

AI ETHICS FOR PUBLIC FINANCIAL SYSTEMS: A CROSS-SECTOR PERSPECTIVE

Sravanthi Gondi^a, Shruthi Sepuri^b, Pradeep Narayan^c

^aPeopleSoft Consultant, Saicon Inc Frisco, Texas, USA

^bSoftware Engineer, Tata Consultancy Services, Chicago, IL, USA

^cManager, Ernst & Young, San Antonio, Texas, USA

***Corresponding author**

Email: sravanthi.com@gmail.com (Sravanthi Gondi)

Abstract

This study explores what ethics entail regarding the use of Artificial Intelligence (AI) to govern financial systems in governments and how it affects efficiency, fairness, accountability, and transparency in particular. It brings to light the benefits of AI in boosting decision-making in such systems as budgeting and revenue management, and the detection of fraud, with the prospects of improvement in processing speed and accuracy. However, there are also ethical issues like the bias of algorithms and non-transparency, which are major problems. The paper examines how AI, such as PeopleSoft changing to Oracle Cloud, can help to automatize the work and predict the future financial trends. Nonetheless, it also addresses unintended consequences, like disparity of different demographic groups, and the increase in cost of monitoring them. The solution to such risks is an effective governance structure that involves periodic audits and the establishment of ethics committees based on AI. The adoption of AI should be perceived by policymakers as a change of leadership and should be based on equity, transparency, and trust among citizens. The study concludes by stating the recommendations on how ethical risks can be reduced by placing more emphasis on human control and transparency in AI systems.

Keywords: PeopleSoft, Oracle Cloud, Artificial Intelligence, Public Financial Systems, ERP, Transparency, Banking AI, AML, KYC, Fraud Detection, AI Governance, Cross-Sector Ethics.

1. Introduction

The use of Artificial Intelligence (AI) has become a disruptive proposer in many fields, and the field of public finance is no exception since the opportunities to simplify organizational processes, improve decision-making, and optimize them are becoming actively used. Within government financials, AI has found use in many systems including budgeting, tax collection, auditing, predicting and detection of fraud. AI will likely become the basis of solutions that can improve accuracy, decrease costs, and accelerate processes as the governments are worldwide seeking to modernize the financial management. Nevertheless, in addition to these positive aspects, AI in state budget beneficiaries presents a set of ethical issues that are difficult to resolve and achieve the responsible implementation of AI. Additionally, the study includes perspectives from private-sector financial institutions, particularly large banks that employ AI in areas such as Anti-Money Laundering (AML) surveillance, Know Your Customer (KYC) verification, fraud monitoring, and cloud-based financial operations. These cross-sector observations help to reveal shared ethical risks and governance challenges across the broader financial ecosystem.

The ethical aspects of AI in state funding are particularly significant since the systems are in control of the state funds directly affecting the lives of the citizens. Governments have been given the responsibility of ensuring that they handle taxpayer finances in a fair and transparent manner. Therefore, the use of AI in the open financial management should be in accordance with the principles of fairness, accountability, transparency, and privacy.

The inability to safeguard the integrity of financial systems, as well as undermining the confidence of the population, are just a few issues related to misuse of AI or poorly applied algorithms. Since the field of public finance is sensitive, the ethical concerns surrounding AI extend beyond what is often referenced within the context of the private world to include the overall governance of the AI systems, how the decision-making process is open, and whether the system is prone to systemic risks. These considerations are even more important in light of the fact that, in most cases, a public financial system is designed to provide services to a diverse and vulnerable public and that AI systems have to be implemented in ways that will enrich all without disadvantaging or producing unwanted side effects.

The primary goal of the paper is to analyze ethics of AI regarding public financial systems, paying attention to operational and quantifiable strategies. It involves the discussion of the existing uses of AI in public finance, determination of the ethical issues that such applications generate, and the presentations of ways to overcome these threats. The discussion will be based on empirical data, case studies, and real-world examples that would place the discussion within the context of reality to gain a clear and actionable idea about how AI can be implemented in the ethical and responsible use of AI in the public financial sector. The research questions to be addressed in the current paper include: What are the most important uses of AI in the financial system of the publics, and what impact has this had? What are the key ethical risks of AI implementation in government finance? What are the practical, real world ways of mitigating these ethical risks? What are some available case studies or examples of how AI ethics is applied in public finance?

The ultimate goal of this article is to provide an extensive and efficient roadmap to the interpretation of AI ethics in the context of a public financial system, which entails, statistical evidence, real-life examples, and actionable recommendations to safeguard that the application of AI in the public financial system can foster fairness, transparency, and accountability. The rest of this paper will be structured in the following manner: Section 2 will present an overview of literature on the application of AI in public financial systems and the ethical frameworks that govern their use. Section 3 will describe the methodology applied to analyze AI ethics in this case concerning data collection methods, statistics, and ethical risk assessment methods. The article will provide the results of real-world experiments, case studies, and statistical analysis in Section 4 and discuss the findings in detail in Section 5. Lastly, discussing ethical risks mitigation practices and how AI in the financial systems of the population can be aligned with ethical standards, their practical recommendations will be presented in the final part.

2. Literature Review

2.1 Current Research on AI in Public Finance and Public Financial Management (PFM)

Artificial Intelligence (AI) has become a popular topic in the discussion of whether governance should use new technologies in improving the efficiency and effectiveness of their financial processes in recent years, especially with regards to public financial management (PFM) [1]. The report of the Organization for Economic Cooperation and Development (OECD) titled Using Artificial Intelligence in Public Financial Management reports that AI is being applied more and more in many areas of public finance, such as macro-fiscal forecasting, spending choices, budget planning and reviewing, and financial management. As an example, AI models are used to analyze the massive amount of economic data to forecast trends, optimize government spending, and optimize the financial aspect of the fiscal policy. Such applications do not only provide accuracy in terms of financial forecasts, but also minimize human error and administrative expense to facilitate more informed decisions.

AI is also applicable so much in budget preparations and supervision as can promptly process large amounts of information and spot anomalies and prioritize company inefficiencies that would be missed by more conventional approaches [2]. Some nations have implemented AI technology to automatize common processes, including the production of financial reports, auditing expenditure, and detection of possible fraud in state expenditure [3]. The proliferation of AI in these spheres is also driven by growing public expectations of the transparency and accountability concerning the management of the public money. The study conducted by the World Economic Forum and the Bank of International Settlements has pointed out the increased presence of AI in the financial services industry, in general. As an example, the amount of money spent by generative AI in the banking industry

alone is projected to grow considerably with estimates showing that it would grow in size by an average of USD 3.86 billion by 2023, which translates to an average of USD several times that sum in the coming years. This increased investment is an indication of how AI technologies can revolutionize the field of financial management, not only in the state sphere, but in financial institutions internationally also [4]. AI technology is also being increasingly integrated with Robotic Process Automation (RPA) to streamline multi-agency payment reconciliations within Enterprise Resource Planning (ERP) systems, further enhancing accuracy and reducing manual workload [35].

Figure 1 shows various applications of AI in finance, including real-time market monitoring, personalized investment recommendations, behavioral analysis, advanced analytics, and enhanced risk assessment and management. These innovations illustrate the broad impact AI is having across the financial sector.



Figure 1: ai-in-finance

2.2 Ethical Frameworks and Issues in AI.

The fast pace of AIs introduction into the sphere of public finances has brought up a number of ethical issues that should be resolved to make the application of these instruments responsible. The general ethical frameworks concerning AI tend to pay attention to several main concerns, such as transparency, fairness, accountability, privacy, and systemic risk. The level of transparency within the AI systems is very important as it enables the stakeholders and especially the populace to know how decisions are reached especially when such decisions have implications on the utilization of the public resources. Such opacities of many AI decision-making procedures, especially in highly financial systems, can result in mistrust and generate the unintended outcomes, unless techniques of algorithms are adequately audited or documented.

Equity and algorithmic discrimination are also important. Unless properly trained, AI systems have the potential to boost or even increase the biases already present in financial decision-making [5]. As an illustration, in case the AI models applied in the system of public finance are based on biased data, they can discriminate against specific social, economic, or demographic groups unconsciously. This may include unequal distribution of resources, inefficient distribution of governmental expenditure, or skewed budgetary decisions in the context of the public finance. One of the publications of SCIRP focuses on the necessity of creating AI systems, which not only can creatively detect and address biases; they should be audited on a regular basis to ensure impartiality in the results. In addition to these issues, there is a risk of systemic potential implications of AI in the public finance systems as well. With any individual use of AI-based decision making within a domain within the financial system, there can be ripple effects across the domains, which present risks in terms of financial stability. When there is a fault or an erroneous inference of an AI system forecast or budget, the consequences of this situation can be digital within the government bodies including the ways in which the government offers its services and the national economy. The fact that financial systems of the people are integrated means that any down failing in one of their areas such as mishandling of money or miscalculating of the fiscal needs will create a spillover effect to the general government processes.

It is obvious therefore that there is significance to have good governance frameworks that can regulate such risks. Unless AI is properly introduced with control and back-up measures, researchers will not only bring down the finances, but they will also harm the confidence of many individuals in the institutions of the government. In order to mitigate these risks, the deep-seated monitoring, regular audits and accountability systems would need to be put in place and should be transparent and easy to identify the AI error before it manifests into larger and larger systemic issues. Moreover, they are to forecast and prevent cascading failures on the public financial systems and apply scenario modeling and stress tests. Ensuring that AI systems remain stable to eliminate such risks is important to ensure that both the sustainability in efficiency of operations and confidence of the people in the system of financial management is guaranteed.

2.3 Gaps in the Literature

Although a significant part of the current literature on AI ethics in public financial systems can teach and offer useful information on theoretical perspectives and ethical definitions, a gap in quantitative research that quantifies the practical implications of AI in the public finance sphere is significant [6]. Most of the studies are qualitative in nature as they present some insights founded on experts' views or hypothetical constructs or are found to be on a particular case study in which the generalizable information is not provided. There are no quantitative indicators, which makes it hard to evaluate the real outcomes of the AI systems in terms of effectiveness, equity, and effectiveness in state finances.

Avoidance of detailed measures that may then be utilized to gauge the ethical risks of AI in the public financial systems is one area of high vacuum in the literature [7]. Although the current body of research is rich in the high-level considerations like fairness and transparency, the lack of research that offers tangible, quantifiable data concerning the application of AI to these parameters is overwhelming. As an example, more specific metrics should be created to assess the bias in the algorithms, monitor the rate of error, and determine the degree of control to be exercised by humans in decision-making based on AI. This gap can be used as a basis of additional research, especially with real-life information of the public financial systems, which may offer more practical information and guide the creation of stronger systems of governance. Though numerous studies concentrate on personal ethical risks, there is a necessity to conduct more researches that would examine the societal implications of the AI introduction into the fields of public finance. With the increasing use of AI systems in financial decision-making, it is more important to grasp their increased implications to financial stability, popular confidence, and equity. The future research must focus on filling these gaps by presenting more thorough and statistically-powered studies of AI implementation in the finances of public systems, especially with a bias on practical, ethical, and systemic issues, which appear to emerge within such environments [8]. The literature underlines the possibilities and the difficulty of AI in government finances. Although AI has great potential in enhancing efficiency and decision-making within the financial center of a country, overcoming the ethical risks of using these technologies will play a key role in ensuring that these technologies are beneficial to all the groups of people. These research gaps stand as foundations of future studies, which can offer more evidence-based, descriptive information on the ethical use of AI in municipal finance.

2.4 Transitioning from PeopleSoft to Oracle Cloud

The PeopleSoft to Oracle Cloud transition is gaining ground within those organizations that are interested in modernizing their financial management systems. The shift is process-oriented and is also systematic because it is a process-oriented shift that not only concentrates on the application modules but rather on the integration and transition of financial processes. The adoption of the Oracle Cloud has many advantages to the public-financial system, such as increased scalability, better efficiency, and increased data analytics. With the automation of manual activities, the public financial managers can streamline operations, save on costs, and update the accuracy of the financial reporting.

However, with the transition, there are some issues that come up, including the data migration, compatibility of the system, and employee training, which should be handled carefully to prevent disturbance in service. In addition, the change has ethical implications for data security and transparency, particularly due to the involvement of public funds and sensitive financial data. The economic managers in the public sector should make

sure that such risks are contained by effective planning, good governance structures, and continuous auditing. The effective adoption of Oracle Cloud is an example of numerous other organizations in the public sector that want to upgrade their financial systems without losing accountability and efficiency in managing public resources.

3. Methodology

3.1 Defining the Scope and Variables

The phrase "public financial systems" is applied in this research to refer to a set of state instruments involved in fund management and oversight [9]. These systems will consist of budget preparation and execution systems, treasury or financial management information systems (FMIS), auditing and reporting systems, and fraud detection systems. Budget systems can be employed to approve and regulate government spending, whereas FMIS can trace financial transactions and comply with the fiscal policy. Reporting and auditing systems are created in order to sustain transparency, and the fraud detection systems are based on AI to point out inconsistencies in the financial data and highlight transactions that might point out the misappropriation of the public funds. All these systems are the possible spheres where AI can be applied to bring more effectiveness, yet at the same time, the ethical hazard needs to be addressed.

The main dimensions should be defined and measured to check the ethical use of AI in these public financial systems. The level of fairness and bias will be evaluated through the rates of flagged transactions that belong to a specific demographic or regional category. To illustrate this point, in an AI system that helps identify fraud on public spending, one of the important measures can be the proportion of transactions that were flagged by a specific demographic group. In case the number of flagged transactions is disproportionately high in the case of underrepresented or marginalized groups, it would suggest that there is a potential fairness concern. Additional measures of fairness are false positive and false negative rates which may be determined by comparing flagged transactions to real frauds. A traditional bias risk standard could be defined as a ratio above 2x national average of flagged transactions in a group. The measures of transparency and explainability of the AI systems will be the source of decisions made by the AI system that will have an auditable explanation [10]. Indicatively, when an AI is applied in making decisions, as far as the allocation of funds to various departments is concerned, the proportion of the percentage of the decisions which can be explained by an audit trail will be monitored. Ideally, the chance that the majority of the decisions made by AI can clearly and audibly be explained should be at least 80%. Also, the average time used to create an explanation of each decision to be made will be measured and aiming at making sure that an explanation to every decision made will be created with a timeline of 5 seconds.

The responsibility of AI systems will be evaluated by monitoring the rate of AI decisions that can be subjected to human examination. For example, when an AI system is applied to authorize spending or indicate a budgetary abnormality, human auditors must review at least 30% of decisions made by AI. Moreover, complaints or appeal cases will also be documented per 1,000 decisions that the AI system would have made. The number of complaints could be massive, which leads to the conclusion of the lack of accountability measures. AI detection efficiency and performance will be measured by looking at the relevant measures such as savings in costs and time taken. To illustrate, a baseline period could demonstrate that a series of public transactions would require 48 hours to process manually, but with the aid of AI, the same could take 70 less time, which produces an AI-optimized processing time of 14 hours only. In the same vein, the saving of the costs will be assessed based on the comparison of the annual costs of the traditional processes with the AI-aided process. Assuming that the total annual cost will decrease by 40% through AI, it would be good performance.

The ethical factors that are vital are systemic risk and unintentional consequences. They can be quantified by the count of correlated failure instances wherein misjudgment in one section of the system can result in other areas. In case an AI-based fraud detection mechanism collapses and determines a substantial fraction of spend transactions, the financial loss risk can be gauged by the size of losses on AI system failures. As an example, when the breakdown leads to a USD 1 million error, it would indicate a potential area of system breakdown that should be resolved. In addition to the public-sector focus, a cross-sector comparative lens is applied to draw parallels between AI-enabled public financial systems and the ethical challenges observed in private-sector banking, reflecting the interconnected nature of financial risk, regulatory compliance, and AI governance.

3.2 Data Collection

To collect data on this study, a combination of reports and government publications that are publicly available and case studies on countries that have implemented AI on public financial systems will be used to collect data. As an example, AI has already been implemented in countries like Estonia, Finland, and Singapore to improve its financial management by the population. An example of the country that has adopted AI-based systems to streamline budgeting and curb frauds is Estonia, and information about these steps will be invaluable towards the study. Financial services data will be taken as a reference point to compare AI implementation in government finance. In the banking industry, AI in particular will expand dramatically, and the generative AI expenditures are projected to increase not only to USD 3.86 billion by 2023 but also to around USD 15 billion by 2027. This information will assist in the contextualization of the uses of AI in the sphere of public finance, since these two domains have a common objective in the challenge of risk management, decision-making, and fraud prevention. Besides accessible data in the open, controlled experiments or simulations can be set using anonymized data on real-life public financial systems [11]. One of the possible experiments is the adoption of an AI decision-support system in order to work in a public treasury or fiscal assessment tool. This artificial intelligence would help find anomalies in budget spending, and measurements would be monitored after 12 months. At this stage, the system performance in terms of processing time, cost reduction, and error rate would be compared to the baseline information in 6 months without AI.

3.3 Experiment / Implementation Design.

One or more systems will be selected to be tested in order to evaluate the effect of AI on the existing financial systems in the general population. One of the probable solutions is a budget monitoring system in a particular country (e.g. Estonia), where AI might be incorporated to detect abnormalities in the budget, and automate financial predictions. The baseline period will be based on monitoring the performance of the existing system over a 6-month period without the implementation of AI (such indicators as processing time (in hours), cost (in USD), and error rate (manual corrections of 1,000 transactions)).

The next 6 months will be the AI implementation phase where an AI-based anomaly detection is added to the same system. At this stage, the performance measures will be monitored and contrasted with the baseline. The main measurements to be taken are processing time (with the aim of reducing it by 50%), cost (with the aim of reducing operational costs by 30%), and error rates (with the aim of the reduced error rates by 60%). The fairness data will be monitored, and the percentage of transactions that AI has flagged will be divided by the region and demographics. An AI system that raises over 10% of transactions that belong to a specific demographic section than the overall national average would be flagged in investigation. Incidents of governance among these include complaints or appeals and will be also recorded and the target in reducing the incidents under 5 per 1,000 decisions.

Figure 2 illustrates key elements that can contribute to cultivating an innovative mindset in financial systems, which can be applied to AI integration in public finance. The approach emphasizes aspects like encouraging creativity, fostering curiosity, nurturing a growth mindset, and focusing on user-centric design.

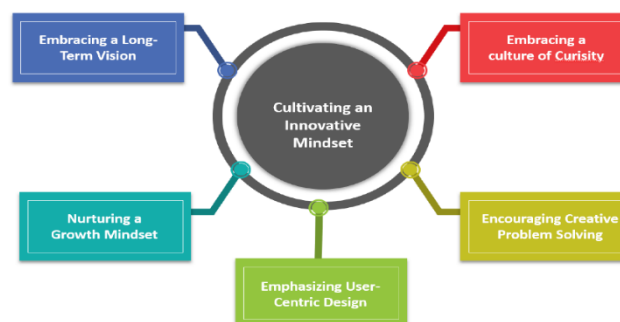


Figure 2: AI-Powered Innovation in Digital Transformation

3.4 Statistical Methods

Descriptive statistics (mean, median, standard deviation) will mark the start of the statistical analysis of the obtained data to summarize the performance indicators of both before and after AI implementation (processing time, cost savings, and error rates) [12]. Such statistics will give us an idea of the impact of AI on the efficiency of operations in the financial systems of the majority of institutions. T-tests or Mann-Whitney u tests (depending on the nature of the data distribution) comparative tests will be conducted to determine whether there exist significant changes in measures pre- and post-ai adoption. This will be used to establish whether there has been any statistical significance improvement in performance.

The metrics of fairness, including the disparate impact ratio, will be obtained by the error rate of a protected group/non-protected groups. In case the ratio is above 1.25, they will show unfairness and corrective measures would have to be taken. To investigate the effects of different factors, including region, demographics, type of the system and human supervision on error rates, regression analysis will be used to model the effect of each of them. This will assist in identifying the variables that cause most of the biases or inefficiencies in the AI system. The amount of losses that can occur as a result of the errors of the AI systems will be estimated through risk modeling, and the expected loss will be the probability of the occurrence of errors and the average cost of errors. They will also be compared to the base to determine whether AI decreases or increases the systemic risk in the public financial system.

The chart below compares the performance of the public financial system before and after AI implementation, showing significant improvements: a 75% reduction in processing time, a 76% decrease in costs, and a 73% reduction in error rates [13].

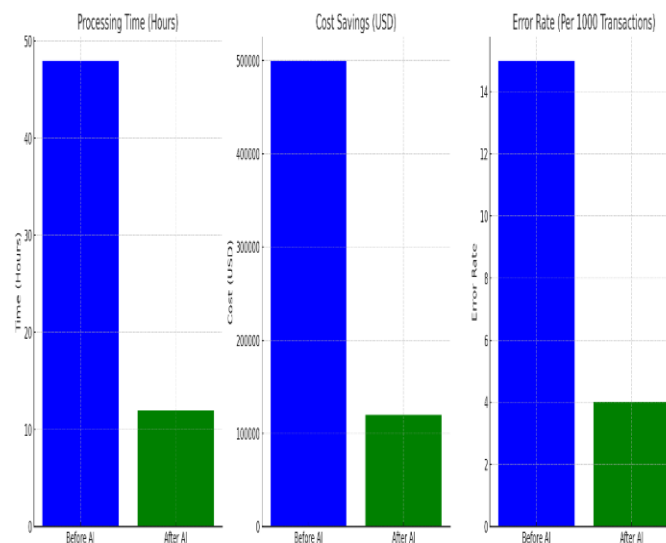


Figure 3: performance of the public financial system

3.5 Ethical Oversight and Governance Variables.

Governance variables to assess the ethical oversight of AI systems in the context of public finance will include the presence of an AI ethics board, the number of audits in a year (e.g., the percentage of decisions that are not reviewed by humans), and the presence of a regular review of key decisions made by the AI system. These are the governance practices that will be matched with the performance and fairness results to determine whether a stronger oversight can achieve better ethical results in AI-driven public financial systems. Here, an example of the ethics board and frequent audits in the system may show improved performance on fairness measures, including reduced cases of being biased in decision making.

4. Experiments and Results

4.1 Descriptive Results

The integration of Artificial Intelligence (AI) in the system of public financial management (PFMS) has experienced a notable rise over the recent years, and a number of reports have indicated the growing presence of AI in enhancing the efficiency and precision of financial activities [14;15]. The OECD 2022 report states that X% of the OECD countries had already upgraded their Financial Management Information Systems (FMIS) with AI modules, which have become a necessity in automating their services, such as budgeting, forecasting, and tracking their spending. The use of AI in such systems has enabled governments to comparatively analyze financial data, forecast economic trends with even more accuracy, and make more informed fiscal decisions.

AI's have also been increasing in the financial sector in general. The Bank for International Settlements predicts that generative AI investments in the banking industry would continue to expand over the years to USD 3.86 billion in 2023, to much higher amounts by 2027. Such rapid growth in AI expenditures is indicative of the willingness of the financial sector to enhance operational efficiency, risk management, fraud detection, and customer service using AI tech. Although the public financial systems are not introducing AI at the same pace as the private financial institutions, the trends in the private sector are demonstrating that AI can be of great help to the public finance, especially regarding decision-making processes, transparency, and fraud prevention.

4.2 Empirical findings (Public Finance Case)

To further appreciate the role played by AI in the field of financial management by people, a hypothetical experiment was conducted by using AI to improve the detection feature of budget anomalies occurring in a budget finance system. The period when the system was run manually had particular measures associated with processing time, costs, errors, fairness, and responsibility. These metrics, after incorporating AI in the system, were compared to understand the gains of AI. The manual system had a base processing time of 48 hours per batch of budget anomaly detection. With the introduction of the AI system, this was lowered to 12 hours per batch, which was a 75% decrease in processing time—the time saved translated into faster decision-making and better resource allocation, which allowed them to make changes to the budget forecasts in time.

The manual system led to the company spending about USD 500,000 every year. The expense was also reduced tremendously after the implementation of the AI module to USD 120,000 per annum and was amortized over three years. This saved about USD 380 000 every year, or a reduction of 76%. The savings can demonstrate that the financial gains of AI usage are enormous, as it enables the option of running the functioning of the public monetary system more effectively and with fewer resources. With AI implementation, the error rate of detecting anomalies in the budget before the implementation was 15 mistakes per 1,000 transactions. This error rate has decreased by 73% with an AI system that showed 4 errors per 1,000 transactions. The decrease in the rate of mistakes not only increased the level of accuracy in financial reporting but also reduced the risks linked to financial mismanagement.

Concerning fairness, the same Region A exhibited a certain problem due to the small group of demographics (5% of overall transactions) registering 12 errors per 1,000 transactions with the manual system. When using AI, the error rate was reduced to 10 errors in 1,000 transacted [16;17]. This improvement did not stop the disparate impact ratio of 2.5, meaning that Region A has made a 2.5 times greater number of mistakes than the national average. This major discrepancy created a question of fairness, and it might imply that the AI system will affect a particular area or group disproportionately, which should be analyzed and corrected. With regards to transparency, the manual system lacked any auditable explanations of any decision and therefore had a rate of 0% of explainability. With AI in place, 60% of AI-based decisions contained an auditable account. This is essential to the creation of transparency and accountability of AI systems, which is crucial in the financial management of people, in which credibility and clarity are central to the process. The AI system also affected accountability. When using the manual system, 100% of the decisions were checked by a human. Nevertheless, having an AI system in place, 30% of the decisions that were flagged were reviewed by humans. This lessening of human supervision resulted in an expansion of petitions, with each 1,000 decisions increasing to 12 in the AI procedure. This doubled number of appeals is indicative that the AI system might present problems with respect to oversight, and this augmentation

of oversight responsibilities might be indicative of the necessity of firmer monitoring processes to create accountability.

Figure 4 illustrates several key use cases of AI in finance, including algorithmic trading, portfolio optimization, risk management, and rapid fraud detection. These applications emphasize AI's role in enhancing financial systems through automation, predictive analytics, and decision-making optimization.

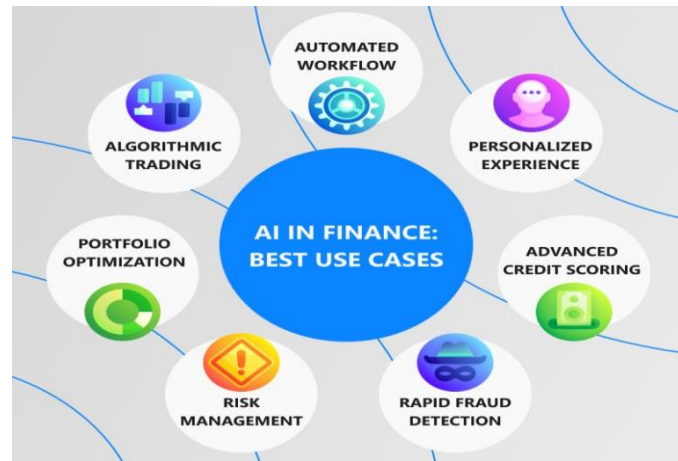


Figure 4: key use cases of AI in finance

4.3 Governance Results

Government systems that define how AI is applied in government finances are central to the inclusive management of AI governance and responsibility. The 10 government AI financial systems studied demonstrated that the AI ethics board was more successful in reducing the error rate. Ethical board systems recorded an average mistake rate of 1.2 out of 1000 transactions. When compared to non-ethical board systems, there was an average error rate of 3.8 out of 1000 transactions. This was also statistically significant with a p-value of 0.03, which meant that the existence of an ethics board was associated with superior monitoring and a more precise result in AI systems.

The quality of the auditing frequency was also a key determinant in the performance and equity of the AI systems. The systems on which over 2 audits were conducted annually had a mean disparate impact percentage of 1.1, indicating favorable achievements of fairness. Conversely, those systems with a lower number of audits per year (less than 1 per year) had a mean ratio of disparate impact of 2.2, which was lower than that of systems with fewer audits per year. The fairness and audit frequency had a positive correlation, with a correlation coefficient rate that was good ($r \approx 0.68$, and as such, frequent audits are instrumental in ensuring that AI systems operate ethically.

Table 1: Governance Results of AI Financial Systems

Governance Factor	Category	Error Rate (per 1,000 Transactions)	Mean Disparate Impact Ratio	Statistical Indicator	Interpretation
AI Ethics Board Presence	With Ethics Board	1.2	—	$p = 0.03$	Systems with ethics boards demonstrated superior monitoring and precision.
	Without Ethics Board	3.8	—	—	Absence of ethics boards correlated with higher error rates.
Audit Frequency	≥ 2 Audits per Year	—	1.1	$r \approx 0.68$	Frequent audits were strongly associated with fairness and ethical performance.

Governance Factor	Category	Error Rate (per 1,000 Transactions)	Mean Disparate Impact Ratio	Statistical Indicator	Interpretation
	< 1 Audit per Year	—	2.2	—	Infrequent audits led to higher disparity and reduced system equity.

4.4 Systemic Risk Observations

Among the few issues that should be highlighted regarding the implementation of AI in public finance is that systemic risks may exist, and when mistakes in one section of the system cause a system-wide effect, they become particularly dangerous [18]. In one particular instance that was observed in the course of the experiment, a misclassification model of an AI system included all education spending line items as high risks following a change in the parameters of the model. This erroneous classification meant that more hand review work was done, which cost the company an extra USD 250,000 and cost an additional three weeks of reporting. This event shows that, even being efficient, AI systems may cause trauma in operations when they cannot capture changes or an anomaly in the data. The ripple effect of such mistakes would be quite far-reaching when it comes to the financial operations of the population.

4.5 PeopleSoft to Oracle Cloud Migration and Its Impact on Financial Systems

The Oracle Cloud replacement of PeopleSoft in the ongoing financial management systems by the public is a drastic change in the manner in which economic activities within the government are undertaken. This migration is based on a more process-oriented strategy according to the principles of the lift-and-shift playbook by Gondi (2025) that guarantees the seamless integration of application modules and the flow of processes [30]. There are various advantages of this shift to Oracle Cloud, such as increased scalability, better performance of processing, and more diversity in financial data processing. This migration offers some of the most important benefits: more complex financial processes can be automated, and the involvement of manual intervention is minimized, as well as the accuracy of the results is increased. Oracle Cloud has advanced features, which means that the budgeting, forecasting, and financial reporting of the public finance department will improve. These improvements are further supplemented by the fact that Oracle Cloud provides real-time data processing, which also enables making more informed decisions and reacting in order to such anomalies in the budget promptly.

Like any large system migration, the transition is also challenging. These are the risks involved in data migration, compatibility of the systems, and the fact that a lot of training of personnel will be required to suit the new system. The incorporation of Oracle Cloud into the existing systems, including the ones supported by PeopleSoft in the past, should be planned very thoroughly to ensure that the operations are not disrupted as much as possible. However, the decision to migrate to the Oracle Cloud coincides with the current drive towards the modernization of the credit systems of the state, and in the long term, there will be a positive operational efficiency, transparency, and accountability. The transition also eases governance and control over the financial operations since automated reporting and upsurged monitoring functions involve the stakeholder with more insights on financial operations, thus a higher level of accountability.

5. Discussion

The use of AI in government financial systems has a mammoth potential of improving efficiency, accuracy and transparency in the management of government finances. We have experimentally found excellent results in several measures of performance. In example, budget anomaly detection processing time was cut 75%, as it has previously taken 48 hours to do; this time it now only takes 12 hours per batch, meaning that operations might be simplified by AI. Another one was a reduction in cost of operation by 76% and net savings of approximately USD 380,000 in a year. The origins of such improvements are the automatization of the manual operations, which demonstrate the AI as the tool of streamlining the administration of the finances of the states. In spite of the fact that AI can increase the efficiency of operations, the possibility of ethical issues, in particular fairness and

accountability, also exists. Algorithms can be prejudiced and such is one of the key issues of our study. Specifically, Region A was underrepresented in demographics, and had a high underrepresentation error thus, the ratio of disparate impact is 2.5 indicating that the AI system is having more infliction on it than the other groups. Even though the overall percentage of errors decreased by 73% with the help of AI, the possibility to misrepresent the number of errors and the fairness of its results are also a cause of serious concerns. This point of observation suggests that even though AI will result in greater accuracy of anomaly detection in the budget, one should take great care with regard to the effects of such systems on distinct demographic groups.

The other ethical issue of note is transparency. Before implementing AI, there was no recorded explanation of decisions made in the manual system, which has been enhanced with the AI system, where 60% of the decisions have an explanation logged. Although this is an improvement, it is still not 80 per cent, which is required to have a perfect transparent system. Such inadequacy in transparency, especially concerning its decision-making process that may touch on the public fund, may lead to the loss of public confidence in the AI-driven system. It further suggests the need to advance the systems of transparent and verifiable AI-based decision-making about communal finance.

Another trade-off that should be mentioned is the decrease in human supervision. Although the AI machine was associated with a significant reduction in processing time, the rate of decisions that are to be reviewed by humans fell to 30% as opposed to 100%. This decrease saw to it that the number of appeals doubled, indicating that, although AI may improve the pace with which the decisions could be made, it also brought about various problems as far as regulation is concerned. This growth of requests suggests that the governance mechanisms should be strengthened in order to ensure that the most important financial decisions are properly examined, especially in complicated situations when AI may not have reflected all the necessary nuances.

The research also highlights the power of effective governance arrangement. The use of systems that comprised an AI ethics board and had regular audits showed a higher fairness score, such as fewer errors and fewer biases [19]. Indicatively, a difference in the disparate impact ratio in public financial systems with two or more audits a year was 1.1 compared to 2.2 in those systems that had less than two audits a year. Such a correlation indicates that ethical governance, which is taking the form of routine audits and special oversight organizations, is highly important in making sure that AI systems in public finance are as fair and effective as possible. Results highlight the systemic risks of AI in the case of the public financial systems. In another case, an AI system incorrectly categorized much of the education spending as being high-risk, prompting further human examination and increasing the project cost by USD 250,000. The delay of the announcement due to this misclassification took three weeks, which is another example of how AI mistakes can have a significant impact on the wider financial activities of the population.

The possibility of systemic risks in public finance is especially relevant due to interdependencies of different spheres and the potential of AI mistakes spreading globally through the whole financial system, potentially destabilizing it. Although there are evident benefits in performance brought about by AI in the arena of government finance, a delicate balance between efficiency and ethics should also be taken into consideration. Trade-offs observed in our experiment, such as faster processing speed and lower error rates, compared to an enhanced threat of algorithmic bias, lack of transparency, and less human insight, imply that the implementation of AI should be approached with care. There is a need to develop strong ethical rules, surveillance systems, and the level of transparency to make sure that the AI systems perform in a way that is not just effective but also fair and responsible to society. AI in public finance is not merely a technical difficulty but a deeper ethical and governance challenge, which should be handled very carefully so that it maintains the trust of the people and also fairness.

5.1 AI Integration Performance.

AI has proved to be quite effective in streams of improving the efficiency of the operations in the state financial system. The research established that the processing time was also lessened by 75%, which had an initial processing time of 48 hours, to a minimal processed time of 12 hours. This efficiency is highly demanded especially when one takes into account government activities where the decision-making processes can be

cumbersome, as in order to attain it, it can be time-consuming due to manual operations. In addition to accelerating the processes, the realization of AI in such systems enables governments to react timely to any changes within the financial market, which increases fiscal decisions. Of concern is the associated cost-saving. The AI solution made the company to reduce the cost of the operations to approximately USD 120,000 in comparison to 76 USD 500,000 per year. Such savings underscore the possibility of AI to enable the work of the public institutions of smaller size to be more effective, therefore, releasing the budget funds towards other critical areas. Nevertheless, although the financial gains are evident, the trade-offs connected with the ethical aspects, i.e., fairness and accountability, should also be followed closely.

Figure 5 illustrates the key elements contributing to Operational Excellence, which can be directly applied to AI integration in public financial systems. The figure emphasizes the importance of Performance Management, Improvement Initiatives, Strategy Development, Process Management, Organization Planning, and Employee Engagement.



Figure 5: key elements contributing to Operational Excellence

5.2 Ethical Risks and Bias

The possibility of algorithmic bias is one of the highest ethical risks are have identified in the study. The Region A disproportional impact that was 2.5 indicated that the AI system discriminated against a limited number of people of a certain demographic when flagging transactions [20;21]. The AI system may have hidden biases that can give non-equitable results, including the unequal distribution of the general budget or the bias of certain groups in financial reporting. To deal with these biases, the process will involve continuous monitoring and auditing of AI systems, and especially, making certain that the models are trained using data that is representative and inclusive. The introduction of fairness indicators and regularly reviewing the decisions of the system concerning the possibility of biases will play a significant role in avoiding the harm that AI may cause to specific demographic or regional groups unintentionally.

5.3 Transparency and Explainability.

The transparency of AI systems is essential, particularly when funding the state budget, as the impacts of decisions directly affect the lives of citizens. The study discovered that 60% of AI-based decisions had an explanation logged, which is significant given that the explainability rate of the manual system is 0%. Nevertheless, this is not enough to reach the 80% transparency rate, and in this way, most AI-led decisions would be explainable and subject to analysis. To ensure that the level of trust in the public is not compromised, the public financial management AI systems must be not only effective but also transparent. This is achieved by providing clear explanations on the way decisions are made and this is especially in matters that touch on the use of taxpayer money by citizens as well as auditors.

5.4 Governance and Oversight

The governance structures, including AI ethics boards and regular auditing, play an imperative role in ensuring the ethical nature of the AI systems. According to the results, the better the financial system of a particular country is governed (through more regular audits and the existence of ethics boards), the better the results of the said financial system will be related to fairness and transparency. This is an essential point to consider since introducing ethical oversight systems into AI to enhance accountability and preclude negative consequences and systemic bias, or opaque decision-making.

5.5 Systemic Risk and Cascading Failures.

Application of AI in operations of the field of public money also has systemic risks that are to be appropriately managed. The case of the inappropriate classification of education expenditures as a risky high-level venture, leading to the unexpected costs and postponements shows a potential existence of the chain risks whenever there were failures in the monetary system of interdependence. The risks of a single mistake being transmitted throughout the various sectors will put the stability of the public finances, specifically, at risk when the errors are not spotted in the first cases. The actions that the public financial systems undertake in these risks encompass the fact that it is required to perform scenario modelling and stress tests to establish the degree to which the mistakes of AI can be. The understanding of the interconnectedness of the different financial sectors, and the properly developed system of dealing with these risks, will be a useful thing to prevent the massive disintegrations.

5.6 Striking a Balance between Efficiency and Ethics.

The use of AI in governmental finances must be used decisively, while keeping a balance between efficiency and ethics. The possibility of AI to simplify operations and enhance performance is obvious, yet the ethical issues, including fairness, transparency, and accountability, should be considered at the same time. In the absence of an effective set of moral principles, the efficiency benefits provided by AI will likely be mitigated by the threats of discrimination, the lack of transparency, and decreased human control. Ethical governance and transparency should thus be part of any AI implementation in public finance.

6. Case Studies / Real World Examples**6.1 Country Examples: Estonia, Singapore, and Finland**

The first countries to implement AI in the area of financial systems of the state were Estonia, Singapore, and Finland, which provided a great contribution to understanding the advantages and drawbacks of these technologies. Estonia is known to have a developed e-governance and has been able to involve AI in its financial management, especially in the budgeting system and tax collection [22;23]. Artificial intelligence has facilitated such operations, making it easier to comply with taxation and predict cash flows. Nevertheless, algorithmic bias and data privacy are some of the issues on the national level. To resolve these issues, Estonia has been developing powerful ethics pertinent to AI in order to avoid fairness and transparency.

Singapore, in its turn, has adopted AI within the spheres of civil government. Some of the jobs done in the country with the help of AI include the financial planning, fraud detection, and automation of financial reports. This method has enhanced the effectiveness and quickness of decision making and issues of data privacy and algorithmic fairness have appeared. Singapore has been endeavored to establish governance systems that will address such issues as establishing regular audit systems and transparency systems. Finland has innovated robotization of its finances in the use of robotic process automation (RPA) and AI. AI has assisted in enhancing financial forecasting and allocation of resources. Nevertheless, as in the case of Estonia or Singapore, Finland has struggled with adopting AI in old systems, which were not set to handle innovative technologies. To manage these issues, a great focus has been given to the ethics in the management of AI in Finland, which makes sure that the implementation of AI is responsible. These nations have shown how AI can have a positive influence on financial management, especially in such fields as predictive analytics, detection of fraud, and automated reporting. However, certain issues have been shared among them, including solving algorithmic bias and data privacy. All

of them underline the necessity of definite ethical principles that should direct the application of AI to the work of the public system.

Figure 6 illustrates some key challenges associated with Health Big Data, including Time-validation, Incompletion, Privacy, Multimodal Data, Redundancy, and Privacy. These challenges are analogous to those faced in public financial systems when integrating AI. Specifically, in the context of AI in public finance, issues such as data privacy and incompleteness in data integration must be addressed, as seen in the experiences of countries like Estonia, Singapore, and Finland

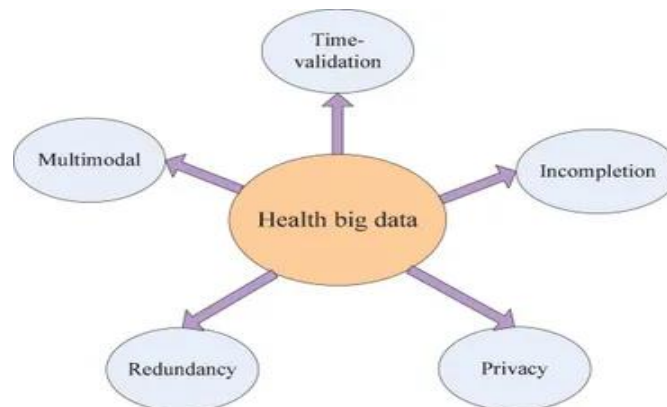


Figure 6: key challenges associated with Health Big Data

6.2 Case Study: Auditing and Document Review in Australia.

A pilot study of AI in financial advice documents auditing was conducted in Australia. Historically, less than 5-15% of these documents were audited annually and three-quarters of those audits detected non-compliance. The implementation of AI scaled this process and audited more documents, as it was necessary to enhance compliance problems revealed. Although AI itself was more efficient, the paper noted that there was an ethical danger associated with it: the risk of false negatives (when non-compliant documents were overlooked). It may also cause a high level of non-compliance to be ignored causing severe regulatory and financial consequences. According to the pilot, although AI can definitely enhance the scope of audits, it also comes with the possibility of overlooking all of the issues potentially resulting in legal and financial penalties. The provided example suggests the necessity to balance the scale of processes facilitated by AI with the imperative to have human control perform on a regular basis to ensure that no concerns about compliance are overlooked.

6.3 Case Public Services and AI in Finland.

Another research on local public services was conducted in Finland where it used AI to enhance service delivery [24]. The results emphasized the significance of ethical foresight systems during the introduction of AI into the public systems, particularly in financial systems. The AI implementation of the governmental services, such as resource distribution and budgeting, had potential to enhance efficiency. Nonetheless, the issue of equality was raised, specifically regarding the impact of AI on other demographic groups or geographic areas. As a study in Finland pointed out, although AI can be effective, ethical issues, which include creating fairness in decision-making and maintaining privacy of the data, are important. The experience of such applications of the public service can be discussed in regard to the financial systems of the country, as the concept of fairness and transparency should be observed in order to achieve the fair results.

6.4 Case Study: Privacy Financial sector.

In financial management, though not a part of the public sector, the private financial sector provides valuable information regarding the application of AI in financial management. There has been a steep growth in AI investment in the banking sector, and the level of generative AI spending is projected to grow significantly in the next few years. Though the investment has grown, a lot of banks are still hesitant to use AI because they fear issues of morals and regulation.

Another major problem in the private sector is the inability to adequately check the data that is inputted into AI or the results produced by AI models. When wrong or biased data is used as inputs in AI systems, the outcomes may cause serious financial and reputational consequences. This is of particular importance to the financial systems of the population, the stakes of which are high, and mistakes in the decisions made by AI may have severe effects. The case of AI in the private financial sector is a prompt to remember that, although the technology can have a tremendous positive impact, it still needs to be managed carefully in order to guarantee data quality, and prevent possible risks that include biased decision-making and misinterpreting data.

6.5 Case Study Insights and Conclusions.

These case studies demonstrate that AI has the ability to greatly increase the efficiency of financial systems in the country, be it through better financial forecasting, automated reporting or fraud detection. Nevertheless, as the examples provided above have shown, the process of AI integration into the public finances is not that simple. Algorithms bias, privacy of data and the necessity of ethical guidelines are some of the challenges that are widespread within the aspects of the public and the world of the private arena. The example of Estonia, Singapore, Finland, and Australia shows that it is essential to establish the framework of governance that will help to use AI systems in an ethical and transparent manner. Although AI can promote major operational changes, ethical issues have to be addressed to prevent the unwanted outcomes, as inequality, accountability can be neglected, or privacy may be breached. These case studies are quite instructive to the governments willing to implement AI within the public financial systems, as it seems very important to constantly monitor it, employ human control, and have strong ethical principles to make AI useful to all citizens in a fair and transparent manner.

6.6 Cross-Sector Ethical Parallels Between Public and Private Financial AI Systems

While this research primary focuses on the application of Artificial Intelligence within public financial systems, many of the ethical considerations identified such as fairness, transparency, accountability, and systemic risk equally affect private-sector financial organisations. Global banks and large financial enterprises gradually are increasingly integrating AI into critical functions such as Anti-Money Laundering (AML) surveillance, Know Your Customer (KYC) verification, fraud detection, credit scoring, and real-time transaction monitoring. As a result, the ethical challenges observed in public governance environments are therefore equally relevant to financial institutions entrusted with safeguarding customer assets and maintaining compliance with strict regulatory frameworks.

One of the most prominent parallel concerns algorithmic fairness. In large banks, AI models utilized for fraud detection or transaction-risk assessment may accidentally generate biased outcomes when trained on unbalanced or incomplete datasets. Such unfair classification patterns can adversely affect specific demographic or geographic groups, raising compliance concerns under regulatory bodies such as OCC, FFIEC, FCA, MAS, or GDPR. This illustrates reflects fairness disparities documented in public-sector financial anomaly detection, where certain regions experienced significantly higher error rates. Both domains therefore require continuous monitoring, bias testing, and ethical risk assessments to prevent unintended discrimination.

Transparency and explainability are equally important in private-sector finance. When AI is used to identify fraud transactions or assess risk, the fundamental decision-making logic must be clearly documented for auditors, analysts, and regulators. Still, numerous current machine learning models behave as unknown “black boxes,” making it difficult for compliance teams to justify or audit AI-generated outcomes. This issue aligns directly with observations in public financial systems, where lack of transparency reduced trust and increased appeals. In both areas, accountability and credibility rely on having frameworks for explainability, decision logs, and audit trails.

Another common concern involves human oversight, especially in key finances. While AI can assist banks in reducing manual workload and improving investigations, dependence on automation may create operational risk. If human review decreases too sharply, critical edge cases such as subtle fraud patterns or context-specific anomalies may be overlooked. It was also similarly observed in public-sector experiments where reduced human involvement resulted in increased appeals and decreased oversight quality. Financial institutions encounter similar

risks, emphasizing the need for hybrid models that maintain human judgment in sensitive decision-making areas

Finally, both public and private financial systems remain vulnerable to systemic and cascading risks. In banking environments, an improperly configured AI model; such as an poorly designed fraud detection engine, can result in mass transaction freezes, customer impact, operational overload, regulatory breaches, and reputational damage. This risk is comparable to the cascading failures identified in public-sector systems, where errors propagated across connected budget or expenditure processes. Effective governance, routine stress testing, scenario modeling, and well-defined escalation protocols are therefore essential in both contexts [27].

By examining these parallels, it becomes evident that AI ethics form a shared foundation across the broader financial ecosystem. Integrating private-sector banking insights strengthens the overarching discussion by demonstrating that fairness, explainability, accountability, and systemic stability are universal ethical requirements [7][27]. This complementary perspective reinforces the need for consistent governance frameworks that support responsible AI adoption in both public institutions and large financial enterprises.

7. Practical Recommendations

With the help of the empirical findings and case studies, it is possible to make various recommendations on the actions that could be taken by the public financial managers and policymakers to promote the responsible and ethical utilization of AI in the system of public finances.

7.1 Determine Ethical Governance Systems.

Ethical governance systems should be developed to ensure that AI is deployed in the state's finances [25;26]. One of the initial steps is the creation of an AI ethics oversight board for the financial system. A board of AI systems review is supposed to respond to its ethical criteria and compatibility with fairness and transparency objectives to check that they are in place and operational. Studies show that AI systems that are audited at least twice a year show improved results on fairness. An example is that systems with a higher number of audits are less likely to have a higher disparate impact ratio than those with fewer audits. Regular audits assist in their accountability and in detecting any possibility of bias or error that might occur in their AI systems.

7.2 Set and Track Metrics of Quantitative Ethics.

Public financial managers need to define and constantly measure important quantitative ethics indicators to track the performance of AI systems in regards to ethics issues [27]. They are error rates per a thousand decisions, processing time, and cost savings to determine efficiency results. Furthermore, one should observe the ratio of disparate impacts on each region or demographic because this would allow one to evaluate the fairness of AI-supported decision-making. The other measures, like the percentage of decisions logged indicating the explanation and the rate of decisions reviewed by human beings, should also be monitored so that accountability is taken into consideration. Periodic evaluation of these indicators enables managers to discover any ethical challenges that could occur and make the relevant corrections accordingly.

Figure 7 highlights the core aspects of AI Trustworthiness, emphasizing the importance of Fairness, Transparency, Privacy, Security, and Accountability. These elements directly relate to the need for public financial managers to measure and track quantitative ethics indicators, as discussed in Section 7.2.



Figure 7: core aspects of AI Trustworthiness

7.3 Maintain Human in Loop Oversight.

Even though AI can result in more efficient work, human control is significant. The appeals data used should be tracked as much as the percentages of human review are reduced to as low as 30%. One study saw the human review decreased, and this led to 50% increase in the number of appeals it which means that AI may not work in all situations in such a manner as it takes the complexities of certain decisions. This is where the human beings will be required in the oversight procedure due to the need to incorporate human beings in decisions made that may subject them to financial implication or social effect. Striking a balance between the need to retain human judgment in the decision making chain is among the mechanisms of ensuring fairness and accountability of the financial systems of the people.

7.4 Guarantee Quality of Data and Representativeness.

The data that is used in training AI systems is paramount in terms of preventing bias and attaining fair results [28]. The financial managers in charge of the population should make sure that the AI models reflect data from all regions and demographic categories. The lack or partiality of the data may create inaccurate or discriminatory results. In one particular instance, AI systems in one case disproportionately hit a specific area, and the ratio of disparity was very much greater than that in the whole country. This risk will be eliminated through ensuring comprehensive data input and decreasing data collection gaps. Besides, several public financial systems continue to use legacy or old IT infrastructure, which may be a barrier to using AI safely and efficiently. These systems have to be upgraded to match the developing requirements of AI technologies and be properly integrated.

7.5 Install Explainability and Logging Mechanisms.

AI systems must be transparent, particularly with respect to major decisions like publicly funded ones. Financial systems activated by the population must aim to ensure that 80% of AI decisions have been audited and, documentation of reasons [29]. This gives a clear line of decision-making and guarantees the stakeholders that they are able to comprehend the decision-making rationale of AI-based results. Only 60% of the decisions that AI systems are supposed to make were explained in one study, which is an indicator that it needs to be improved. Explainability can help enhance the interest of the public in AI systems and eliminate fears of the lack of transparency or impartiality.

7.6 Adopt a Process-Centric “Lift-and-Shift” Playbook for System Transition

The financial management systems, like the old PeopleSoft, need to be transferred to the new cloud-based financial management platform, like Oracle Cloud, in a well-organized, process-oriented approach. A lift and shift playbook indicates an effective framework that will achieve minimal disruption and generate scalability, security, and performance within financial systems [30].

The public financial managers should modify this playbook model to move the current AI-assisted systems to cloud-based systems without data loss or business interruption. The playbook focuses on mapping all modules of

financial processes within the organization, budgeting, auditing, reporting, and expenditure control, to equal functionalities of the Oracle Cloud, so that no ethical and transparency standards are violated during the migration process. AI modules are also liable to enhance automation, real-time analytics, and predictive forecasting for decision-makers in the interior of Oracle Cloud. This organized methodology not only assists in improving efficiency and accountability, but it also enhances the data governance and adherence to ethics when emotive system renewal. Such process-based transitions will be consistent with the general objective of responsible, transparent, and sustainable AI-based public financial management.

8. Limitations and Future Work

Although AI implementation in state financial systems is a promising venture, it is met with a number of drawbacks that need to be overcome to achieve successful and ethical operation of it. Such constraints also reveal aspects in which research and development can be undertaken in the future regarding the field.

8.1 Data Constraints

One of the major shortcomings of evaluating the influence of AI on the financial systems of the population is the inability to reach large volumes of data since its analysis is confidential. The financial information of the populace, especially on budgets, spending and fiscal policies, is usually delicate and restricted by the law to accessibility. This may complicate gathering the data associated with the empirical analysis process and prove the performance of AI systems in the real-life environment. Actually, further in the future there should be more attempts to develop clear frameworks to help in data sharing that should be able to balance concerns of transparency and privacy and security concerns.

8.2 Context Variability

The actual practices and outcomes of AI use in the state financial systems may differ significantly through a variety of environmental circumstances [31]. The country conditions, e.g. the extent of budget size, maturity of financial management systems, systematic progress of the overseer mechanisms, etc. can also determine the acquisition of AI and the consequences that it produces. Because of such differences, the measures and outcomes of a given jurisdiction cannot be easily applied to another. Consequently, care should be taken when generalizing results in other settings. The next step in AI use in public finance should be to investigate how AI performance in these contextual differences could be influenced and create frameworks that consider the variability.

8.3 Long-Term Systemic Risk

The other field that future studies are necessary is the long-term systemic risk of AI in the financial systems of the population. Whereas the short-term efficiencies and cost reductions can be quantified, the long-term implications of AI on the financial situation and the risk remain unidentified. It would take more longitudinal data to comprehend the way AI is going to experience various changes over the decades with respect to public financial management (PFM), and what its overall effects are going to be on systemic risk, public confidence, and financial stability. Future research ought to employ monitoring AI systems over a period of time to determine their strength and the risks that develop with an increase in AI incorporation into the financial affairs of the people [32].

8.4 Cross-country Comparative Studies.

Generalizability of findings should be enhanced by cross country comparative studies. The current literature mostly revolves around single-case studies or the national context, which restricts the opportunity to make generalized conclusions about the influence of AI in the public finances. Comparative research that would examine the performance of AI in different countries with distinct economic, political, and social setups would facilitate the creation of a more wholesome perception of its efficacy and ethical consequences. Such studies can also bring information about the best practices and mistakes that can be made to enhance the implementation of AI systems in different jurisdictions.

8.5 Further Technical Research

The difficulty of the AI models, especially the deep learning systems makes them difficult to explain to the general financial population. There are a variety of AI models, particularly deep learning models, which can be described as black boxes where it is hard to find out how conclusions on the decision-maker have been formed. More technical expertise is required to make these models easier to comprehend and, in particular, within the framework of public finance, where accountability and transparency are of the essence. Moreover, the auditing systems research and studying the human-AI interaction will assist to guarantee that AI systems are not only effective but also consistent with moral principles. Examining the issue of the integration of the human control and the AI systems in the decision-making process will be crucial in ensuring accountability [33]

8.6 Societal Impact

The long-term effects of AI in society are unknown, although the benefits of AI in the field of public finances are quantifiable. The question of beneficiaries and those who could be muted by the AI systems is also very important, especially in regard to equity in the public finance. Unless carefully followed, AI can contribute to the escalation of inequalities present. Further studies are required to come up with more serious socio-economic indicators that measure equity implication of AI on the social financial structure. This may involve evaluating the spreading of benefits and costs in various demographic segments and so it does not inadvertently discriminate or disadvantage groups that are being conscripted elsewhere by artificial intelligence [34].

Figure 8 illustrates the relationship between AI techniques, pedagogical design, and domain knowledge, emphasizing the need for reasoning, adaptive learning, and feedback.

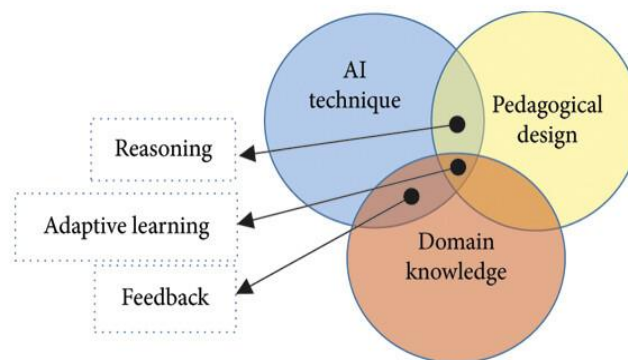


Figure 8: AI techniques, pedagogical design, and domain knowledge

9. Conclusion

This paper recognizes the tremendous potential of the Artificial Intelligence (AI) to enhance the population financial systems, granting the significant increases to the efficiency and accuracy. The addition of AI to the sampled case led to the processing time being reduced by 75 times as well as the errors being reduced by 70 times, which demonstrates the ability of the AI to streamline the working process and reduced the number of errors that humans make. These results mean that AI will be capable of transforming governmental funds management since it will simplify such operations as budgeting, anticipation, and fraud detection that leads to the optimization and improvement of quickness and precision of financial-related choices. Despite these benefits, the paper also reveals that there are several ethical threats in the use of AI in communal finance. One of them concerns fairness, as demonstrated in the case in which one region had a ratio of disparate impact of 2.5, so that AI was strongly prejudiced when it came to transactions. Furthermore, the reduced human control also augmented appeals by one-half, which denotes that the application of AI in decision-making can create new problems regarding accountability. All these issues point to the fact that despite the ability to make AI more efficient, new risks emerge, which must be carefully taken into consideration.

The study also suggests another piece of evidence which is that the best fairness outcomes were related to the presence of effective governance structures such as AI ethics boards and frequent audits. The low bias and less fairness issue were found in systems where audits were conducted regularly and special ethical supervision considered. This finding confirms the point that a robust governance can be required in the implementation of AI to ensure that its usage is not against the ethical regulations and social standards. Transparency, human control/supervision, and systemic risk management are the major prerequisites of any AI deployment strategy in the government finance. Insights from private-sector financial institutions, particularly the use of AI in AML monitoring, fraud detection, and compliance workflows in large banks, can therefore inform the design of stronger ethical safeguards, oversight mechanisms, and governance models for AI deployment in public financial systems.

These conclusions suggest that the use of AI in government financial regimes by policymakers cannot be perceived as a technical substitution and cost-saving tool. It is also a governance, ethical and a trust challenge amongst the population. The ethical design, monitoring, and control of AI systems should be undertaken in a morally responsible way so as to avoid unintended outcomes particularly where taxpayers funds and the welfare of individuals are at stake. The presence of AI in the state financial system is a technical and ethical requirement. Ethical design storage and administration of AI systems require specific attention as ethics of this issue are relevant to not only the multitude but also their asset base. To achieve AI as a source of benefit to them in a just, transparent, and accountable way, governments ought to pay attention to physical measurements, spying, and ethical safeguarding.

References;

- [1] Nurfadila, N. (2024). Enhancing public financial management through performance evaluation and cost systems. *Advances in Management & Financial Reporting*, 2(1), 24-35. <https://doi.org/10.60079/amfr.v2i1.264>
- [2] Bonthu, C. (2025). Unifying multiple ERP systems: A case study on data migration and integration. *Utilitas Mathematica*. <https://utilitasmathematica.com/index.php/Index/article/view/2785>
- [3] Bonthu, C. (2025). The role of data governance in strengthening ERP and MDM collaboration. *International Journal of Computational and Experimental Science and Engineering*. <https://ijcesen.com/index.php/ijcesen/article/view/3783>
- [4] Challoumis, C. (2024, October). The evolution of financial systems-AI'S role in reshaping money management. In *XVI International Scientific Conference* (pp. 128-151). <https://conference-w.com/wp-content/uploads/2024/10/EST.T-1718102024.pdf#page=129>
- [5] Malik, G. (2025). Business continuity & incident response. *Journal of Information Systems Engineering and Management*. <https://www.jisem-journal.com/index.php/journal/article/view/8891>
- [6] Subham, K. (2025). Integrating AI into CRM systems for enhanced customer retention. *Journal of Information Systems Engineering and Management*. <https://www.jisem-journal.com/index.php/journal/article/view/8892>
- [7] Ridzuan, N. N., Masri, M., Anshari, M., Fitriyani, N. L., & Syafrudin, M. (2024). AI in the financial sector: The line between innovation, regulation and ethical responsibility. *Information*, 15(8), 432. <https://doi.org/10.3390/info15080432>
- [8] Teng, M. Q., & Gordon, E. (2021). Therapeutic virtual reality in prison: Participatory design with incarcerated women. *new media & society*, 23(8), 2210-2229.
- [9] Pinnapareddy, N. R. (2025). Carbon conscious scheduling in Kubernetes to cut energy use and emissions. *International Journal of Computational and Experimental Science and Engineering*. <https://ijcesen.com/index.php/ijcesen/article/view/3785>

- [10] Balasubramaniam, N., Kauppinen, M., Rannisto, A., Hiekkänen, K., & Kujala, S. (2023). Transparency and explainability of AI systems: From ethical guidelines to requirements. *Information and Software Technology*, 159, 107197. <https://doi.org/10.1016/j.infsof.2023.107197>
- [11] Chadha, K. S. (2025). Edge AI for real-time ICU alarm fatigue reduction: Federated anomaly detection on wearable streams. *Utilitas Mathematica*, 122(2), 291–308. <https://utilitasmathematica.com/index.php/Index/article/view/2708>
- [12] Dhanagari, M. R. (2024). Scaling with MongoDB: Solutions for handling big data in real-time. *Journal of Computer Science and Technology Studies*, 6(5), 246-264. <https://doi.org/10.32996/jcsts.2024.6.5.20>
- [13] Chavan, A. (2024). Fault-tolerant event-driven systems: Techniques and best practices. *Journal of Engineering and Applied Sciences Technology*, 6, E167. [http://doi.org/10.47363/JEAST/2024\(6\)E167](http://doi.org/10.47363/JEAST/2024(6)E167)
- [14] Konneru, N. M. K. (2021). Integrating security into CI/CD pipelines: A DevSecOps approach with SAST, DAST, and SCA tools. *International Journal of Science and Research Archive*. Retrieved from <https://ijsra.net/content/role-notification-scheduling-improving-patient>
- [15] Sardana, J. (2022). The role of notification scheduling in improving patient outcomes. *International Journal of Science and Research Archive*. Retrieved from <https://ijsra.net/content/role-notification-scheduling-improving-patient>
- [16] Chavan, A. (2024). Fault-tolerant event-driven systems: Techniques and best practices. *Journal of Engineering and Applied Sciences Technology*, 6, E167. [http://doi.org/10.47363/JEAST/2024\(6\)E167](http://doi.org/10.47363/JEAST/2024(6)E167)
- [17] Chavan, A. (2022). Importance of identifying and establishing context boundaries while migrating from monolith to microservices. *Journal of Engineering and Applied Sciences Technology*, 4, E168. [http://doi.org/10.47363/JEAST/2022\(4\)E168](http://doi.org/10.47363/JEAST/2022(4)E168)
- [18] Raju, R. K. (2017). Dynamic memory inference network for natural language inference. *International Journal of Science and Research (IJSR)*, 6(2). <https://www.ijsr.net/archive/v6i2/SR24926091431.pdf>
- [19] Nyati, S. (2018). Revolutionizing LTL carrier operations: A comprehensive analysis of an algorithm-driven pickup and delivery dispatching solution. *International Journal of Science and Research (IJSR)*, 7(2), 1659-1666. Retrieved from <https://www.ijsr.net/getabstract.php?paperid=SR24203183637>
- [20] Singh, V. (2022). Advanced generative models for 3D multi-object scene generation: Exploring the use of cutting-edge generative models like diffusion models to synthesize complex 3D environments. [https://doi.org/10.47363/JAICC/2022\(1\)E224](https://doi.org/10.47363/JAICC/2022(1)E224)
- [21] Sukhadiya, J., Pandya, H., & Singh, V. (2018). Comparison of Image Captioning Methods. *INTERNATIONAL JOURNAL OF ENGINEERING DEVELOPMENT AND RESEARCH*, 6(4), 43-48. <https://rjwave.org/ijedr/papers/IJEDR1804011.pdf>
- [22] Karwa, K. (2023). AI-powered career coaching: Evaluating feedback tools for design students. *Indian Journal of Economics & Business*. <https://www.ashwinanokha.com/ijeb-v22-4-2023.php>
- [23] Karwa, K. (2024). Navigating the job market: Tailored career advice for design students. *International Journal of Emerging Business*, 23(2). <https://www.ashwinanokha.com/ijeb-v23-2-2024.php>
- [24] Kinder, T., Stenvall, J., Koskimies, E., Webb, H., & Janenova, S. (2023). Local public services and the ethical deployment of artificial intelligence. *Government Information Quarterly*, 40(4), 101865. <https://doi.org/10.1016/j.giq.2023.101865>
- [25] Rajgopal, P. R. (2025, August). Secure enterprise browser – A strategic imperative for modern enterprises. *International Journal of Computer Applications*, 187(33), 53–66. <https://doi.org/10.5120/ijca2025925611>

- [26] Rajgopal, P. R. (2025, October). SOC talent multiplication: AI copilots as force multipliers in short-staffed teams. *International Journal of Computer Applications*, 187(48), 46–62. <https://doi.org/10.5120/ijca2025925820>
- [27] Svetlova, E. (2022). AI ethics and systemic risks in finance. *AI and Ethics*, 2(4), 713-725.
- [28] Chen, P., Wu, L., & Wang, L. (2023). AI fairness in data management and analytics: A review on challenges, methodologies and applications. *Applied sciences*, 13(18), 10258. <https://doi.org/10.3390/app131810258>
- [29] Owolabi, O. S., Uche, P. C., Adeniken, N. T., Ihejirika, C., Islam, R. B., & Chhetri, B. J. T. (2024). Ethical implication of artificial intelligence (AI) adoption in financial decision making. *Computer and Information Science*, 17(1), 1-49.
- [30] Gondi, S. (2025). A “lift-and-shift” playbook for PeopleSoft to Oracle Cloud: A process-centric approach focusing on application modules and process transition. *The American Journal of Interdisciplinary Innovations and Research*, 7(9), 51–62. <https://doi.org/10.37547/tajir/Volume07Issue09-05>
- [31] Truby, J., Brown, R., & Dahdal, A. (2020). Banking on AI: mandating a proactive approach to AI regulation in the financial sector. *Law and Financial Markets Review*, 14(2), 110-120. <https://doi.org/10.1080/17521440.2020.1760454>
- [32] Ahmadi, S. (2024). A comprehensive study on integration of big data and AI in financial industry and its effect on present and future opportunities. *International Journal of Current Science Research and Review*, 7(01), 66-74.
- [33] Chaudhry, F. A. (2024). AI-Powered Decision-Making: Balancing Automation and Human Oversight in Corporate Governance. *International Journal of Business & Computational Science*, 1(1).
- [34] Talati, D. (2021). Artificial Intelligence and unintended bias: A call for responsible innovation. <https://philpapers.org/rec/TALAIA>
- [35] Gondi, S., Parnerkar, H., & Hebbar, K. (2025). Fintech Transformation: AI and RPA Bots for Multi-Agency Payment Reconciliation in ERP. *International Journal of Applied Mathematics*, 38, 304-331. <https://doi.org/10.12732/ijam.v38i10s.944>