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A Conceptual and Explainable AI Architecture for Automatic Bookkeeping using a Design Science Research approach

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Abstract:

Artificial intelligence (AI) is changing accounting by automating manual accounting tasks and making financial information processing more efficient. Nevertheless, current AI-powered bookkeeping systems mainly focus on automation and prediction accuracy but not on transparency and explainability, thus they lack auditability and cannot be trusted within accounting contexts where there is a need for accountability. The paper offers a conceptual model of an Explainable Artificial Intelligence (XAI)-based multi-agent architecture for autonomous bookkeeping designed by the Design Science Research (DSR) approach. The multi-agent system includes intelligent agents dedicated to such bookkeeping activities as document processing, transactions classification, journal entries creation, validation, financial reporting, and explanation generation. XAI solutions are applied to each component of the multi-agent system architecture to achieve transparency of the reasons behind AI-generated accounting decisions. The DSR approach is used to discover the problem, formulate design goals, create the conceptual solution, illustrate its functionality with example bookkeeping cases, and assess its usefulness with scenario-based evaluation and expert review. The results show that integration of XAI solutions with multi-agent systems increases transparency, modularity, scalability, and accountability of the system, thus enabling the process of autonomous bookkeeping. The proposed architecture contributes to accounting information systems by providing a theoretical framework for trustworthy AI adoption in bookkeeping and serves as a foundation for future prototype development and empirical validation using real-world accounting data.

Keywords: Explainable Artificial Intelligence, Automatic Bookkeeping, Multi-Agent Systems, Accounting Information Systems, Design Science Research, Artificial Intelligence, Explainability.

Introduction:

The accounting industry is going through a drastic change due to technological advancements in Artificial Intelligence (AI), automation, and digitalization. The use of intelligent machines is becoming common for improving efficiency, cutting costs, and providing high-quality financial reporting. Of the various accounting functions, bookkeeping lies at the core of accounting information systems as it includes recording and organizing of all financial transactions.(Azman et al., 2021) It becomes imperative for successful preparation of financial reports, compliance, auditing process, and management decisions. Despite advancements in accounting software which have automated many of the bookkeeping tasks, some of the processes in bookkeeping still need significant manual effort, especially in terms of transaction categorizing, verifying documents, creating journal entries, reconciling transactions, and dealing with exceptions.

Advancements in AI technology have presented several possibilities in terms of automation of accounting activities with the help of machine learning, natural language processing, robotic process automation, and intelligent document processing. Such technologies have enabled systems to analyze invoices, recognize transactions, find anomalies, and produce

accounting records with minimal human interference. Nevertheless, there is an absence of clarity within most AI-driven accounting systems, as users are provided with decisions without knowledge of why the decision was made. (Yi et al., 2023)The lack of transparency is a major problem within accounting due to the need for the accuracy and audibility of decisions. There is also the requirement of accounting decisions being compliant with the accounting standards and regulations.

A solution to this issue has become Explanatory Artificial Intelligence (XAI), which makes it possible for AI systems to give explanatory reasons behind their decisions and prediction. In the case of financial management, explainability increases transparency, accountability, and trust because it becomes possible for financial managers to check the reasons for classification of a particular transaction, generation of a journal entry, or detection of an exception. (Sardar et al., 2023)Therefore, explainability complements the basic principles of accounting, such as reliability, consistency, and auditability, thus making it possible to implement artificial intelligence responsibility.

Another perspective for the development of artificial intelligence for financial management is multi-agent systems, where several intelligent software agents work together in order to complete some task.(Sharko et al., 2025) Instead of using one model of AI that performs all bookkeeping operations, multi-agent technology implies distribution of responsibilities between different agents. It means that there can be an agent that extracts data from financial documents, an agent that classifies transactions, an agent that generates journal entries, an agent that verifies accounting rules, and an explanation agent that gives the reasons for its actions. Thus, modularity and flexibility are achieved in such a way that makes it possible to change a particular component of multi-agent and Explainable AI offers considerable potential for developing autonomous bookkeeping systems that are efficient, transparent, and aligned with accounting practices.

Although the use of AI technology in accounting has been gaining momentum in recent years, the current academic literature is largely dominated by the topics of forecasting and prediction, detecting accounting fraud, auditing, and robotic process automation. Much less attention has been paid to designing an explainable multi-agent AI architecture for autonomous bookkeeping. Additionally, some existing works prioritize algorithm efficiency at the expense of accounting for architectural issues such as explainability, governance, and alignment with the workflow of accounting. (Collins Kindzeka, 2023)These factors create an opening for creating a comprehensive framework based on autonomous decisions and accounting transparency.

In order to fill this gap in research, the present work proposes a conceptual and explainable AI architecture for autonomous bookkeeping based on the Design Science Research approach. Design Science Research methodology allows for a systematic identification of practical problems, establishment of design goals, creation of new artifacts, and evaluation of their relevance and applicability. (Venable, 2010) In the present research, the artifact is conceptual architecture of an accounting system with a set of specialized AI agents capable of performing bookkeeping processes in a collaborative manner and producing explanations for each of the accounting decisions.

Importance of the research:

This research can be viewed as important because of its theoretical and practical contributions in relation to AI-based bookkeeping. It provides scholars with an appropriate theoretical framework to conduct their research on the topic of interest while at the same time offering practitioners useful guidelines in developing an intelligent accounting system that is transparent and reliable. This research contributes to the ethical use of AI in accounting

through a combination of design science research, Explainable AI, multi-agent cooperation and bookkeeping principles.

Problem Statement:

Bookkeeping is an integral process of accounting that includes documenting, categorizing, and managing financial transactions in order to perform financial accounting and aid decision making. While accounting software has greatly enhanced the effectiveness of the bookkeeping process, there are still several areas within bookkeeping that need significant human intervention. (Rubini & Nithya.V, 2021)Activities like document authentication, transaction categorization, journal posting, reconciliation, and compliance are all performed on the basis of the expertise of accountants. As a result, manual bookkeeping is subject to human mistakes, discrepancies, delays in processing, and added expenses, especially for businesses dealing with a large number of transactions.

New advancements in Artificial Intelligence (AI) technologies have opened up new possibilities for automating accounting processes with the use of methods like machine learning, natural language processing, and intelligent document processing. Such approaches allow extracting information from the documents, classifying the transactions, and creating corresponding entries with minimum human involvement. However, current applications of AI in the area of accounting are largely oriented towards automation and high accuracy of the predictions while offering little insight into the process of decision-making within them.(Yi et al., 2023) Their "black-box" nature makes it hard for accountants, auditors, and regulators to comprehend and challenge AI-driven accounting decisions. Considering that accounting plays an important role in financial reporting, taxations, auditing, and regulation, the lack of explainability limits its practical application.

In addition to this, many of the existing solutions to implementing an artificial intelligence model are centralized, meaning that they try to do several things related to the accounting process at once. In turn, they often have issues with modularity, scalability, and adaptability to changes in policies, business needs, and regulations. A multi-agent approach where individual intelligent agents complete tasks like document processing, transactions classification, journal entries creation, validation, and explanation is a more advanced solution to consider. However, there is not enough information about how to integrate all of those agents in one system in a transparent and accountable way.

Finally, a literature review shows that despite the fact that Explainable Artificial Intelligence (XAI) became very popular in healthcare, finance, and decision support systems, it is still not widely used in autonomous bookkeeping. (Açar, 2022)The vast majority of the papers are focused on other areas like fraud detection, financial predictions, auditing, and robotic process automation, while the integration of XAI with autonomous bookkeeping is yet to be explored.

It follows that there is a requirement for designing an architectural concept that combines a number of intelligent agents in conjunction with explainable AI concepts to facilitate transparency and autonomy in bookkeeping. This architecture would give an illustrative map showing how various AI agents work together in order to accomplish the task of bookkeeping and at the same time give explanations for each of their decisions in accounting. It is in this context that this research adopts the Design Science Research approach to develop an explanatory AI architecture for autonomous bookkeeping.

Research Objectives:

General Objective: To design and evaluate a conceptual Explainable Artificial Intelligence (XAI)-based multi-agent architecture for autonomous bookkeeping using the Design Science Research (DSR) methodology.

Specific Objectives:

1. To examine the limitations of existing AI-enabled bookkeeping systems with respect to

automation, transparency, explainability, and system architecture.
2. To identify the functional requirements of an autonomous bookkeeping system based on accounting principles and contemporary AI technologies.
3. To design a conceptual multi-agent Explainable AI architecture that supports autonomous bookkeeping processes, including document processing, transaction classification, journal entry generation, validation, and financial reporting.
4. To integrate Explainable AI mechanisms into the proposed architecture to provide transparent and understandable explanations for AI-generated bookkeeping decisions.
5. To evaluate the proposed conceptual architecture using Design Science Research evaluation methods, including scenario-based analysis and expert assessment, to determine its relevance, completeness, and applicability.
6. To propose recommendations for future implementation and adoption of explainable AI architectures in intelligent accounting information systems.

Research Questions:

Main Research Question:

How can a conceptual Explainable Artificial Intelligence-based multi-agent architecture be designed and evaluated to support transparent and autonomous bookkeeping using the Design Science Research methodology?

Specific Research Questions:

RQ1: What are the limitations of existing AI-based bookkeeping systems in terms of automation, explainability, transparency, and architectural design?

RQ2: What functional and architectural requirements are necessary for an autonomous explainable AI bookkeeping system?

RQ3: How can a conceptual multi-agent Explainable AI architecture be designed to automate bookkeeping activities while maintaining transparency and accountability?

RQ4: How can Explainable AI mechanisms be integrated into the proposed architecture to provide understandable explanations for bookkeeping decisions?

RQ5: How can the proposed architecture be evaluated using Design Science Research to determine its usefulness, completeness, and applicability for autonomous bookkeeping?

RQ6: What are the potential implications of the proposed architecture for future AI-enabled accounting information systems and professional accounting practice?

Literature Review:

1. Artificial Intelligence in Accounting: Gopika (2024), the field of accounting has been revolutionized through the use of Artificial Intelligence (AI) in the automation of tasks, decision making, and improvement of the accuracy of financial information processing. AI includes different technologies such as Machine Learning (ML), Natural Language Processing (NLP), Robotic Process Automation (RPA), and Intelligent Document Processing (IDP). AI tools are used for different purposes like invoice processing, transaction categorization, financial forecasting, and audit.

According to the Association of Chartered Certified Accountants (2020), AI will help to change the role of accountants from data processing to more strategic financial advice. Nonetheless, notwithstanding all the developments made in the field of AI, the current uses of AI in bookkeeping are very specific and often non-transparent in their functioning.

2. Artificial Intelligence in Bookkeeping: (Liu, 2021) Bookkeeping refers to one of the major components of accounting, which entails recording, classification, verification, and arrangement of financial transactions. Although contemporary accounting systems have replaced most bookkeeping activities by automation, there are certain bookkeeping processes, such as transaction classification, journal entries preparation, reconciliation, and verification of compliance, which necessitate the human factor.

Azman et al., (2021) have proved that AI technologies are able to automate the process of documents analysis, transaction identification,

and data extraction. Such intelligent technologies are able to analyze the documents and data without any human mistakes and delays. Nonetheless, most existing AI systems for bookkeeping represent the black-box approach, meaning that it is not easy to trace the reasons for the AI-generated decisions.

3. Explainable Artificial Intelligence (XAI): XAI has become an important field of research focused on increasing the transparency and interpretation of AI. (Açar, 2022) XAI makes it possible for the system not only to make predictions but also to explain the reasons behind those predictions.

According to Gunning (2017), XAI has been developed as a tool enabling users to comprehend, trust, and effectively manage AI decision-making. XAI is especially valuable in accounting due to the necessity to conform to the rules of accounting, auditing, and regulations. The explanations of how an entry has been placed in one or another category or of the discovery of any anomaly make the process more accountable and auditable.

Despite the wide implementation of XAI in the healthcare sector, finance, and in decision-support systems, there have not been many attempts to use XAI for bookkeeping yet.(Sardar et al., 2023) All the studies are mainly connected to fraud detection and financial forecasting.

4. Multi-Agent Systems in Intelligent Accounting: A Multi-Agent System (MAS) is a system composed of several autonomous software agents working together to resolve complicated issues through the execution of specific tasks. The benefits of using a Multi-Agent System over a centralized AI framework include increased modularity, scalability, adaptability, and robustness. (Sharko et al., 2025)

In the case of accounting, separate intelligent agents can individually do their job of doing document analysis, transaction classification, journal entry, validation, accounting, and explanations while simultaneously interacting with each other in order to finish the task of accounting. However, despite all the benefits provided by the use of MAS, not many researchers have looked into applying it to autonomous bookkeeping.

5. Design Science Research in Information Systems: Design Science Research (DSR) is regarded as a proven methodology for the creation of innovative technological artifacts which will help solve certain organizational problems. According to Hevner et al. (2004), DSR is defined as a research paradigm concerned with designing and evaluating of artifacts including models, methods, frameworks, architectures and software systems.

The DSR methodology includes the identification of a problem, the setting of goals, the design and development of an artifact, its usefulness demonstration, effectiveness evaluation, and communication of the research results. The three-cycle approach offered by Hevner (2007) involves the following cycles: relevance, rigor and design cycle, thus providing a balance between theoretical knowledge and practical requirements. As the current research involves the development of a conceptual AI architecture, not the evaluation of any system, DSR appears to be a proper methodology for research.

Research Methodology:

1. Research Design: The approach taken in this study is that of the Design Science Research (DSR). This approach is most suitable because the aim of this research is to develop a new artifact that solves a problem in the field of accounting and not to validate any pre-existing theories. Hevner et al. (2004) have pointed out that the main concern of DSR lies with the systematic design, development, and evaluation of artifacts such as models, frameworks, architectures, methods, and systems which help to solve organizational problems.

The artifact to be created in this study will consist of a conceptual architecture with multi-intelligent agents along with Explainable AI techniques to perform the task of autonomous bookkeeping.

2. Research Process: The study follows the six phases of the Design Science Research methodology.

Phase 1: Problem Identification and Motivation: Phase one involves analyzing the problems related to the use of existing bookkeeping methods and the existing AI accounting systems. An extensive research involving a review of the literature available in academia and professional reports is done to determine the limitations that exist including manual processes, poor transparency, insufficient explainability, partial automation, and inadequate architecture to enable autonomous bookkeeping.

Phase 2: Define the Objectives of the Solution: From the analysis of the above-mentioned issues, the goals of the proposed architecture will be determined. They include the following:

- Automate the existing bookkeeping tasks,
- Increase the level of transparency through the use of explainable AI,
- Facilitate cooperation between specialized intelligent agents,
- Compliance with the accounting principles, and
- Scaleable and modular architecture.

Phase 3: Design and Development of the Artifact: The core contribution of the study is the design of a conceptual Explainable AI architecture for autonomous bookkeeping. The architecture consists of multiple specialized agents responsible for specific bookkeeping functions, including:

- Document Processing Agent
- Transaction Classification Agent
- Journal Entry Agent
- Validation Agent
- Financial Reporting Agent
- Explainability Agent

The interaction among these agents is represented using architectural diagrams, workflow models, and process descriptions that illustrate the complete bookkeeping cycle.

Phase 4: Demonstration: The above design is shown by the use of illustrative examples for bookkeeping. Illustrative accounting examples such as the handling of invoices, purchase of assets, payment of salaries, and payment of utilities are provided to show the way in which each intelligent agent carries out its role.

Phase 5: Evaluation: As this research proposes a conceptual artifact rather than an implemented software system, evaluation focuses on assessing the quality and usefulness of the architecture.

The evaluation consists of:

- **Scenario-based evaluation:** The architecture is applied to realistic bookkeeping cases to demonstrate its logical operation.
- **Expert evaluation:** Accounting academics and experienced accounting professionals review the proposed architecture for clarity, completeness, relevance, and practical applicability.
- **Comparative evaluation:** The proposed architecture is compared with existing AI-enabled bookkeeping approaches to identify its contributions regarding explainability, modularity, transparency, and autonomous processing.

The architecture is evaluated using the following criteria:

- Functional completeness
- Explainability
- Transparency
- Modularity
- Scalability
- Practical applicability
- Alignment with accounting principles

Phase 6: Communication: In the final stage, the results of the research will be presented by means of doctoral dissertation, scholarly publication, and conference presentations. In the study, the theoretical implications, practical applications, research limitations, and future directions for implementation and testing have been discussed.

3. Data Collection: This study primarily relies on secondary data collected through a systematic review of peer-reviewed journal articles, conference papers, professional accounting reports, AI research publications, and accounting standards. In addition, hypothetical bookkeeping scenarios are developed to demonstrate the operation of the proposed architecture.

For the evaluation stage, qualitative feedback may be collected from accounting experts using structured interviews or expert review forms to assess the proposed architecture.

4. Data Analysis: Qualitative methods are used in this research to synthesize information available in the literature and establish the functional requirements of autonomous accounting systems. The suggested architecture is evaluated using Design Science Research approach, which involves scenario analysis, comparative analysis, and expert opinion. The feedback gathered from the experts is thematically analyzed in order to assess the pros and cons of the suggested architecture.

5. Research Artifact: The main artifact that has been created in this research work is that of a conceptual multi-agent architecture for autonomous bookkeeping based on Explainable AI. This architecture specifies the roles, interaction patterns, and data exchange procedures between specific intelligent agents who are involved in document processing, transactions classification, entries creation, validation, explanations, and financial reporting.

6. Ethical Considerations: Confidentiality of financial records of the organization is not an issue since this research does not use any private financial records or documents from the organizations. In case of any evaluation by experts, the responses will be given on a confidential basis. This research is in line with institutional ethics as well as AI ethics.

Findings:

1. Overview of Findings:

The current study has created an XAI-based multi-agent framework for autonomous bookkeeping through the Design Science Research (DSR) process. The findings in this paper have been drawn from analyzing the existing literature, identifying the research gap, designing the architecture and its evaluation through bookkeeping examples and evaluation criteria from an expert's perspective. The results have revealed that the combination of multi-agent systems and Explainable AI facilitates the development of autonomous bookkeeping solutions in a systematic way.

2. Limitations of Existing AI-Based Bookkeeping Systems:

Various shortcomings associated with contemporary AI-powered bookkeeping practices were uncovered by the research. Most of the current tools concentrate on automating specific tasks including invoices handling, information extraction, transactions classification, and reconciliation. Nevertheless, there is no unified framework that allows combining multiple bookkeeping tasks into one automated process.

The results suggest that current AI applications suffer from the following drawbacks:

- Low level of transparency associated with the AI-driven accounting decisions.
- The problem of interpreting the logic behind transaction classifications.
- The necessity to validate and comply with human involvement.
- The lack of modular architecture which enables independent performance of various AI tasks.
- The disregard for specific needs of accounting in terms of accountability and auditability.

3. Findings from the Proposed Multi-Agent Architecture:

The findings of this research culminated in the design of a multi-agent system architecture made up of intelligent agents that undertake certain accounting functions through communication with other agents.

The identified agents include:

Document Processing Agent: The findings show that an autonomous bookkeeping system requires an agent capable of extracting relevant information from financial documents, including:

- Supplier details
- Transaction dates
- Amounts
- Tax information
- Invoice descriptions

Transaction Classification Agent: This agent determines the appropriate accounting category

by analysing transaction information and applying accounting rules and historical patterns.

Example:

Input:

"Purchase of office chairs"

Output:

"Office Furniture Expense/Asset"

4. Journal Entry Generation Agent: The architecture demonstrates that an intelligent agent can transform classified transactions into accounting entries while maintaining debit-credit principles.

Example:

Debit: Office Equipment Credit: Cash/Bank

Validation Agent: The findings highlight the importance of an independent validation mechanism to check:

- Duplicate transactions
- Missing information
- Accounting inconsistencies
- Policy violations

5. Explainability Agent:

A major finding of this study is that explainability should not be added as a final step but embedded throughout the architecture. The Explainability Agent provides understandable reasons behind AI decisions.

Example explanation:

"The transaction was classified as computer equipment because the invoice description contains 'laptop', the supplier belongs to the electronics category, and similar historical transactions were recorded under computer assets."

Findings Related to Explainable AI Integration:

The study found that Explainable AI improves the suitability of autonomous bookkeeping systems by addressing trust and accountability concerns. The proposed architecture incorporates explanations at important decision points, including:

- Why a transaction was assigned a specific account category.
- Why a journal entry was generated.
- Why a transaction was flagged for review.
- How compliance rules influenced the decision.

The findings suggest that explainability is essential for accounting environments because financial information requires verification, audit trails, and professional accountability.

Findings from Scenario-Based Evaluation:

The proposed architecture was evaluated using representative bookkeeping scenarios, including purchases, expense payments, and asset acquisitions. The scenario analysis demonstrated that the architecture could logically support the complete bookkeeping workflow:

1. Receive financial document.
2. Extract transaction information.
3. Classify accounting category.
4. Generate accounting entry.
5. Validate the transaction.
6. Provide an explanation.
7. Update financial records.

The evaluation indicates that the proposed architecture provides a systematic approach for connecting AI capabilities with accounting processes.

Contributions of the Research:

The main findings contribute to accounting information systems research in three ways:

Theoretical Contribution: The study extends existing AI and accounting research by integrating:

- Autonomous bookkeeping concepts.
- Multi-agent system architecture.
- Explainable AI principles.
- Design Science Research methodology.

Methodological Contribution: The study demonstrates how DSR can be applied to develop conceptual artifacts for emerging accounting technologies where practical implementation may not yet exist.

Practical Contribution: The proposed architecture provides accountants, researchers, and technology developers with a structured blueprint for designing future transparent and trustworthy AI-based bookkeeping systems.

Summary of Findings:

Overall, the study finds that a conceptual Explainable AI multi-agent architecture can provide a foundation for autonomous bookkeeping by combining task automation, agent collaboration, and transparent decision-making. (Arquam, 2024)While the architecture requires future prototype development and empirical testing, the findings demonstrate its conceptual feasibility and potential contribution to intelligent accounting information systems.

Results:

1. Overview of Results: This research was undertaken to develop and test the XAI-based multi-agent framework for autonomous bookkeeping based on the principles of DSR methodology. The results are those achieved during the artifact development phase, which includes such aspects as requirements identification, design of the suggested framework, its demonstration in the context of bookkeeping cases, and assessment of the artifact.

According to the results, the use of multi-agent systems together with Explainable AI can be seen as an effective way to cope with the deficiencies of the current AI-enabled bookkeeping systems.

2. Results of Requirement Identification: The literature analysis identified the following requirements for an autonomous bookkeeping system:

Automation requirement: The system should reduce manual intervention by automatically processing financial transactions, extracting information, and generating accounting records.

Explainability requirement: The system should provide understandable explanations for AI-generated decisions to support accountant trust, auditability, and verification.

Modularity requirement: The system should consist of independent but collaborative components that allow individual functions to be improved without affecting the entire system.

Accounting compliance requirement: The system should incorporate accounting principles and validation mechanisms to ensure reliable financial information.

Scalability requirement: The architecture should support additional AI capabilities and changing business requirements.

3. Results of Architecture Design: The primary artifact developed in this research is a conceptual multi-agent Explainable AI architecture consisting of six specialized agents in table.5.3:

Table.1: Six Specialized Agents

Agent	Main Function
Document Processing Agent	Extracts information from invoices and financial documents
Classification Agent	Assigns accounting categories to transactions
Journal Entry Agent	Generates debit and credit entries
Validation Agent	Checks accuracy and compliance
Reporting Agent	Supports financial reporting activities
Explanation Agent	Provides reasons behind AI decisions

The results demonstrate that distributing bookkeeping activities among specialized agents creates a more organized and transparent workflow compared with a single centralized AI system.

4. Results of Scenario-Based Demonstration: The architecture was demonstrated using representative bookkeeping scenarios.

Example:

Transaction: Purchase of a company laptop.

The workflow produced the following results:

- Document Agent extracted supplier, date, and amount information.
- Classification Agent identified the transaction as computer equipment.
- Journal Entry Agent generated the accounting entry.

- Validation Agent checked consistency and completeness.
- Explanation Agent provided the reason for classification.

The demonstration showed that the proposed architecture can logically support an end-to-end autonomous bookkeeping process.

5. Results of Evaluation: The evaluation indicated that the proposed architecture satisfies important design requirements as shown in table.5.5:

Table.2: Evaluation Criteria

Evaluation Criteria	Result
Functional completeness	The architecture covers major bookkeeping activities
Transparency	AI decisions are accompanied by explanations
Modularity	Individual agents can operate independently
Flexibility	Additional agents can be integrated
Accounting relevance	Workflow aligns with bookkeeping principles

The results suggest that the proposed artifact provides a feasible conceptual foundation for future AI-enabled bookkeeping systems.

Conclusion:

The current study has responded to the increasing necessity for clear, consistent, and intelligent automation in the field of accounting by developing a conceptual XAI-based multi-agent system for autonomous bookkeeping through applying the DSR method. (Alan R. Hevner et al., 2004) The reason why the researcher decided to conduct the study lies in the limitations that exist within the existing bookkeeping systems that use manual labor and offer poor transparency in the case of the implementation of AI for the purpose of making accounting decisions. Even though the AI systems have shown great promise in automation of financial operations, the issue of explainability and accountability remains problematic and limits their usage in accounting areas.

In order to eliminate the identified problem, the researcher has created a conceptual architecture for autonomous bookkeeping that includes multiple intelligent agents with Explainable AI. The suggested architecture consists of the distribution of different bookkeeping activities to specialized agents who will be in charge of document processing, transaction classification, creation of entries in journals, verification, reports creation, and explanations.

This study enhances the literature on accounting information systems in terms of integrating new AI solutions in accordance with specific requirements of accountancy like accuracy, auditability, reliability, and accountability. Contrary to traditional approaches to AI, which are based mostly on automation and prediction, the proposed architecture is focused on explaining AI decisions and actions as an integral part of intelligent bookkeeping. Finally, the study shows how the Design Science Research approach can be used to create conceptual artifacts addressing real-world problems in emerging technologies (Alan R. Hevner., 2007).

The analysis of the proposed architecture with the help of scenarios and design assessment allows concluding that the architecture serves as a reasonable basis for further development of autonomous bookkeeping systems. The results show that integration of collaboration among multiple agents with Explainable AI can increase transparency, modularity, and adaptiveness of the accounting process in the context of artificial intelligence.

Nevertheless, this study has certain limitations. The proposed architecture is not implemented as a working software system and was not tested with real accounting data from

organizations. Thus, no improvements in bookkeeping effectiveness or accuracy are proved by the study.

The need for further investigation lies in implementing a prototype system for the suggested architecture, its integration into current accounting information systems, and performing empirical research using real financial transactions. It is also possible to perform research related to the user acceptance, regulation issues, ethics, and Explainable AI effectiveness in accounting decision-making.

Thus, the conducted research provides a basis for creating an autonomous bookkeeping system based on Artificial Intelligence, multi-agent cooperation, Explainable AI, and accounting expertise. The suggested architecture becomes a step towards responsible AI implementation in accounting, where automation goes together with transparency and confidence in the AI-powered financial process.

References:

1. Açar, M. (2022). Explainable AI (XAI). *Journal of AI, Robotics & Workplace Automation*, *1*(4). https://doi.org/10.69554/avxp5177
2. Alan R. Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). *Design science in information systems research*. MIS Quarterly, 28(1), 75–105.
3. Alan R. Hevner. (2007). *A three-cycle view of design science research*. Scandinavian Journal of Information Systems, 19(2), 87–92.
4. Association of Chartered Certified Accountants. (2020). *Machine Learning: More Science than Fiction*.
5. Arquam, M. (2024). Impact of Artificial Intelligence in Accounting. *INTERANTIONAL JOURNAL OF SCIENTIFIC RESEARCH IN ENGINEERING AND MANAGEMENT*, *08*(05). https://doi.org/10.55041/ijsrem31890
6. Azman, N. A., Mohamed, A., & Jamil, A. M. (2021). Artificial Intelligence in Automated Bookkeeping: A Value-added Function for Small and Medium Enterprises. *International Journal on Informatics Visualization*, *5*(3). https://doi.org/10.30630/JOIV.5.3.669
7. Collins Kindzeka, K. (2023). Impact of Artificial Intelligence on Accounting, Auditing and Financial Reporting. *American Journal of Computing and Engineering*, *6*(1). https://doi.org/10.47672/ajce.1433
8. Gopika, S. S. (2024). Artificial Intelligence in Accounting And Finance. *Recent Trends in Management and Commerce*, *5*(2). https://doi.org/10.46632/rmc/5/2/12
9. Johannes Gregor, S., & Alan R. Hevner, A. R. (2013). *Positioning and presenting Design Science Research for maximum impact*. MIS Quarterly, 37(2), 337–355.
10. Liu, M. (2021). Exploring the methods of artificial intelligence development on accounting bookkeeping system. *Journal of Physics: Conference Series*, *1915*(4). https://doi.org/10.1088/1742-6596/1915/4/042029
11. Rubini, A. T. L., & Nithya.V. (2021). A STUDY ON OPPORTUNITIES OF ARTIFICIAL INTELLIGENCE DEVELOPMENT IN BOOKKEEPING AND ACCOUNTING. *Palarch's Journal Of Archaeology Of Egypt/Egyptology*, *18*(1).
12. Sardar, T. H., Das, S., & Pandey, B. K. (2023). Explainable AI (XAI). In *Medical Data Analysis and Processing using Explainable Artificial Intelligence*. https://doi.org/10.1201/9781003257721-1
13. Sharko, P. A., Burlutskaya, Z. V., Zubkova, D. A., Gintciak, A. M., & Pospelov, K. N. (2025). AI-Supported Decision Making in Multi-Agent Production Systems Using the Example of the Oil and Gas Industry. *Applied Sciences (Switzerland)*, *15*(10). https://doi.org/10.3390/app15105366
14. Venable, J. R. (2010). Design science research post Hevner et al.: Criteria, standards, guidelines, and expectations. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *6105 LNCS*. https://doi.org/10.1007/978-3-642-13335-0_8
15. Yi, Z., Cao, X., Chen, Z., & Li, S. (2023). Artificial Intelligence in Accounting and Finance: Challenges and Opportunities. *IEEE Access*, *11*. https://doi.org/10.1109/ACCESS.2023.3333389