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Review Article

Integrating generative AI into financial reporting systems for automated insights and decision support

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Abstract: Generative AI refers to deep learning technology that can automatically produce original text, images, audio, video, and other outputs. With its emerging capabilities, Generative AI can radically change the dynamics of key operational processes in most industries. In this document, we illustrate how it is possible to integrate Generative AI technologies into the Financial Reporting System (FRS) of a corporation. The integration will allow the FRS to deliver on demand concise and lucid insights to its associated users on what is happening in the corporation and different aspects of the corporation performance assessment, such as its liquidity, solvency, profitability, organizational structure, and share buy back decision. The integration will also facilitate the delivery of what-if analyses associated with different strategic and tactical decisions taken by the corporation management, such as capital budgeting and profit distribution decisions. The unique added value of several attributes of these insightful analytics is automating the responses to ongoing requests of the FRS users on the corporation. Generative AI capabilities are rapidly expanding. The integration can be applied not only for the corporate FRS but any FRS at the national or global levels delivered by a central bank or an accounting standards setter. Any of these FRS can be made into a unique "hub" for the integrated Generative AI technologies. An equally innovative possible generalized integration could put any corporate process at the center and its supporting FRS tasks and deliverables in its periphery.

Keywords: Generative AI, Deep Learning, Financial Reporting System, Corporate Performance, Liquidity Analysis, Solvency Assessment, Profitability Metrics, Organizational Structure, Share Buyback, What-If Analysis, Strategic Decisions, Tactical Decisions, Capital Budgeting, Profit Distribution, Automated Insights, User Requests, National Financial Reporting, Central Bank Systems, Accounting Standards, Integrated Analytics

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1. Introduction

Recent advancements in artificial intelligence (AI), and particularly natural language processing (NLP), are reshaping an increasing number of domains. Generative AI (GenAI) represents a further advance in AI, enabling machines to create novel audio, visual, and text outputs at a level of quality, scale, and flexibility that surpasses prior generations of AI capabilities. By synthesizing information from vast quantities of training data, GenAI can produce content on demand, handling writing tasks that often seemed highly specialized. Ongoing improvements in GenAI capabilities are resulting in an increasing array of use cases for GenAI in financial reporting, and the technology is beginning to attract the attention of corporate managements and governing boards, accounting standard-setting boards, securities regulators, and auditors.

Considerable progress has been made already, even before the recent public rollout of GenAI technologies, in applying earlier generation AI solutions to automate, and improve the timeliness, accuracy, and relevance of, certain low-level tasks in financial

reporting, auditing, and related operations and business processes. For example, AI-enabled bots have been developed to extract data from contracts and other documents, to review financial statement disclosures for compliance with standards, and to analyze historical accounting information as part of the audit process. Research has examined the use of earlier generation AI capabilities in financial reporting-related tasks, and prior studies have also pointed to an emerging set of ethical and regulatory concerns. GenAI has implications far beyond existing AI capabilities, however, from its much richer content creation abilities to its scalability across a vastly wider range of tasks.

Figure 1. Generative AI in Financial Reporting

1.1. Purpose and Scope of the Study

The purpose of this exploratory study is to consider what it would look like to use Generative AI as an embedded decision support system in human decision-making, within a financial reporting context. The standard setter for public company disclosures has called for the enhanced use of analytical technology to support investor insights, and has reminded companies that they can utilize graphics, advanced data tags, and the use of segmented disclosures to convey their financial story. Generative AI, within that technology sector, is a next step in that advancement, as tools such as these can generate natural language, enhanced graphic representations, and potentially new, additional, or differently segmented disclosures, within seconds, based on user input and the current dataset.

This exploratory essay considers the questions such a tool for financial reporting would answer, how companies could effectively use the technology, and what the potential risk management caveats are. This essay is focused on the potential opportunity set for market users of such technology who are traditional preparers of financial reports, public companies. Certainly, the AI technology being applied could have positive implications for AI application software companies, investment managers, rating agencies, investor relations consulting firms, corporate directors, and perhaps many other professional support services through additional decision-useful services. It is meant to help frame and encourage such discussions.

2. Contextual Framework

Financial reporting is an essential process that helps organizations monitor their performance and fulfill stakeholder accountability. This process strengthens decision-making capabilities by providing insightful, timely, and relevant accounting and non-accounting information. The objective of general-purpose financial reporting is to provide information about the reporting entity, which is useful to existing and potential investors, lenders, and other creditors in making decisions about providing resources to the entity. Thanks to more flexible standards and the implementation of XBRL by all major federal agencies, accounting graduates must master both traditional forms of accounting and modern ones involving publishable coding. This evolution underlines the need for accounting programs to use a variety of modern techniques in preparing graduates for the new world.

The introduction of Artificial Intelligence (AI) technologies has rapidly spread across many organizations to improve work efficiencies and support decision-making. From

communicating with clients to implementing audits, the implementation of AI technologies in the business ecosystem is acting as a driver of change for many organizations. The use of AI plays an inevitable role in the workforce to innovate and enhance decision-making strategies. The reorganization of routine tasks and collaborative work with smart machines involves the entire life cycle of business functions, including high-level executive functions. AI technologies are becoming a valuable asset for business leaders. This technology allows the business ecosystem to redefine strategies to increase efficiency by providing reliable metrics, methods, and models. The use of novel AI models creates challenges, and companies should be prepared to deal with all the aspects that arise when trying to integrate these tools into business functions, particularly compliance with regulatory provisions, data privacy and protection, ethical impact, internal control, and responsibility for decisions.

2.1. Insight into Financial Reporting Systems

Financial reports play a vital role in providing stakeholders with a structured representation of the financial position and performance of an entity. Financial reporting aims to provide information about the company's assets, liabilities, equity, revenue, expenses, and cash flows, including the consolidated financial statements, about past transactions and events. This information is used to make decisions regarding the entity and its activities and to determine whether the company's financial condition and results of operations are favorable or unfavorable, which can lead to a stock value decrease due to security price declines.

A financial reporting system is a set of interrelated subsystems that support the accounting function. It includes the source document, accounting journals, the general ledger, work sheets, and financial statements. Financial reporting and describing formal models of such systems are critical to the discipline of accounting because they enable accountants to verify and enforce the business policies of their stakeholders. By integrating generative AI with the financial reporting systems that support traditional and foundation report creation, we automate stakeholders' generation of custom reports and accurate, context-rich explanations, hypotheses, and conclusions. As a result, AI drives participation in decisions affecting the creation of stakeholder reports and cost savings, as well as improved transparency of policies and estimates used to generate those reports.

Equation 1: Financial Data Embedding for Generative Modeling

$$Z = E\left(X\right)$$

Where:

- Z : Latent representation of financial data
- X : Structured/unstructured financial input (e.g., ledgers, reports)
- E : Encoder function (e.g., from a Transformer or VAE model)

2.2. The Impact of AI on Financial Practices

"How to use AI? In any way that will mess up your competitors." AI tools and techniques have the potential to outperform human craftsmen in numerous ways, from blowing tailored personal computer chess grandmasters to imitating the distinctive nuances of exceptional authors to generating works with little apparent human intervention. It may seem, and indeed it has been the actual case, that practically all at once almost any tangible task may be partially completed, ultimately culminating in a world where no human at all need carry out any tedious, mindless work.

In the past, computers have simply replicated, augmented, and exponentially increased the capacity and scope of intelligent human endeavor, while presently, few jobs

have even insinuated, let alone been threatened, by the touch of a synthetic assistant. Going forward, however, creativity, and notably rather than simply recalling knowledge alone, may not be entirely, or possibly at all, beyond the pale. How might this development affect those jobs and tasks that have utilized accounting and financial tools for centuries? Broadly, AI will integrate into the real and virtual mechanisms of financial and business practicalities in three ways, either augmenting human sentience via expertise, selectively obviating drudgery and repetition in these tasks, or indeed revolutionizing their very nature at a deeper level.

The discrete automation of current financial operations and financial services offers more insights in specialty work by controlling reporting or preparation and internal control conditions that would be at greater risk from automation. The accelerating evolution of "robos" into financial services and careers has been noted. FinTechs have already rapidly disrupted insider operations, lending, and payment services, while incubators within banks are exploring new financial models in tandem with non-banking firms [1].

3. Generative AI: Concepts and Applications

Generative artificial intelligence (AI) refers to algorithms that can create new content, from text to images and other modalities. What makes generative AI distinct from its AI predecessors is the explicit goal of generating content rather than extracting patterns from it. Generative AI copilot technologies have made available to the general public remarkably powerful tools to facilitate tedious tasks like drafting emails, coding, and translating text from one language to another, and are embarking on creative tasks like writing essays, poetry, and film scripts. It's no surprise that the public's imagination has been captivated by the technological leap represented by generative AI and that the media is full of stories about everything from the humorous to the fearful implications of a future where generative AI copilot tools are integrated into almost all aspects of everyday human life. What is surprising, however, is the depth of the implications when it comes to enterprise task performance. The recent barrage of new generative AI tools has focused on consumer needs, but the long-term potential impacts for businesses are deeper still, as companies look to implement this new technology to accelerate creativity, increasing business performance through the increased speed of existing employee output as well as the increased outputs available through selective automation.

Generative AI falls into a family of algorithms called neural networks - computing systems inspired by the biological neural networks that constitute animal brains, specifically Deep Learning Neural Networks (DNNs), which are comprised of deep stacks of computational layers that share and process information before passing that information on up the stack to other layers for further processing. It's not the implementation of Neural Networks itself that makes Generative AI special. It is the implementation of Neural Networks in specific ways combined with the countless terabytes of content amassed on the internet and recent advances in computational hardware and techniques enabling massive scale parallelization of DNN training processes that have made possible the remarkable creative abilities now being demonstrated by Generative AI systems [2].

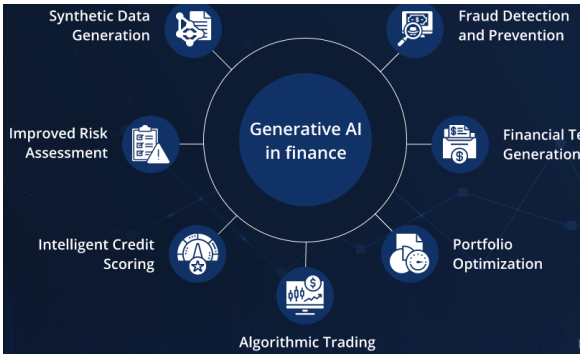

Figure 2. Generative AI in finance and banking

3.1. Understanding Generative AI

Generative AI has emerged as one of the fastest-growing technology sectors today. Generative AI refers to algorithms and artificial intelligence models that leverage massive amounts of curated data and instructions to produce new content including outputs such as text, video, audio, photos, animations, and simulations. Generative AI algorithms can mimic the patterns of original content using specific frameworks or generalized frameworks. The systems used to develop Generative AI have been around for decades but have increased in capability due to much better foundational models. These models have been trained in a self-supervised way on exabytes of data and require dense distributed computing infrastructure.

Generative AI apps will facilitate much faster content production and can also reduce costs. These applications are based upon relatively inexpensive and easy-to-use Generative AI models that allow end-users to interact with the AI using a combination of natural language prompts and, in some cases, existing input content. Generative AI apps are suitable for work at varying levels of complexity, from simple tasks that don't require much human judgment to complex tasks that may have a high degree of subjectivity, such as writing and producing engaging stories or videos. Generative AI systems take many forms, from simple text-boxes to sophisticated software used for producing board games and play scripts, to systems that print images in response to natural language prompts or systems that compose music and generate singing voices. Though the main commercial systems are currently developed by technology start-ups and tech giants, companies across industries are developing and implementing their own proprietary Generative AI systems [3].

3.2. Applications of Generative AI in Various Sectors

Generative AI has seen a surge in popularity and commercial investment in and the first half of This has been fueled by the availability of easy-to-use interfaces to unleash transformative artificial intelligence capabilities in the form of generative solutions. Generative AI has been applied to various sectors, such as autonomous systems, AI-generated art, AI-generated video, AI-generated music, AI-generated engineering, chemistry and drug discovery, AI-generated insurance products and services, AI-generated games, AI-generated virtual environments and business models, AI-enabled code generation, bot assistance and conversational agents, AI-generated virtual advertising and events, and data and financial report generation. Clearly, generative AI is a very potent technology with many applications. In the media sector, AI-enabled news and content generation is pervasive. Major news outlets are using generative AI models to generate breaking news stories. Even business documents like earnings releases, press releases, annual reports, and fact books are generated by AI. Numerous vendors have recently introduced tools that can accelerate the news writing process, carrying out actions such as AI-generated business earnings reporting, text enrichment suggestions, and more.

With continuing improvements in generating quality, accuracy, and fidelity to the original source, generative AI tools could soon assist corporate communications departments in content generation. We also see tools being introduced by vendors that enable AI summaries of documents like meeting notes, internal documentation, case studies, etc. These early generation products are rapidly evolving and could soon find widespread adoption for knowledge workers.

4. Current Trends in Financial Reporting

Over the past few years, key developments in the field of finance have had a key impact on the financial reporting function in an organization. The disruptions caused by the pandemic have forced companies to re-evaluate their operational expenditures and tighten controls. Globalization has prompted organizations to opt for shared service models and plan budgets across geographies. Reliance on third-party vendors for services has led to a renewed focus on data validation and reconciliation. These factors have contributed to the drive for automation in various domains of financial reporting. Organizations have begun adopting automation for transaction processing, compliance and regulatory reporting, providing real-time dashboards for data insights, and routine audit tasks. The growing adoption of enterprise resource planning systems, the emergence of advanced technologies for process automation, and an increasing focus on building centers of excellence for various accounting and finance processes are also facilitating growing investments in automation.

The key underlying elements for an effective automation initiative include process readiness, technology solutions, data policy harmonization strategy, and digital talent. Automating structured data processes is the first step to take for implementing automation. Finance and accounting automation should include data collection, reconciliation, validation, and management. Once a company's processes are in place, there are various tools available for finance automation. These tools include Intelligent Process Automation tools that leverage technologies such as Optical Character Recognition and Machine Learning for automating rule-based tasks. RPA comes with a much lower cost of implementation, is faster to implement, and has a shorter payback period as compared to tools that support functions such as Business Process Discovery. Next to actually implementing the automation solution, finance teams are required to follow best practices for effectively monitoring and governing the automation processes. Implementation of an automation solution does not imply that no manual oversight is needed. Automation tools can free teams from repetitive, mundane tasks, but the more complicated higher-value-added processes still need human interventions [4].

4.1. Automation in Financial Reporting

Financial reports are usually produced in a multi-tier hierarchy consisting of a number of highly located experts, such as chief financial and accounting officers. They manually collect raw financial data from disparate internal system modules – owned by different parties in an organization, such as sales forecasts, production and overhead budgets, tax regulations and auditors, and the budget performance database – as well as from external sources, such as industry trends, interest and investment tax incentives, stock market and debt prices, and the international product market. The costs of manual report creation and the risks associated with report errors and omissions are growing significantly thanks to the increasing speed of changing financial environments, the growing size and complexity of conglomerate firms, and the increasing globalization of product and service markets, making it expensive to maintain local offices in each of its subsidiaries.

These trends have led financial report producers in diversified manufacturing or service businesses to devote major investments in computerized report systems. These investments have been usually justified by the expected improved speed, quality, and

efficiency of decision support from the achieved report automation. Possible new developments in computers and related technologies will make the report systems even more attractive for producers and users in the next decade. As a result, the incentives of incidental users such as suppliers, customers, investors, and lenders to adopt them will grow significantly [5].

4.2. Data Analytics in Financial Decision Making

In this age of technology disruptions, the role of accountants in business strategy is becoming pivotal as organizations strive to build sustainable advantages through the development of technology paths and nurture a challenging culture. The finance and accounting function has begun to appreciate the value of data analytics as an important tool in their toolkit. In fact, both the Big 4 firms and a global accounting organization have maintained that data analytics has become a core competency of finance and accounting professionals. However, despite industry rhetoric about data analytics, there has been minimal empirical research that investigates the decision support of data analytics: What data does the accounting profession intend to analyze? What analyses are they performing? What clients or internal users do they provide results for? What decisions do organizations make based on these results? Information is vital to aid decision making, and data analytics can provide very useful insights to help management make wiser choices and thereby improve the probability of achieving success. This underscores the importance of research that investigates the practice of data analytics in accounting specifically.

In addition, we build on and extend existing research that discusses Big Data in accounting. As evidenced by our relatively restrictive research setting, the large sample size of Fortune 1,000 filers that are included in previous research is difficult to achieve for archival data analysis. Our findings would provide some of the needed empirical support to research that addresses the questions of what Big Data is analyzed by the accounting profession, what analytical methods organizations employ, and what decisions organizations make based on the analytics findings. We focus on decision support during the execution and operational phases of the business cycle. Importantly, we are able to control the differences in the provision of decision support that exist between external auditors and internal auditors. External auditors are hired by clients to issue opinions on their financial statements, whereas internal auditors provide value to the organization that employs them.

5. Integrating Generative AI into Financial Reporting

Although some traditional report preparation tasks can be partially automated using standard techniques, an organization that seeks to implement a system that can fully automate the reporting process and multimedia integration needs to adopt a Generative AI toolchain that integrates several technologies into a coherent system. This includes a Generative Adversarial Network, which can generate realistic dollar values and JSON reports from given textual prompts along with Template Transformer Engines, which can preprocess the textual prompts to specify the desired report templates. Once the reports have been generated, image models can convert the templates into augmented HTML pages, while various AI tools can generate the required graphics. Finally, UI-enhancing packages can allow the final generated pages to be usable report formats.

There are a large number of Monetization-focused Generative AI Tools currently available in the market, including for Technical Document Generation and Visual Design Automated Tools. A subset of these tools is the LLMs, which can be interacted with via various modes. Token-based APIs enable applications to query a specific structure while Few-Shot using a few manual prompts help generate human-like well-organized documents, while the Interactive Mode allows Clients or EndUsers to negotiate directly with it in a live session. The factors affecting tool selection include speed, cost, and

accuracy, along with available in-house expertise and existing infrastructure architecture. Current State-of-the-Art Long-Document Generative LLMs focus on large reports; however, these are available only via API. Recent research has also focused specifically on template generation for Financial Reports [6].

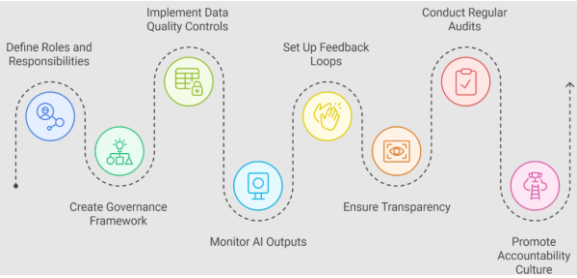

Figure 3. Financial Reporting with Generative AI

5.1. Framework for Integration

The advent of generative artificial intelligence holds promise to transform how financial reporting functions are operated within organizations and how they serve external stakeholders. This integrated digital financial reporting function can leverage generative AI models to augment and assist finance professionals in performing various activities, including process automation, transaction coding, journal entry formulation, tax filing, compliance report preparation, variance analyses, and financial statement preparation. The insights can either address queries arising from the deskless finance functions or support decision-making at senior leadership or executive levels. To realize the promise in financial reporting, organizations need to make strategic investments to build an Integrated Digital Financial Reporting capability that integrates generative AI tools into all financial reporting activities.

Organizations already have data integration in place with ERPs or banks, but deeper integration is needed to fetch data analytics insights that respond to financial questions or report KPIs triggered by set thresholds. Discrete generative AI models need to be integrated into various financial reporting activities from automation of low-complexity tasks to co-pilots assisting finance professionals, to provide insights. In terms of providing results, organizations also need to integrate generative AI relied outputs into data-driven, content-first financial reports using modern report design and distribution solutions that both inform and narrate the organization's financial picture to stakeholders while satisfying their safety and regulatory requirements. Continuous learning is also needed to evolve the designed and deployed generative AI models to suit the unique organizations to provide better and reliable results to stakeholders. We proposed a capability-driven implementation framework to realize the promise in financial reporting which organizations can customize to meet specific needs while taking necessary precautionary actions [7].

Equation 2: Generating Automated Financial Narratives

$$\hat{T} = D(Z)$$

Where:

- $\hat{T}$: Generated financial text or insight
- D : Decoder generating text from latent space
- Z : Encoded financial context from raw input

5.2. Key Technologies and Tools

Publicly-exposed financial reports are prepared using standardized financial statement templates with pre-defined line captions for each row. Therefore, core reporters are financial statement preparers and financial statement consumers, who use the reports for various types of decision support and analysis, typically investment-related. For different consumers, the same report can offer significantly different decision support on distinct timeframes for different triggered events. Since there could be thousands of quarterly or annual reports published around the same time, it is important for consumers to quickly identify the key changes in the core financial metrics in an understandable manner, as well as any significant issues, threats, and risks, behind the changes to capture the most critical value-added insights.

For live operational and financial reporting, cloud platforms that support interactive multi-dimensional data cubes using OLAP engines and visualizations could be used. For quicker financial disclosures of any particular core lines of interest or alerts, business reporting and governance platforms could be used. These third-party vendors could fill in the reporting framework first. Next, using scripted Supervised Learning techniques, audiences of interest could train the continuously-running services that conduct all the preparatory checks for report generation and the deployed risk-alert service to detect the events proactively. These platforms could provide the detected findings with any supplemented visualizations, such as dashboards using line or bar charts that depict changes over time for both the triggered metric(s) and the relativity metrics, as well as heatmap and other visualizations [8].

6. Benefits of Generative AI in Financial Reporting

Despite the fact that the efficient generation of reports using past approaches has the risk of low quality and reliability, the use of Generative AI could greatly help in the delivery of automated insights on financial performance. With the much richer information set at the disposal of management, its insights could be much superior over those provided by third-party analysts. The speed and cost of financial reporting might also reduce drastically due to the automation possible with Generative AI. In addition to improving the efficiency and resource allocation of the management reporting process, large language models could also help in the effectiveness and quality of financial reporting. First, Generative AI could help in the accuracy of insight generation by acting as an intelligent assistant helping to identify the most relevant performance drivers that management should evaluate, the metrics to evaluate them on, and the thresholds for the metrics. Even though identifying key drivers of performance and understanding how sensitive firm performance is to these drivers is the essence of decision-making. However, even though firms generate modelling insights for strategic plans, such modelling is often absent for quarterly and annual performance assessment, therefore diminishing the utility of the financial statement. Corporations also do not carry out dynamic modelling to adjust their performance expectations as new information is received. Doing so makes financial judgemental forecasting of the actual numbers less helpful for analysts nudging the usefulness of corporate financial reporting. This is because decision-making is only episodic, and information becomes stale, and firms are unwilling to release forecasts after 90 days of inaction since filing the previous quarter's performance [9].

6.1. Enhanced Data Processing

Generative AI techniques improve upon traditional data processing techniques by providing improved standardization, tagging, and metadata generation. For any corporation that prepares financial statements, a wide range of data is used to determine the values that are reported, such as the acquisition date of stock, the purchase price of inventory, and the classification of an asset as a liability. The quality of the financial statements and the underlying information that is reported can be improved by ensuring data is standard (e.g., price of inventory reported in dollars), tagged for machine-reading

(e.g., purchase price of inventory associated with the relevant inventory), and comprehensive (e.g., all categories of fixed assets have an associated acquisition date). Board members want current data that is accurate and comprehensive; CEOs want the most updated and detailed data to support their decision-making; and CPAs want internally prepared reports to be validated by external audit procedures. Generative AI improves the preparation and validation process, and this provides a persuasive argument that integrates Generative AI technology into an organization's overall system of financial reporting.

Using Generative AI processes to develop data for financial statement preparation or data that are used to support discussions and decisions made by board members, CEOs, CPAs, or external party users should greatly increase the effectiveness of communication, which is a goal for all users of financial data. Generative AI can be used to support accounting decision-making and data preparation by improving the standardization of data. For example, publicly traded corporations must prepare detailed forms for regulatory bodies that are posted along with the annual report on the corporation's financial position. The firm must disclose the nature of its operations, the critical accounting policies employed, and the quarterly results of continuing operations.

6.2. Improved Decision-Making Support

Generative AI can provide timely insights that increase the efficiency and quality of managerial decisions. Companies increasingly rely on outlining specific questions or hypotheses instead of only obtaining results from traditional data analytics methods using pre-defined variables. Through natural language processing, decision-makers can generate textual or visual explanations of the past to help them formulate further questions. This is useful, for example, for identifying factors driving a drop in the company's value or the business impact of a new market dynamic, such as new competition, changes in oil prices or customer preferences, or political tensions. In recent years, we saw examples of technology companies seeking answers to these questions as they attempted to understand their stock price collapse and formulate their responses [10].

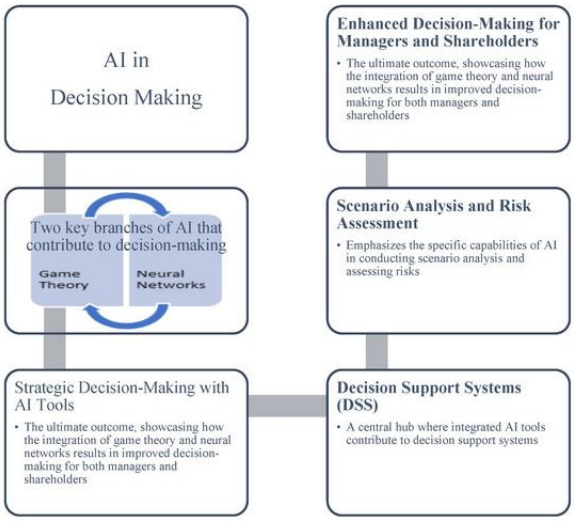

Figure 4. Integrating AI-Driven Decision-Making in Financial Reporting Systems

Also, executives are not alone in needing timely situational insights. Other users of corporate performance reporting and valuation also have topical, specific questions. For example, investors want to assess the current company strategy toward generative AI and other new technologies, and the company's particular capabilities to use it to create economic value. Therefore, ensuring that the response to these questions is accurate and

timely will now be a competitive issue in a digital world, and interactive tools will help realize this goal. Market value is increasingly affected by opaque issues that cannot be quantified in classic accounting statements, such as the company's future capability to innovate or to benefit from technology advances. And there are no existing measures of the company's advantage, disadvantage, or neutral position toward these aspects.

By using generative AI to supplement classic interactive tools for corporate performance reporting, companies can provide high-quality explanations associated with the data, anticipating comments from the audience. High-quality commentary should assess the sustainability of the trend in selected important measures over time and relate it to the company's business model, strategy, competitive environment, and current events. This commentary helps decision-makers reason through the data more effectively. It should also express a forward-looking view, discussing expected changes in those measures in the future [11].

6.3. Cost Efficiency and Resource Allocation

Reports allow us to check the state of all business activities and identify issues impacting growth, but increasing workload and spending within financial departments challenge common standards. The main goal of any company is to create value for its owner or shareholder, who puts invested capital at risk. Certainly, these cash flows are affected positively by an increase in revenues, but are affected also by the cost spending, where to reduce it is a priority goal of the owner or shareholder. As a response to this statement, IT services connected to financial departments can be used. These Report Services can have two separate addresses: as Focused Services such as Cluster Services concentrating on certain specific requirements of the financial departments like ERP connected to logistics with budgeting service for automatic accounting of the costs incurred with budget spending for logistics or service of internal cash flow verifying the accounts for operating cycles; as Full Services connected to the complete functional area of conducting financial departments, such as ERP connected to Consolidated Accounting with internal cash flow analyzing service. For these two benefits, these Report Services, besides specializing in focused directions, should have also resources spent for advanced technological applications focused on cost reduction of the financial department operations, such as BPM, Data Mining, Data Warehousing, Data Quality, Data Mart, Data Visualization, DSS [12].

7. Challenges and Limitations

The deployment of generative artificial intelligence (AI) in financial reporting and compliance operations promises unprecedented efficiency gains and quality improvements, yet also poses unprecedented regulatory, security, and ethical challenges in its application. Alongside mapping potential inroads for and providing recommendations on its deployment, we also discuss underlying deployment challenges and ethical issues to be addressed, arguably a more important and weighty risk discussion investing many hours than the relatively straightforward, powerfully enhancing technological execution of deployment, alongside providing resources for auditing. We consider deployment challenges in three areas: integration into existing legacy technological frameworks, security of financial data entering the generative AI model and ethical considerations of driving decision-making based upon the augmented output of generative AI directly – especially where future repercussions exist in terms of elevating existing workplace concerns of elevation of responsibilities without elevation of control over processes and potential enormous penalties for errors.

As with any progressive technological innovation, generative AI poses its own set of risks and challenges, especially with regard to data privacy, integration to existing technology frameworks, and concerns for stakeholders. First, stakeholders capturing sensitive data must ensure that data ownership and proper access to sensitive past

interactions at the generative AI level is guaranteed. This data has the potential to unintentionally spill sensitive historical information into future prompts, as generative AI by design is built to utilize past interactions to address new ones, with potential repercussions on company market performance or risk of being reprimanded by governments over data breaches. Second, generative AI adds another layer of complexity to existing finance and accounting technology frameworks. Technology stakeholders behind financial reporting processes must design contingency recovery plans as well as test generative AI in pilot programs before its actual day-to-day implementation. Third, educated by financial experts but drawing conclusions based upon an AI's internal functioning based upon logic that could be divergent to the finance expert, decisions based purely upon an AI's output can remove the human aspect from the final financial reporting outcome. Fairness issues may arise if the human decision-maker fails to review AI results based upon underlying assumptions diverging massively from those of the AI system. Given how firmly entrenched the finance expert decision-maker framework is and the averseness of stakeholders to diminishing human control over final decisions, this last noted challenge warrants the most future research attention [13].

7.1. Data Privacy and Security Concerns

Integrating AI Linguistic Technologies into Financial Reporting and Analysis Systems has far-reaching implications for data privacy and security. Financial Reports contain sensitive information about the affairs and underlying transactions of Corporations issued for public consumption; Auditors' Reports contain sensitive personal information about Auditors' work processes and practices, which Corporations are not allowed to disclose under Law; Management Letters contain sensitive information with respect to Corporations that is Company-Confidential, Executive-Confidential, or Stakeholder-Confidential. As such, the Policies and Controls governing access to sensitive information in Financial Reports, Auditors' Reports, and Management Letters is beyond complex. AI Linguistic Technologies, and most particularly Generative AI Tools, solicit large volumes of sensitive personal and confidential information in the everyday course of their work without being governed by an enterprise's Policies and Controls, because the Tools are not deployed in a Company-Controlled digital environment. When sensitive personal and confidential information is used to train AI Tools, the risk of exposure is heightened. But the risk exists, whether or not the Tools are trained on sensitive personal or confidential information. Sensitive data can be included in the responses generated by the Tools for any number of reasons, including the intended use of the Tools to generate memorable responses; questions posed by Users of the Tools, such as imitators' requests to develop mimicry intelligibility of well-known Individuals; and the use of the Tools to imitate a specific person. Indeed, the risk of disclosing confidential information learned from Individuals in previous interactions is a concern, yet Companies are nonetheless still concerned about the possibility of exposing highly sensitive data [14].

7.2. Integration Challenges with Legacy Systems

One of the major challenges of integrating Generative AI technologies with financial reporting systems is interfacing with existing legacy systems. Legacy systems include older infrastructure, applications, and databases that were designed to provide a specific function for the organization. They may be patched and updated to support new functions or operational efficiencies, but their foundation as a legacy product remains. Financial organizations typically have numerous legacy systems designed to handle specific financial reporting process functions, such as accounts receivable or payable, cash management activities, or compliance with accounting and regulatory reporting.

These systems are typically undergoing modernization efforts but may not have the capability or efficiency to support advanced functionality such as automating complex self-service reporting or integrated data analytics. However, many financial organizations

still rely on these legacy systems for generating the periodic financial reports and supplemental compliance filings required by laws and regulatory agencies. The reliability and accuracy of the reports and financial controls implemented to manage the security, access, and processing of the transaction information provided by established legacy systems are essential to maintain trust and credibility for the organization.

Institution leaders and boards rely on periodic and ad hoc reports generated from these legacy systems to aid in decision-support capabilities for transactional opportunities or risks. Making these older systems intelligent through the automation of frequently queried reports and usability for characters when financial data could be made available 24/7 is the challenge that many financial organizations face. Addressing these challenges will require investment, time, and skilled resources with knowledge in AI and what is possible, data availability, network infrastructure, security and resiliency, and legacy technology platforms. For AI to be valuable, it must improve the user experience.

7.3. Ethical Considerations in AI Usage

Discussions about the ethics of Artificial Intelligence (AI) technologies are not particularly new. Indeed, issues related to data usage already affect the access to publish datasets for non-profit activities. While new Generative AI applications offer unprecedented opportunities, it is important to reflect on the potential consequences of their application. In the case of textual content, concerns have been raised about the ability of language models to provide fake news in an automated manner. Detractors also point to inherent biases in the data used for training such models that get reflected by outputs. Most notably, a lawyer who invented an A.I. program that filters out frivolous lawsuits sees the output of language models being dangerously "authoritative – sometimes way too authoritative for their own good."

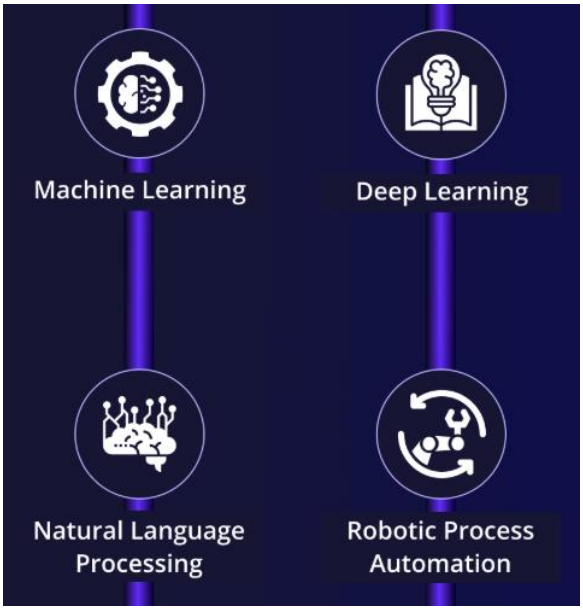

Figure 5. AI for financial compliance

So, there exist several controversies regarding an increased automation of decision-making through Generative AI applications. A former member of the United Nations Human Rights Committee warned that an increased automation of governance functions may undermine the rule of law, accountability, and the protection of fundamental rights and freedoms. Designers of AI applications must work rigorously to mitigate any potential societal harm stemming from their use. It is not only the deployment of an AI application but also its design that involves ethical considerations. In this sense, it is

important to develop and deploy Generative AI systems that augment the roles and responsibilities of people while supporting organizational values of importance [15].

8. Future Directions

Over the last fifty years, financial reporting has been radically transformed, shifting from handwritten summary documents in a physician's office to databases linked by complex systems and most recently to real-time descriptive and predictive analyses powered by AI. It is not only possible that the next generation of financial reporting will be even more radical, it is certain. Real-time analysis and prediction using dozens of variables has become routine in the fields of marketing and sales, using sophisticated technologies that were not even imagined during financial reporting's most recent transformation. Why should the discipline of financial reporting continue to be the odd man out in terms of delaying the adoption of contemporary technologies? Could using the most advanced technologies lead to radical but also long-overdue changes in the scope of financial reporting? Could financial reports result in predictive analyses, in advisory services to clients, and other functions beyond the current format of computerized econometric models and descriptive dashboards?

True, audits would need to be redesigned to respond to the risk assessment strategies rooted in these advanced technologies. While the technology of future audits may differ radically from its predecessors – could future audits consist of AI-based simulations and their validation? – the need for trust in the accuracy of agile, predictive analytics will necessitate at least some auditing as a catalyst for the wider acceptance of financial reports. Even with a narrower focus, expanding the adoption of AI and related technologies into accounting and reporting will call for a thorough understanding of existing auditing approaches and procedures [16].

8.1. Emerging Technologies in Financial Reporting

The changing technological landscape is affecting virtually all business processes and financial reporting is not an exception. The ever-increasing speed of technological changes such as the development of blockchain technology, new financial technologies enabling more efficient crowdsourcing of funds, and various types of machine learning and AI models open avenues for increasing the efficiency of accounting and auditing procedures, greater assurance regarding information accuracy and completeness, new forms of data and information storage and exchange, and new types of information users. Ever-denser reliance on information technology provides ways for easier and cheaper access and better, more timely security ensuring quantitative support of otherwise qualitative difficult judgments of decision makers. Developments such as globalization and expansion of regulated trading venues encourage a wider use of uniform accounting standards that could be satisfied in a quicker manner. Changing user demographics and changing user needs give rise to the increased demand for exploration-stimulating and story-telling information because new members or constituencies become aware of the ability of financial consolidation data to describe the operational reality of business entities and the human context of that operational reality.

This chapter provides a succinct overview of technology developments that are especially relevant to financial reporting. Existing literature is explored to detail the various ways in which the aforementioned developments would affect the financial reporting systems of the future in terms of the type, amount, timeliness, and overall usefulness of accounting information. Various parties are concerned with the changed costs and benefits relationships determined by such developments. The managers of business enterprises whose activities become part of the financial reporting systems, accountants who develop and maintain them and prepare information for them, auditors who assure the accuracy of information generated by the systems, and users who benefit or suffer from the systems – are collectively or singly the subjects of such explorations [17].

Equation 3: Decision Support via Insight Scoring

$$S_i = \alpha \cdot R_i + \beta \cdot U_i$$

Where:

- S_i : Score for insight i used in decision-making
- R_i : Relevance of the insight to reporting goals
- U_i : Uncertainty or risk impact associated with the insight
- α, β : Tunable weights for relevance vs. risk

8.2. The Role of Machine Learning and AI in Future Systems

System developments will increasingly require the application of intelligent agents to facilitate both inputs into accounting systems and also to question outputs from these systems. There have been developments in machine readable descriptions of business transactions, but the 'business rules' triggering the need for particular reporting criteria and details in financial reporting have not yet been machine readable. The future change to machine readable rules will enable a leap forward in AI assistive participative systems with advances such as natural language questioning possibilities incorporated into the reporting responses, enabling participative bottom-up reporting capabilities. Business computer systems will increasingly have embedded in them a sense of the overall 'moral purpose' or ethics of the corporation entity reflecting not just designed-in business process quality but also a corporate social responsibility. AI enabled chatbots will service the functional need for available input and question time from business users. Algorithms incorporated into accounts and audit processes will be capable of overcoming current and ongoing talent difficulties, particularly in the low mid market business segment for whom minimum risk and good value are the key issues. The first point of contact for business and clients on accounting resources, configuration, processes, product, and service options will be AI driven. AI tools will also assist in applying trauma reduction for clients in managing normalizing events and activities in accounting driven forensic investigations around exceptional and catastrophic business environments [18].

9. Conclusion

In summary, the primary goal of this study is to explore, through a qualitative exploratory approach, how artificial intelligence, especially generative AI, can be successfully integrated into financial reporting systems to implement automated analyses and insights. From this analysis, we highlight some implications both for the future of financial reporting and the importance that technology will have for the role of accountants in knowledge and value creation for organizations that are supplied with relevant and timely information. In doing so, we hope to contribute to the current discussion that anticipates the increasing use of automated processes through technology, especially generative artificial intelligence, and conclude with the hope that this debate will make clear our perception that accountants can no longer provide a backward look at organizations' events through the timely production and publication of reports but must look to the future and transform the data provided into relevant insights.

The expectations regarding the possibilities of using generative AI are very optimistic and impactful, especially considering that it will allow for greater data analysis agility, while reducing the number of people needed in some operations, in addition to being a facilitator of the work for specialists, allowing them to focus on the core of their jobs. However, generative AI must be trained and supervised by qualified people, especially for information systems, which are often criticized for lacking depth and not presenting answers to the questions in a summarized way, but still providing a large volume of data disconnected from the context and without the necessary connections.

9.1. Final Thoughts and Implications for the Future of Financial Reporting

In conclusion, generative AI applications have the potential to profoundly improve corporate financial reporting quality, allowing accounting information to become more useful, usable, timely, and connected. For the past several years, financial reporting has prioritized static presentations of historical numerical data, subjected to an arcane set of rules about when to adjust and how to label [19].

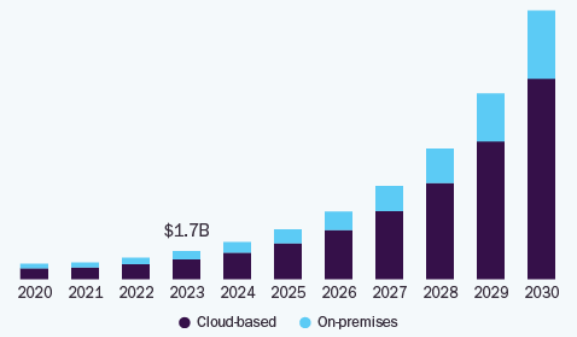

Figure 6. Generative AI in Financial Services Market Size Report, 2030

However, with increasingly repurposed, tailored financial reports created through business intelligence tools and the growth of delegated disclosure through the use of social media, demand is increasing for financial reporting in which near real-time insights can be drawn from structured and unstructured inputs addressing specific informational needs. This is especially true during times of stress, where automation of the reporting of qualitative, as well as quantitative, information can make the difference in market efficiency. These capabilities, and generative AI are wholly consistent with the move towards accountability reporting.

The foundational principle of accountability reporting is that it consolidates insight to key trends and issues affecting long-term performance, value, and ability to create value. This bridges the gap between current disclosures and the future needs of the capital markets and completes the picture, addressing the "so what" explanation of financial results while providing insight into what is likely to come. With generative AI having the ability to create hyperlinks to underlying records and data sets, and to automatically surface underlying analyses and resources, AI can be a real-time, ongoing watchdog that ensures that relevant insights are more efficiently surfaced and presented on an ongoing basis. As corporate reporting practices continue to evolve in the shadow of the plaudits from users, generative AI's ability to bring the underlying functional analyses to life will help accounting be recognized as an essential partner with finance in enabling sound decision making, for both the short and long term, enhancing assessments of both firm accountability and credit worthiness.

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