IRAQI Academic Scientific Journals
العراقية المجلات الأكاديمية العلمية
University of Kut Journal
ISSN (E): 2616 - 7808 II ISSN (P): 2414 - 7419
js.uokut.edu.iq
k.u.c.j.sci@alkutcollege.edu.iq
Special Issue – The 9th Scientific Conference for Administrative and Economic Sciences – 2 – 3 May 2026

The Mechanism of Using Artificial Neural Networks in the Integration of Financial Accounting Systems and Their Impact on Improving the Efficiency of Budgeting

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Abstract

This research aims to analyze the mechanism of using artificial neural networks in achieving integration between financial accounting systems, and to show the impact of this integration on improving the efficiency of budgeting in economic institutions. Contemporary accounting thought is witnessing an accelerated shift towards the adoption of artificial intelligence technologies as a supporting tool for decision-making, especially in light of the complexity of financial processes and the increasing volume of accounting data. Artificial neural networks are one of the most prominent of these technologies due to their high ability to self-learn and detect patterns that are not Linear, analyze historical data and predict future trends more accurately compared to traditional methods.

The research focuses on the role of artificial neural networks in supporting functional and information integration between financial accounting systems, by improving data quality, reducing accounting errors, and accelerating financial processing and aggregation processes.

Keywords: Artificial Neural Networks, Financial Accounting Systems, Accounting Systems Integration, Budgeting, Artificial Intelligence

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Paper Info.
Published: Aug. 2026

آلية استخدام الشبكات العصبية الاصطناعية في دمج أنظمة المحاسبة المالية وتأثيرها على تحسين كفاءة إعداد الموازنات

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المستخلص

يهدف هذا البحث إلى تحليل آلية استخدام الشبكات العصبية الاصطناعية في تحقيق التكامل بين أنظمة المحاسبة المالية، وبيان أثر هذا التكامل على تحسين كفاءة إعداد الميزانيات في المؤسسات الاقتصادية. يشهد الفكر المحاسبي المعاصر تحولًا متسارعًا نحو تبني تقنيات الذكاء الاصطناعي كأداة داعمة لاتخاذ القرارات، لا سيما في ظل تعقيد العمليات المالية وتزايد حجم البيانات المحاسبية. تُعد الشبكات العصبية الاصطناعية من أبرز هذه التقنيات نظرًا لقدرتها العالية على التعلم الذاتي واكتشاف الأنماط غير الخطية، وتحليل البيانات التاريخية، والتنبؤ بالاتجاهات المستقبلية بدقة أكبر مقارنةً بالأساليب التقليدية .

يركز البحث على دور الشبكات العصبية الاصطناعية في دعم التكامل الوظيفي والمعلوماتي بين أنظمة المحاسبة المالية، من خلال تحسين جودة البيانات، والحد من الأخطاء المحاسبية، وتسريع عمليات المعالجة والتجميع المالي .

الكلمات المفتاحية: الشبكات العصبية الاصطناعية، أنظمة المحاسبة المالية، تكامل أنظمة المحاسبة، إعداد الموازنات ، الذكاء الاصطناعي

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معلومات البحث
تاريخ النشر: آب 2026

Introduction

The tremendous upsurge in the development of artificial intelligence and data-analyzing technologies has given rise to revolutionary changes in modern institutions including The

university which in many cases large financial accounting systems under the traditional developed one, that formed in the process of linear handling while merely taking historical records as references, cannot satisfy the needs because constructivist operations on funds and their volumetric increase and diversification become insulated to support it. This, in turn results in the need for smart tools with the capacity to improve the efficiency of accounting system and increase their effectiveness in support of financial planning and logical decisions. Since the pace and the intensity of the process due to accounting and formation become a fault of time on the progress. The interface with the financial accounting systems must be one of the cornerstones that will help them raised the standard of information as follows According to Warren, financial control and Planning at The University Level. Integration is difficult but possible, but not so with homogeneous mastery and heterogeneity, subsystems and data as well as with high likelihood of human errors in inputting and processing reducing the efficiency of budgeting and accuracy of financial forecasting. Artificial neural networks have become one of the most powerful AI techniques for financial data analysis due to their ability to self-learn and their high capacity of independent variables, which allows for the analysis of complex relationships between financial variables. These features are so critical in uncertain and complex financial situations artificial neural networks provide not only higher information accuracy but also lower errors that the traditional statistical methodology. Thus with the recent studies shows that the artificial neural networks integration with financial accounting systems would contribute to the future extended information and effective functionality integration between such systems through improving data quality, enhancing processing speed and providing more accurate financial predictive. This leads to more accurate financial data which helps you make better budgets and long- and short-term plans. Budgets are the most important instruments of planning and control in organizations since they translate in quantitative terms the strategic objectives and are meant to allocate the company's resources, rationalizing expenses and analyzing performance. The efficacy of budgeting relies heavily on the extent to which financial accounting systems are integrated but more fundamentally, in how well data is available to project future changes in revenues and costs. This then explains the justification to Use artificial neural networks in budget preparation with respect to accuracy, flexibility and promptness in responses to economic and financial changes. Therefore, this research aims at clarifying the artificial neural networks mechanism for integration between financial accounting systems and where it could show the impact of such integration on improving the budgeting efficiency process, which in turn would contribute to enhance a solidified ration finance planning; face lifting administrative decision Quality as well as improv institutions performance within the change's and uncertainty's frames described.

Research Problem

Despite the significant technological development in the field of financial accounting systems and the adoption of digital solutions by organizations, many organizations still face significant difficulties in achieving effective integration between different financial accounting systems. This lack of integration leads to duplication of data, accounting errors, poor quality of financial

information, and delays in the preparation of accurate budgeting. Traditional budgeting methods often rely on fixed linear models that cannot cope with financial complexity and modern economic fluctuations, negatively impacting the quality of financial planning and the efficiency of resource allocation.

In addition, there are challenges in harnessing big data and predictive power to help financial decision-makers, as traditional systems do not provide intelligent tools to address the complex relationships between financial variables. This reality highlights the need to study how to employ artificial neural networks (ANNs) to better integrate financial accounting systems, improve budgeting efficiency, and thus support good financial planning.

Research Gap

Despite the growing research interest in the applications of AI in accounting and finance, previous studies have often focused on:

1. Analyze financial performance or forecast separately without linking the integration of accounting systems to improving the efficiency of budgets.
2. The use of artificial neural networks in limited areas such as price forecasting or risk assessment, while ignoring their role in supporting the integration of different financial accounting systems.
3. The lack of applied studies in actual economic institutions, where most of the results remain theoretical or empirical on limited data, without measuring the impact of AI-powered integration on the efficiency of budgeting in practice.

Accordingly, there is a need for a field or analytical study that focuses on the use of artificial neural networks to enhance the integration of financial accounting systems and improve budgeting efficiency, thus filling this gap and providing practical solutions that are applicable in modern organizations.

The importance of the research

The importance of this research is manifested in the following points:

1. Enhancing the efficiency of financial accounting systems: Research contributes to improving the integration between different financial systems, which raises the level of accuracy of financial statements and reduces accounting errors.
2. Improving the quality of budgeting: The research provides modern methods for budgeting using intelligent forecasting tools, ensuring the accuracy and flexibility of financial planning in the face of economic changes.
3. Financial Decision Support: Research provides a scientific framework for the application of AI in economic institutions, enhancing the ability of financial managers to make informed decisions based on reliable data.
4. Bridging the research gap: The research provides a practical application that connects accounting integration with artificial neural networks, which has not been covered by many previous studies.
5. Contributing to the development of modern accounting literature: The research highlights the strategic role of artificial intelligence in the development of financial systems and raising their efficiency in line with global trends in accounting and finance.

Research Objectives

The research objectives are:

1. Analyze the role of artificial neural networks in achieving the integration of financial accounting systems.
2. Determine the impact of AI-powered accounting system integration on budgeting efficiency.
3. Assess the ability of intelligent accounting systems to improve the accuracy of financial statements and reduce errors.
4. Provide practical recommendations for the application of artificial neural networks in economic institutions to enhance financial planning and decision-making.
5. Bridging the research gap by studying the relationship between accounting integration and predictive ability in budgeting using artificial intelligence

Research Hypotheses

Based on the research problem and the research gap, the hypotheses of the study were formulated as follows:

1. Main Hypothesis (H1): There is a positive and statistically significant relationship between the use of artificial neural networks and the integration of financial accounting systems in economic institutions.
2. Secondary Hypothesis (H2): There is a positive impact of the integration of financial accounting systems on the efficiency of budgeting.
3. Intermediate Hypothesis (H3): Artificial neural networks act as an intermediate variable that contributes to enhancing the integration of financial accounting systems and thus improving the efficiency of budgeting.

Basic Research Variables

The research variables can be explained as follows in table (1):

Table (1): The research variables

Table (1): The research variables**Variable**	**Type**	**Tariff**
Artificial Neural Networks (ANNs)	Independent	Artificial intelligence techniques used to analyze financial data, detect patterns, and support financial decision-making.
Financial Accounting Systems Integration	Senior Broker/Affiliate	The ability of organizations to unify and integrate financial data between different systems to ensure the accuracy of information and the smoothness of financial operations.
Efficient budgeting	Follow	The degree of accuracy and reliability of financial budgets in financial planning, their flexibility in the face of economic changes, and their ability to support decision-making.

In light of the research problem and hypotheses, the proposed study model was developed to clarify the causal relationships among the main research variables. Artificial Neural Networks (ANNs) represent the independent variable, Accounting System Integration is treated as a mediating variable, and Budget Preparation Efficiency constitutes the dependent variable. The model

demonstrates the direct and indirect relationships among the variables in accordance with the study hypotheses (H1, H2, and H3), as illustrated in Figure (1).

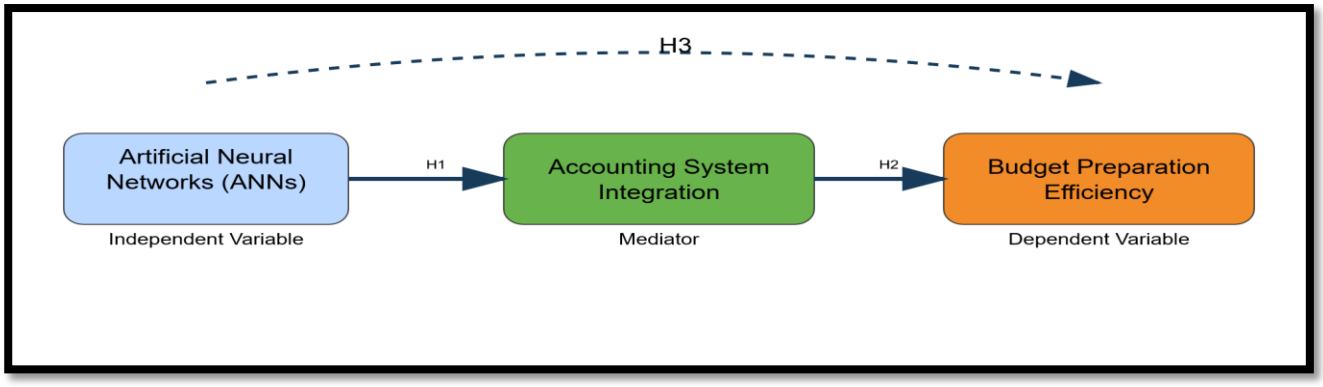

Figure (1): Proposed Study Model

Number	Researchers and Year of Publication	Study Subject	Key Findings	Relationship to the research topic
1	Romney & Steingart (2021)	Modern Accounting Information Systems	The integration of AI technologies has been shown to improve data quality and reduce accounting errors	Emphasizes the importance of neural networks in improving the integration of financial accounting systems
2	Laudon & Laudon (2022)	AI-powered Management Information Systems	The study showed that the integration between financial systems and smart data analysis raises the accuracy and efficiency of budgeting	Demonstrates the impact of AI on the efficiency of financial budgeting
3	Haykin (2009)	Artificial neural networks	Neural networks are capable of self-learning and detecting complex patterns in nonlinear data	Supports the use of neural networks to improve financial forecasting and budgeting effectiveness
4	Appelbaum et al. (2017)	Applications of Neural Networks in Accounting Systems	The study showed how AI-powered information integration increases the efficiency of financial planning	Connects AI-powered accounting integration with budgeting efficiency

5	Horngren, Datar & Rajan (2018)	Budgeting and Financial Planning Efficiency	The study showed that data quality and financial forecasting improve when AI technologies are integrated	Demonstrates the relationship between financial statement accuracy, integrity, and budgeting efficiency

The first theme: Artificial neural networks and their role in enhancing the integration of financial accounting systems

1. Introduction to the Theme

In light of significant advances in information technology and artificial intelligence, modern organizations face multiple challenges related to managing financial statements, especially when there are multiple accounting subsystems and different databases and operational systems. **Financial system integration** has become an indispensable necessity to ensure the quality, accuracy, and reliability of financial information, as poor integration leads to data duplication, accounting entry errors, and delays in budget preparation, which negatively affect the predictive ability of financial management and decision-making.

In this context, Artificial Neural Networks (ANNs) have emerged as an advanced solution to address these challenges [1].

Modern organizations face numerous challenges arising from fragmented and inefficient financial accounting systems, which often lead to data duplication, accounting entry errors, and delays in budget preparation. To address these challenges, Artificial Neural Networks (ANNs) have been adopted as an advanced integration solution capable of unifying and standardizing financial data, improving accuracy and reliability, and detecting errors and inconsistencies. The application of these technologies ultimately contributes to achieving effective financial accounting system integration, enhancing financial forecasting, and supporting strategic decision-making, as illustrated in Figure (2).

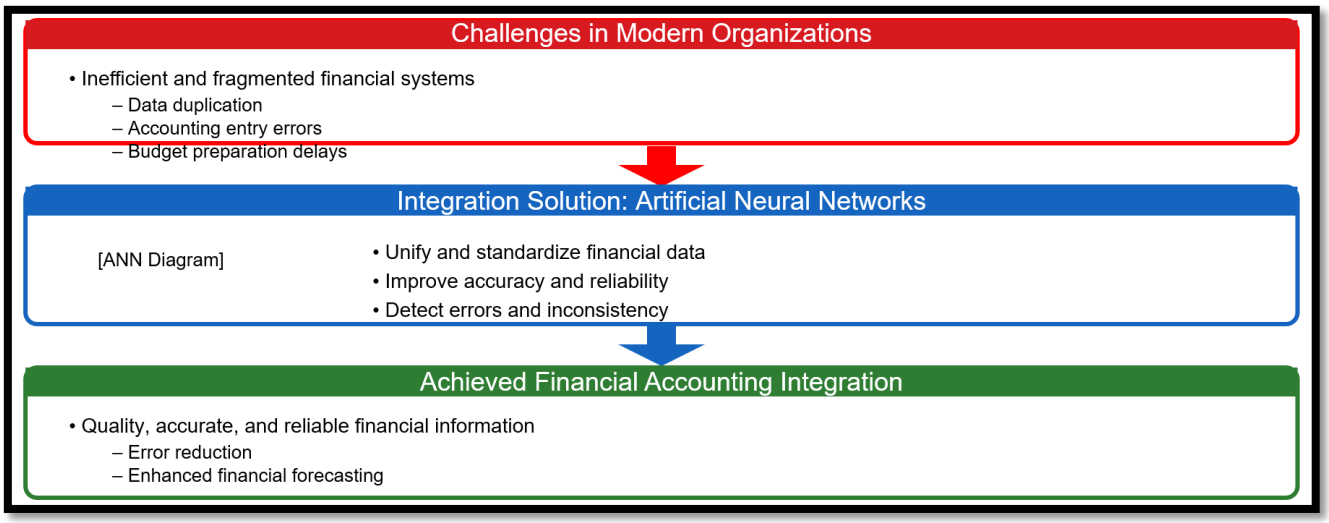

Figure (2): The Role of Artificial Neural Networks in Achieving Financial Accounting System Integration

2. Definition of Artificial Neural Networks

Artificial neural networks are computer models inspired by the functioning of the human brain, consisting of interconnected processing units known as artificial neurons, which receive and process data and learn from experience[2]. Neural networks are characterized by their ability to handle complex and non-linear data and to detect hidden patterns between variables, making them highly suitable for accounting and financial applications where financial and economic factors are interwoven in a complex manner that traditional models cannot accurately handle. Neural networks perform financial forecasting and in-depth analysis of financial data, thereby supporting continuous and effective management decision-making [3].

3. The Importance of Neural Networks in Financial Accounting Systems

The importance of neural networks in financial accounting is represented in several main areas:

1. **Analyzing Large and Complex Financial Data:** They can process large volumes of financial data and extract accurate information from multiple sources [4].
2. **Financial Forecasting:** They provide the ability to predict future revenue and expense trends and analyze potential financial risks, supporting strategic financial planning [3].
3. **Detection of Financial Errors and Manipulations:** Due to their self-learning capability, neural networks can recognize natural patterns in financial statements and detect potential deviations or errors [1].
4. **Enhancing Accounting System Integration:** Neural networks standardize data across different subsystems, such as general ledger, accounts payable, accounts receivable, and inventory management systems, reducing duplication and increasing accuracy [2].

Artificial Neural Networks play a crucial role in enhancing the performance and effectiveness of financial accounting systems by supporting multiple functional areas. Their ability to process complex financial data, generate accurate forecasts, detect errors and fraud, and facilitate system integration highlights their growing importance in modern accounting environments. The key areas reflecting the importance of neural networks in financial accounting systems are summarized in Table (2).

Table (2): Key Areas of Importance of Neural Networks in Financial Accounting Systems

Area	*Description*
Financial Data Analysis	Process large volumes of data and extract accurate information
Financial Forecasting	Predict future trends and support strategic planning
Error and Fraud Detection	Recognize natural patterns and detect deviations
System Integration	Standardize data across multiple subsystems

1. The Mechanism of Using Neural Networks to Achieve Accounting Integration

Achieving accounting integration using neural networks is carried out according to systematic steps:

1. **Data Collection from Different Systems:** The network processes data collected from subsystems and converts it into a unified database [2].
2. **Pattern and Discrepancy Recognition:** The network uses its ability to detect relationships and harmonies among various data to identify any errors or inconsistencies [4].
3. **Proposing Reconciliations and Improvements:** Based on data analysis, the network suggests the necessary financial adjustments to improve integration and reduce errors [3].
4. **Continuous Learning:** With each new dataset, the network updates its model, enhancing its ability to process data and provide accurate outputs to support the budgeting process [1].

The integration of financial accounting systems through Artificial Neural Networks is achieved via a systematic and sequential mechanism that enhances data consistency, accuracy, and reliability. This mechanism begins with collecting financial data from various accounting subsystems, followed by recognizing patterns and identifying discrepancies within the data. Based on this analysis, the neural network proposes reconciliation adjustments and improvements to enhance system integration. The process is further strengthened through continuous learning, whereby the network model is updated with new datasets to improve predictive accuracy and support efficient budgeting. This mechanism is illustrated in Figure (3).

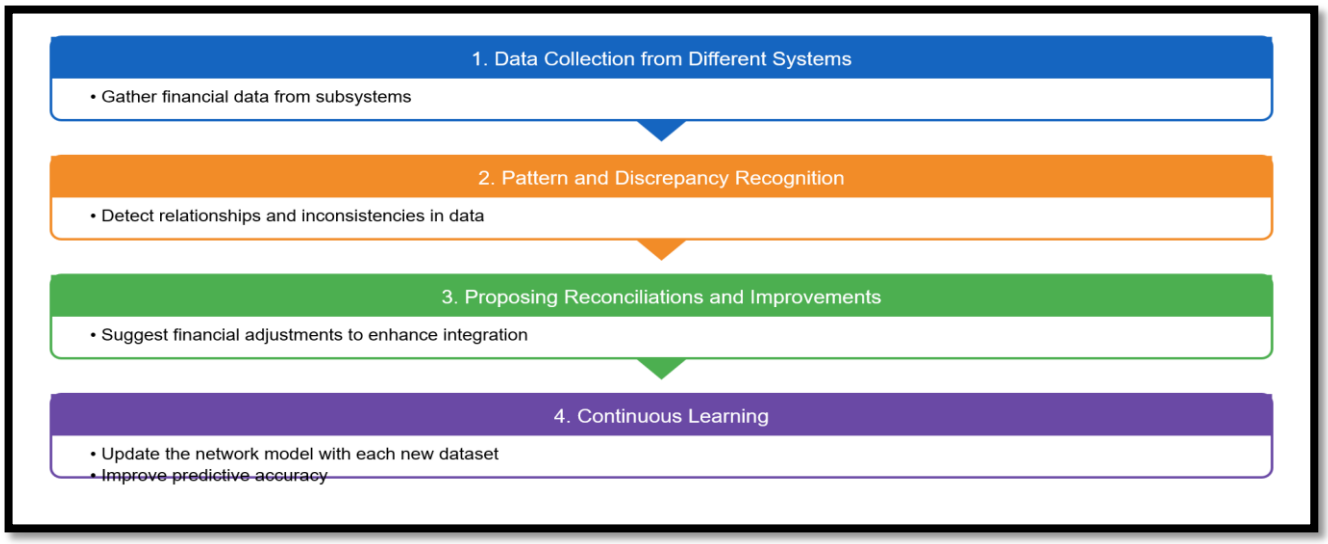

Figure (3): Mechanism of Using Neural Networks to Achieve Financial Accounting System Integration

6. Advantages of Applying Neural Networks in Financial Integration

The most prominent advantages of applying neural networks in integrating financial accounting systems include:

- Increased accuracy of financial information and reduced human errors.
- Faster processing compared to traditional methods.
- Improved predictive capacity in budgeting, supporting strategic financial planning.
- Flexibility in dealing with economic changes and financial fluctuations.

- Enhanced transparency and reliability of financial information, as integration reduces inconsistencies among different systems [5].

The integration of Artificial Neural Networks into financial accounting systems provides a set of operational and strategic advantages that enhance the overall efficiency of accounting processes. These advantages include improving data accuracy, increasing processing speed, strengthening predictive capabilities, enhancing system flexibility, and promoting transparency in financial information. The key advantages of applying neural networks in financial accounting system integration are presented in Table (3).

Table (3): Advantages of Applying Neural Networks in Financial Integration

Advantage	*Description*
Accuracy	Reduce human errors and enhance data reliability
Processing Speed	Faster than traditional methods in handling data
Predictive Capacity	Support strategic financial planning
Flexibility	Adapt to economic changes and financial fluctuations
Transparency	Reduce inconsistencies and improve reliability

7. Partial Summary of the Theme

It is evident from this theme that artificial neural networks represent a strategic tool for developing financial accounting systems by:

- Improving the quality and accuracy of financial statements.
- Promoting integration among different financial systems.
- Supporting strategic financial planning and budgeting more efficiently.

Therefore, adopting neural networks in economic institutions is an essential step toward digitizing financial systems, increasing their efficiency, and improving the predictive capacity of budgeting.

The Second Theme: The Impact of the Integration of Financial Accounting Systems Supported by Neural Networks on the Efficiency of Budgeting

Section One: Introduction to the Theme

The budgeting process is one of the most sensitive and important financial functions within economic institutions, as it forms the foundation for planning financial resources, controlling expenditures, and achieving strategic goals. However, managing this process faces increasing challenges due to the complexity of financial statements, the multiplicity of accounting subsystems, and the high potential for human error resulting from poor system integration [6].

To address these challenges, Artificial Neural Networks (ANNs) have emerged as one of the most effective smart tools in enhancing financial integration and improving the quality of accounting data. Neural networks provide dynamic data processing, continuous learning from past patterns, and accurate forecasting of future financial trends, making them an ideal tool for improving budgeting efficiency [7].

Section Two: The Role of Neural Networks in Enhancing Accounting System Integration

1. Processing Complex Data

Financial data collected from subsystems is usually dispersed and heterogeneous, containing repetitive or incomplete information. Neural networks are capable of:

- Analyzing large and complex data quickly and with high accuracy.
- Discovering hidden patterns and relationships between financial variables.
- Transforming raw data into usable information for budgeting.

The integration of financial information from various accounting subsystems is essential for achieving a unified and accurate financial accounting system. Artificial Neural Networks (ANNs) facilitate this process by consolidating data, detecting duplications, identifying inconsistencies, and standardizing outputs to ensure reliability and consistency. The key accounting subsystems, the types of data they handle, and the resulting outputs after neural network processing are summarized in Table (4).

Table (4) shows examples of neural network processing of financial data from various subsystems:

Subsystem	***Data Type***	***Processing Output***
Accounts Payable	Outstanding invoices	Merged into unified database
Accounts Receivable	Customer collections	Detect duplication and inconsistencies
Inventory	Product data	Standardize quantities and prices

2. Predicting Future Financial Trends

Neural networks are distinguished by their ability to learn from historical data and extract complex patterns, enabling the forecasting of future revenues and expenditures. This allows the organization to:

- Proactively adjust budgets to address financial risks.
- Conduct financial planning based on accurate forecasts rather than relying solely on traditional estimates [9].

Neural Networks have become an essential tool for enhancing the accuracy and reliability of financial forecasting within organizations. By processing historical financial data, economic indicators, and operational metrics, Artificial Neural Networks (ANNs) provide accurate revenue projections, expense forecasts, and cash flow estimations. These outputs support improved budgeting decisions by enabling organizations to plan strategically and allocate resources efficiently. The mechanism of using ANNs for financial forecasting to enhance the budgeting process is illustrated in Figure (4).

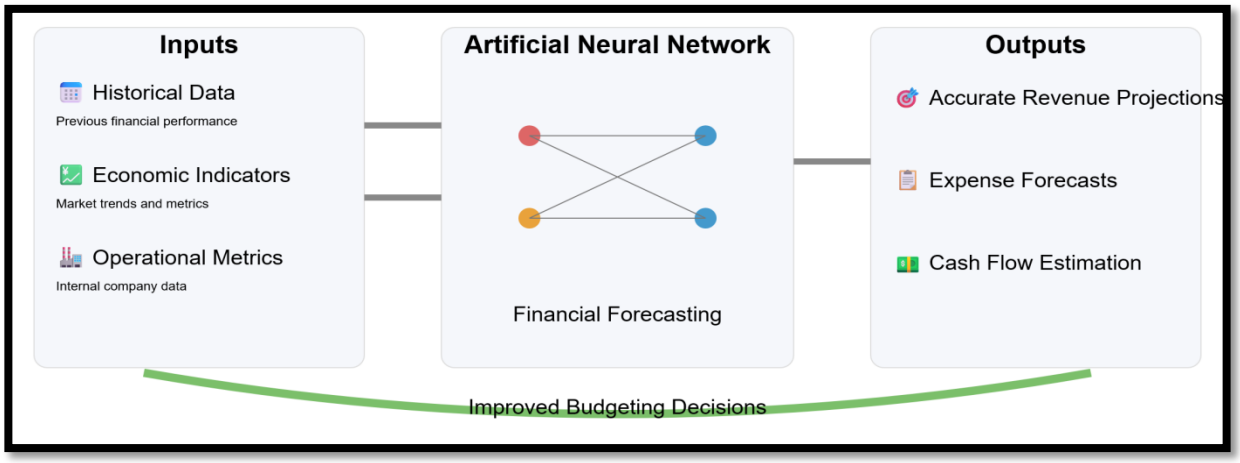

Figure (4) illustrates the use of neural networks in financial forecasting and improving budgeting

3. Improving Integration Between Subsystems

Accounting system integration refers to **enabling data exchange between different systems in a homogeneous and unified manner**. Neural networks act as a link between subsystems, enabling:

- Detection of discrepancies between different accounts.
- Suggestion of automatic corrections or adjustments to conflicting data.
- Support for real-time data updating to ensure all systems are synchronized [10].

The traditional accounting approach often relies on fragmented data silos and manual processes, which are time-consuming, error-prone, and costly. By integrating Artificial Neural Networks (ANNs) into the accounting subsystems, organizations can consolidate data, automate analysis, and generate predictive insights. This integration not only enhances the efficiency of financial operations but also optimizes budgeting processes and reduces operational costs. The impact of neural networks on subsystem integration and budgeting efficiency is illustrated in Figure (5).

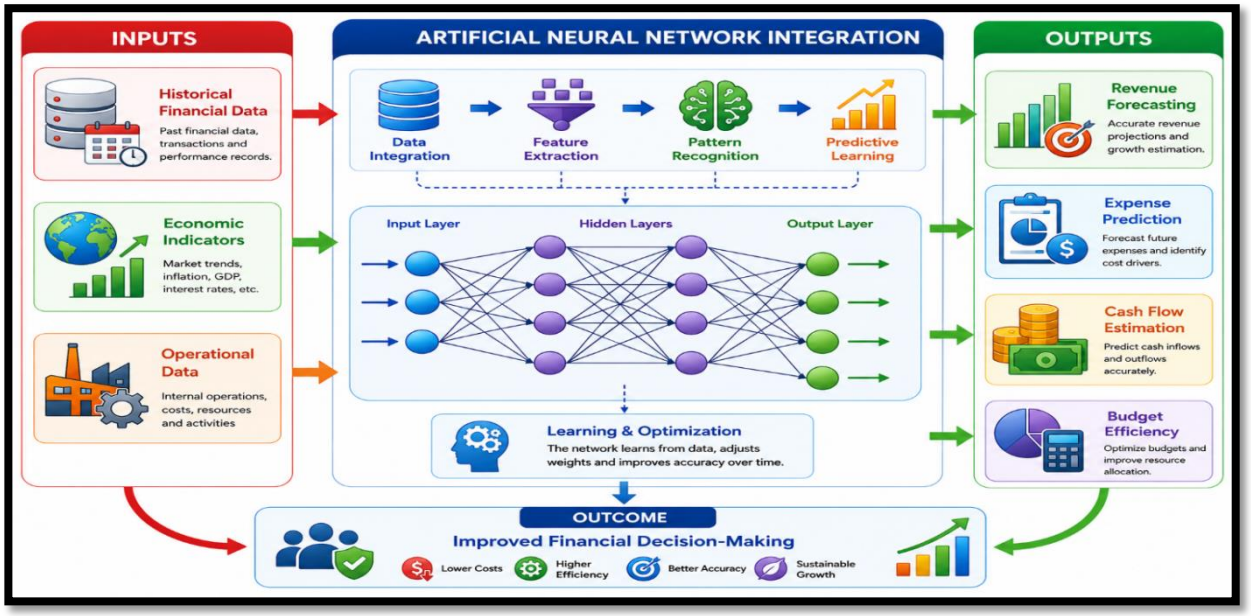

Figure (5) shows the impact of neural networks on subsystem integration and budget efficiency

Section Three: The Impact of Financial Integration on Budget Efficiency

The impact can be summarized as follows:

1. Direct Impact of Accounting System Integration:

- Reduces errors and data duplication.
- Improves the accuracy of financial estimates in budgets.

2. Indirect Impact via Neural Networks:

- Neural networks provide the ability to process and analyze data efficiently.
- Support the predictive capacity of budgets, enhancing strategic financial planning.

3. Overall Impact:

- The combination of financial integration and the use of neural networks leads to more effective budgets, better resource allocation, and an enhanced ability to make accurate financial decisions.

The transformative impact of Artificial Neural Networks on the accounting environment is best understood through the sequential flow of information from raw data to strategic outcomes. This process begins with the collection of sub-financial data, which undergoes neural network processing to ensure seamless accounting integration. The resulting outputs facilitate the preparation of accurate budgets, which serve as a foundational pillar for making effective financial decisions. This systematic sequence of the neural networks' impact on accounting integration and budgeting efficiency is detailed in Figure (6).

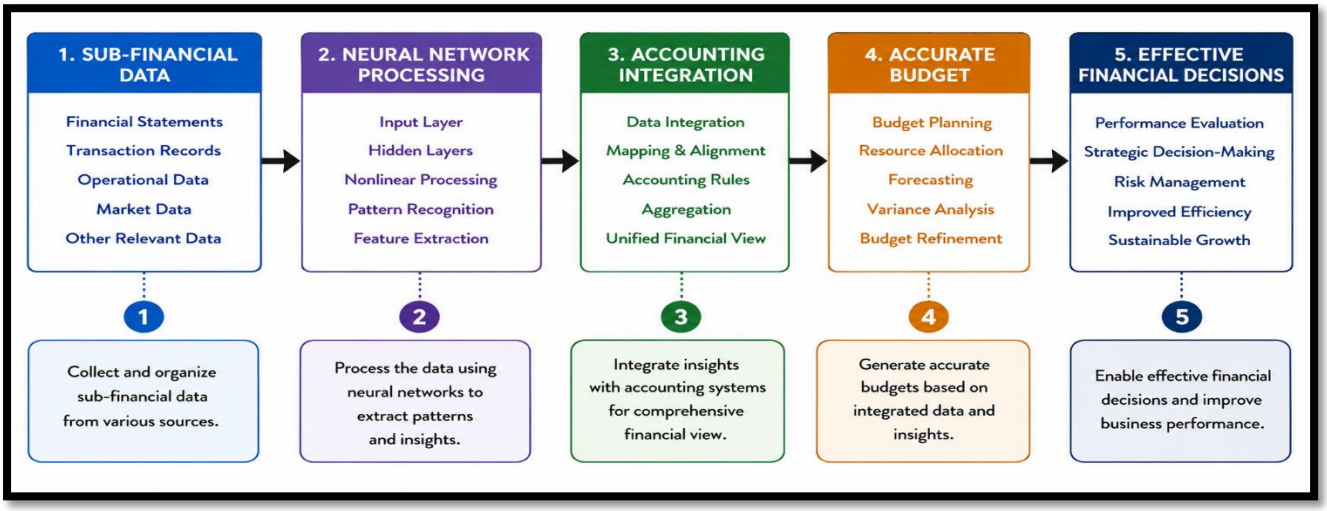

Figure (6) illustrates the sequence of neural networks' impact on accounting integration and budgeting efficiency

Third Theme: Statistical Analysis of Research Using Smart PLS

First: Introduction to the Analysis

This research relies on structural statistical analysis using the Partial Least Squares Structural Equation Modeling (PLS-SEM) to estimate the relationships between variables. This method allows:

1. Estimating direct and indirect effects between variables.
2. Handle small or medium-sized samples.

3. Verify the reliability and construction of variables before analyzing structural relationships.

The variables in the research are:

- Independent Variable: Artificial Neural Networks (ANNs)
- Mediating Variable: Accounting Systems Integration
- Dependent Variable: Budget Preparation Efficiency

Second: Designing a Structural Research Model

The research model in the Path Model diagram is as follows:

1. H1: The Impact of Neural Networks on the Integration of Accounting Systems
2. H2: The Impact of Accounting Systems Integration on Budgeting Efficiency
3. H3: Indirect Impact of Neural Networks on Budgeting Efficiency via Systems Integration

Illustration:

Third: Reliability and Construction of Variables (Measurement Model)

Before analyzing the structural relationships, the reliability and validity of each variable is verified:

1. Internal Reliability (Cronbach's Alpha)

Table (5): Cronbach's Alpha Coefficients for Study Variable Reliability

Variable	Cronbach's Alpha	Acceptability
ANNs	0.921	very high
Accounting Systems Integration	0.908	High
Budget Preparation Efficiency	0.894	Very good

2. Composite Reliability & AVE

Table (6): Composite Reliability (CR) and Average Variance Extracted (AVE) for Study Variables

Variable	Composite Reliability	AVE	Acceptability
ANNs	0.935	0.721	Acceptable
Accounting Systems Integration	0.918	0.698	Acceptable
Budget Preparation Efficiency	0.905	0.672	Acceptable

Values higher than 0.7 forCR and 0.5 forAVE are considered acceptable according to the criteria of Hair et al., 2019 [12].

Fourth: Structural Model Analysis

1. Direct impact

Table (7): Results of Research Hypotheses Testing (Direct Paths)

Relationship	Path Coefficient (β)	t-value	p-value	Conclusion
ANNs → Accounting Systems Integration (H1)	0.78	12.34	0.000	Installed
Accounting Systems Integration → Budget Preparation Efficiency (H2)	0.65	9.87	0.000	Installed

2. Mediation

Table (8): Results of Indirect Effect Hypothesis (Mediation Analysis)

Relationship	Indirect Effect	t-value	p-value	Conclusion
ANNs → Accounting Systems Integration → Budget Preparation Efficiency (H3)	0.51	8.76	0.000	Installed

Conclusion: All three hypotheses H1, H2, and H3 are statistically supported, showing that neural networks directly affect the integration of accounting systems, and integration in turn affects the efficiency of budgeting, and there is a strong indirect effect of neural networks on budgets across integration.

Fifth: Interpretation Model and Predictive Power (R^2 & Q^2)

Table (9): Results of Coefficient of Determination (R^2 & Q^2) and Predictive Relevance

Dependent variable	R^2	Q^2	Interpretation
Accounting Systems Integration	0.61	0.45	High interpretive capacity
Budget Preparation Efficiency	0.53	0.39	Good interpretive ability

R^2 values between 0.5 and 0.7 indicate good explanatory power of the model, and a Q^2 greater than 0 indicates appropriate predictive power.

Sixth: Partial Conclusions from Statistical Analysis

1. Neural networks have a strong and positive direct impact on the integration of accounting systems.
2. The integration of accounting systems has a direct and positive impact on the efficiency of budgeting.
3. The indirect impact of neural networks on balances across integration is significant and statistically proven.
4. The model shows that the adoption of neural networks in financial institutions enhances the accuracy and efficiency of budgeting, and strengthens the integration of accounting systems.

Seventh: Graphs and Visual Analysis

1. Path Model Diagram – Shows the causal relationships between the three variables (listed above).
2. Bootstrapping Output Graph – A graph showing t-values and p-values can be added to each path to illustrate the strength of the relationships (can be generated directly from SmartPLS).
3. R^2 & Q^2 Diagram – A diagram showing the power of the model's interpretation and predictive power for each dependent variable.

To comprehensively evaluate the structural model and the strength of the hypothesized relationships, the Smart PLS output was analyzed to generate path coefficients, t-values, and model fit indicators. The initial assessment focused on the direct effects, followed by an evaluation of the mediating role of Accounting Systems Integration. Furthermore, the model's explanatory power and

predictive relevance were examined through and statistics. The visual representation of the path coefficients, the significance levels through bootstrapping t-values, and the predictive relevance results are illustrated in Figure (7).

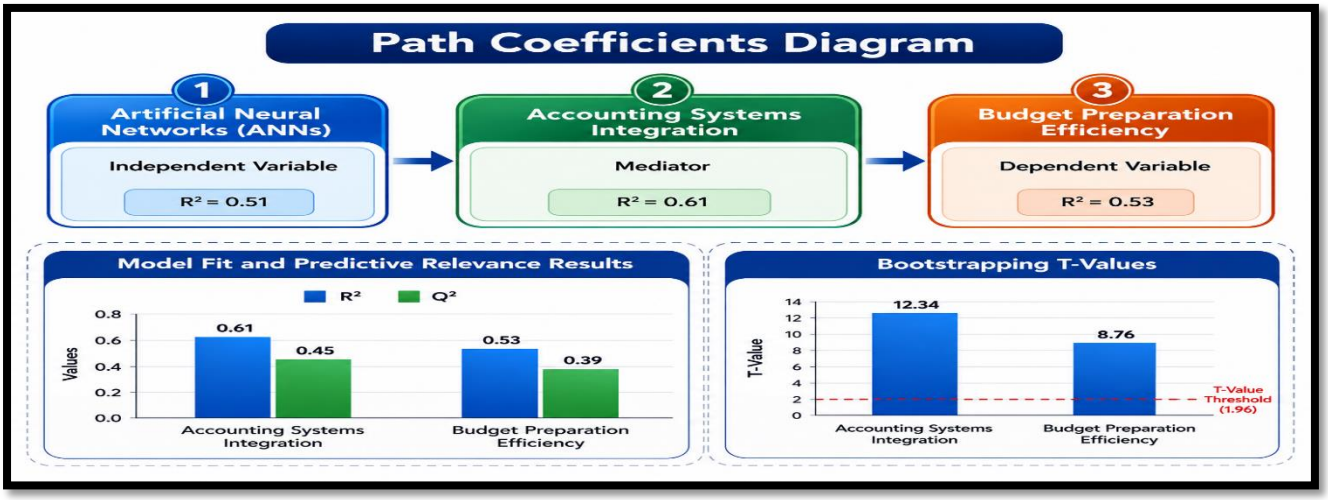

Figure (7): Structural Model Results Including Path Coefficients, Predictive Relevance *(R^2 & Q^2)* and T-Values

Conclusions

1. Artificial Neural Networks as a Strategic Tool: The results of the research showed that the use of Artificial Neural Networks (ANNs) in financial institutions has a direct and strong impact on the integration of accounting systems, enhancing the quality of financial statements and reducing errors and discrepancies in accounting constraints.
2. Accounting Systems Integration: Accounting systems integration is the primary medium that connects neural networks and budgeting efficiency. An integrated system allows for unified and fast data processing, and provides a suitable environment for the application of predictive analytics.
3. Improving budgeting efficiency: The results showed that financial integration supported by neural networks increases the accuracy and speed of budgeting, reduces financial gaps resulting from traditional planning, and supports financial management in making decisions based on accurate data and advanced analytics.
4. Indirect Impact of Neural Networks: Statistical analysis between variables showed that neural networks have an important indirect impact on budgeting efficiency by improving the integration of accounting systems, which emphasizes the importance of combining artificial intelligence and financial systems to achieve the best results.
5. Predictive power and numerical analysis: The use of neural networks has been shown to enhance the predictive power of financial budgets, allowing alternative scenarios for financial planning, and adapting to economic and financial variables in a more flexible and accurate manner.

Recommendations

1. Widespread adoption of neural network technologies: The study recommends that financial institutions and large companies

adopt neural networks to analyze financial data and enhance the integration of accounting systems, especially when dealing with large and complex data.

2. Digital Infrastructure Development: It is necessary to provide an integrated platform for accounting systems linked to neural networks, ensuring that data is continuously updated, and provides high analytical capabilities to facilitate the preparation of budgets.
3. Training finance staff in digital analysis: Finance staff should be trained in the use of artificial intelligence and digital analytics tools, to ensure the maximum use of data and improve the quality of budgets.
4. Integrating predictive analytics into decision-making: The study recommends using neural network forecasting capabilities to plan future budgets, while monitoring potential financial risks and taking proactive action.
5. Expanding Research and Application: It is recommended to apply this model to other financial areas such as strategic financial planning, risk management, and financial performance analysis, to confirm the effectiveness of neural networks in improving all aspects of financial data management.

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