented the theoretical framework of the XBRL language, represented in its definition, characteristics, and importance. As well as presenting the extent of its contribution to some important accounting issues, such as building and developing classifications of accounting information, determining audit fees, forecasting financial crises, increasing the quality of financial reports, and improving the efficiency of the stock market. He then talked about the application of governance indicators with the XBRL language to increase the efficiency of financial crisis forecasting models, by addressing the relationship between governance indicators and the quality of electronic disclosure in XBRL and measuring the extent of their explanatory and taxonomic ability to increase the efficiency of forecasting models. If the corporate governance indicators are combined with the financial statements published in the reports and financial statements presented in XBRL, it contributes to increasing the degree of efficiency of forecasting models. To create a model capable of accurately predicting accounting estimates, potential profits and losses, and future financial correlations.

Abbreviations

HTML	Hypertext Markup Language
XBRL	Extensible Business Reporting Language
IFRS	International Financial Reporting Standards

Author Contributions

Basma Mohamed: Project administration, Resources, Writing - review & editing

Mahmoud Almashad: Conceptualization, Data curation, Methodology, Software, Visualization

Conflicts of Interest

The authors declare no conflicts of interest.

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