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The Evolution of Internal Auditing: Towards intelligent Control Systems Using Modern Technology

CaseWare IDEA Case Study in Bank Loan Analysis

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Abstract :

This study aimed to highlight the development of internal audit in light of the technological transformation that the world is witnessing. It addressed the role played by intelligent internal control systems in improving the quality of control in financial institutions by automating tasks and reducing costs Enabling internal auditors to focus on strategic tasks rather than routine tasks, so that they can make objective decisions based on comprehensive data analyses that help build predictive models and anticipate future risks.

The case of Caseware IDEA, a program specializing in bank loan analysis, was studied by presenting its importance in the internal control system and explaining how the program works.

We concluded the study with a set of recommendations that will help the internal auditor control artificial intelligence technologies well and manage the risks that may result from them.

Keywords: Artificial Intelligence, Internal Audit, Caseware IDEA Software, Intelligent Control.

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1. INTRODUCTION:

Internal auditing is considered a fundamental pillar of the governance in any economic institution. It constitutes an integrated system of mechanisms, policies, and procedures designed to achieve a set of vital objectives -such as ensuring the reliability of financial information, compliance with applicable laws and regulations, protection of assets from loss or misuse, and the effectiveness and efficiency of operational activities.

Given the transformation of the Algerian economy from a centralized model to a market-based system, internal control frameworks have become indispensable in combating corruption, promoting transparency, and attracting foreign investment. This shift has created an urgent need to modernize these systems and align them with international standards and emerging technological frameworks.

Over time, internal audit practices have evolved significantly. Traditionally focused on compliance and financial reporting, the role of internal audit has expanded to include risk management and strategic advisory functions. Modern internal auditors are now expected to engage with various stakeholders and provide insights that shape organizational strategies, making them integral to overall business success. This evolution reflects a shift from merely checking compliance to proactively adding value through informed risk assessments and performance evaluations.

However, as internal audit practices advance, traditional methods face challenges that can limit their effectiveness. These challenges include resource constraints, hierarchical structures, and the need for continuous professional development. Addressing these issues is important to ensure internal audit functions can adapt to the demands of a rapidly changing business environment. Understanding these traditional challenges sets the stage for exploring how the adoption of artificial intelligence technologies can transform internal audit practices into more intelligent and effective controls (Surya et al., 2023).

1.1. Statement of the Problem:

Accordingly, and based on the foregoing, this study seeks to address the following research question: **To what extent can artificial intelligence applications contribute to achieving a successful transformation toward intelligent control systems?**

1.2. Research Questions:

This main research problem can be further divided into the following sub-questions:

- What is the concept of internal auditing and internal review as defined by international professional bodies?
- What are the key requirements for transitioning toward smart internal control systems?
- How do artificial intelligence tools contribute to improving the efficiency and effectiveness of internal control processes?
- What is the CaseWare IDEA software, and how does it assist in detecting errors and irregularities within loan records and banking transactions?

1.3. Hypothesis/ hypotheses:

To address the main research question, the following hypotheses have been formulated:

- The concepts of internal auditing and internal review, as defined by international professional bodies such as the Institute of Internal Auditors (IIA), are grounded in the principles of governance, transparency, and risk management, forming an integrated framework aimed at enhancing institutional performance and strengthening control over financial and administrative resources.
- The transition toward smart internal control systems requires the establishment of an advanced digital infrastructure, the availability of qualified human resources in data analysis and artificial intelligence, as well as the adoption of an organizational culture that fosters innovation and supports electronic governance.
- Artificial intelligence tools contribute to improving the efficiency and effectiveness of internal control systems by analyzing large volumes of data accurately and rapidly, predicting potential risks, and detecting unusual patterns -thereby reducing human error and enhancing the quality of control-related decision-making.
- The CaseWare IDEA software represents one of the most prominent automated analysis tools used in internal auditing. It enables auditors to systematically analyze large financial datasets and assists in identifying errors and irregularities through advanced testing and comparison algorithms, thus enhancing the reliability of banking audit processes.

1.4. Significance of the Study:

The significance of this study lies in its focus on the ongoing transformation of internal auditing toward intelligent control systems through the integration of modern technologies. In an era characterized by rapid digital advancement, the reliance on artificial intelligence and data analytics has become essential to enhance the efficiency, accuracy, and reliability of internal control mechanisms.

This research gains particular importance by bridging the theoretical framework of internal auditing with its practical applications through a case study of CaseWare IDEA, one of the leading automated audit tools used for financial data analysis, especially in the examination of banking loans.

Moreover, the study highlights how the adoption of smart auditing systems can improve the quality of internal audit decisions, reduce risks of financial misstatements and fraud, and ultimately strengthen transparency, accountability, and corporate governance within financial institutions

1.5. Objectives of the Study:

This study aims to achieve the following set of objectives:

- Analyze and highlight the role of internal audit as a mechanism to improve oversight and good governance in institutions.
- Presenting the most important drivers leading to digital transformation in internal control systems.
- Identify the contribution of artificial intelligence to enhancing the effectiveness of internal auditing.
- Introducing one of the applications of artificial intelligence - CaseWare IDEA -in the field of internal audit, and highlighting its importance in analyzing bank loans.

1.6. methodology of the Study:

This study relies on the descriptive analytical approach to present the theoretical aspect of internal auditing and internal control systems, and to analyze the most important requirements for the transition to intelligent systems. The applied aspect was a case study of an artificial intelligence application CaseWare IDEA (Interactive Data Extraction and Analysis) used by internal auditors in the field of audit automation and specifically addressed the process of analyzing bank loans using this program.

1.7. Previous researches :(literature review)

Among the studies that addressed the role of artificial intelligence in improving the effectiveness of internal auditing in banks, we find the study by

Herlina et al. (2026) which was entitled The Role of Artificial Intelligence and Electronic Data Processing in Internal Audit Transformation: A Qualitative Descriptive Approach at Bank Mandiri, where she addressed the importance of artificial intelligence in significantly accelerating auditing processes in addition to automating repetitive tasks This study also highlighted the role of artificial intelligence and electronic data processing in transforming internal audit within the banking sector, while emphasizing the need to develop the technical competencies of auditors and optimize cross-unit system integration to fully reduce digital audit technologies.

The study of Shivram (2024) examines the uses of artificial intelligence in auditing, specifically the application of machine learning across the internal audit lifecycle. The study emphasizes the need for internal auditors to develop a basic and fundamental understanding of the fundamentals and concepts of machine learning and integrate them with data analytics as part of training programs. This is so that they can contribute significantly to innovation, enhance their skills in the future, and be effective agents of change.

The study of Al- Khasawneh & Al- Khasawneh (2023) addressed the impact of the Fourth Industrial Revolution technologies on internal audit operations in Jordanian banks, especially during the Corona pandemic, as the study concluded that these technologies improve the quality and speed of completion of internal audit operations and make them more accurate and effective, increase efficiency and achieve independence, in addition to Developing the practical skills of auditors, the study also recommended the necessity of updating the legislative environment for digital transactions And updating professional standards to suit digital developments.

1.8. Organization of the Study:

In order to answer the problem of the study and explain the relationship between its variables, the research was divided into two parts. The theoretical part deals with the conceptual framework of internal audit and intelligent control systems, by explaining the concepts of internal audit and internal control, and presenting the digital development of internal control systems and the requirements for transitioning to intelligent systems. Artificial intelligence technologies and their importance in internal audit were also addressed The practical part was devoted to presenting the IDEA program, which specializes in analyzing bank loans, and explaining the program's components and its role in enhancing the effectiveness of internal control in banks.

2. Theoretical Framework of Internal Auditing and intelligent Control Systems:

2.1 The Concept of Internal Auditing and Internal Control:

The definitions of internal auditing are numerous; however, we adopt the comprehensive definition provided by the Institute of Internal Auditors (IIA) in the United States, which defines it as: an independent, objective assurance and consulting activity designed to add value and improve an organization's operations. It helps an organization accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes (The IIA, 2026).

From this definition, it can be inferred that internal auditing represents a structured set of procedures aimed at assessing the various activities and processes within an organization by ensuring the efficiency and effectiveness of internal control systems, while also providing analyses and recommendations that support management in making sound and informed decisions.

The American Institute of Certified Public Accountants (AICPA) defined internal control as follows: Internal control comprises the plan of organization and all the coordinated methods and measures adopted within a business to safeguard its assets, check the accuracy and reliability of its accounting data, promote operational efficiency, and encourage adherence to prescribed managerial policies (Bouchikhi, 2020).

The International Standard 2130 defines internal control as: The organizational plan, records, and procedures designed to safeguard the company’s assets, ensure their efficient use, and verify the accuracy and reliability of accounting records, thereby allowing for the preparation of dependable financial statements in accordance with generally accepted accounting principles (The IIA, 2019).

Accordingly, internal control encompasses all policies and procedures designed to ensure the reliability of financial reporting, the effectiveness and efficiency of operational processes, and compliance with applicable laws and regulations, all with the purpose of safeguarding the organization’s assets from loss or misuse.

From the above, it can be concluded that internal control represents one of the most essential elements upon which internal auditing relies in assessing and mitigating risks, measuring efficiency, and evaluating financial performance, with the ultimate goal of protecting the organization’s assets and achieving its strategic objectives.

2.2 The Digital Evolution of Internal Control Systems:

Internal control systems have witnessed remarkable development with the advent of modern technological innovations, increasingly relying on digital solutions to keep pace with the contemporary business environment, the growing volume of data, and the diversity of operational and financial risks.

Consequently, internal control has evolved from a system primarily focused on detecting errors after they occur into a proactive system capable of predicting, identifying, and minimizing - or even preventing - potential risks. Moreover, it is no longer limited to monitoring financial transactions alone; it now encompasses the oversight of all operational processes, the performance of technological systems, and the monitoring of user behaviors and unusual data patterns (anomalies).

Therefore, investing in the development of internal control systems is no longer considered an additional cost, but rather a strategic necessity to safeguard organizational assets, manage risks, ensure business continuity, and strengthen competitive advantage in the digital era.

3. Requirements for the Transition Toward Intelligent Internal Control Systems:

The transition from traditional internal control systems to intelligent ones requires the integration of several interrelated elements, which include the development of the technological infrastructure to include scalable cloud computing systems, secure high-speed networks, and massive data storage capacities. In addition, it necessitates integrated platforms encompassing enterprise resource planning (ERP) systems, comprehensive data analytics solutions, continuous monitoring tools, anomaly detection mechanisms, and intelligent risk management systems, all powered by artificial intelligence and machine learning technologies.

In the field of data management, it is essential to establish an integrated data management system by unifying data sources and applying quality and governance standards to ensure their accuracy and reliability.

The transformation also requires qualified human competencies in data analysis and information systems. This can be achieved through training programs and workshops that enable professionals to obtain technical audit certifications, such as Data Analytics for Auditors and CISA (Certified Information Systems Auditor).

As for cyber-security requirements, they involve implementing advanced systems to protect data from breaches, along with digital identity detection

systems, access management frameworks, and login pattern analysis tools to ensure the integrity and confidentiality of organizational information.

The transformation also requires investments that include adequate budgets and sustained funding for technological projects and research and development initiatives. This should be supported by a comprehensive feasibility study and long-term financial planning to ensure the sustainability of the digital transformation process.

Leadership requirements involve the commitment of top management through the allocation of necessary resources and continuous monitoring of the transformation process. In addition, it is essential to build an organizational culture that supports and encourages innovation and is receptive to technological change.

In terms of compliance, digital transformation requires full adherence to local and international regulations, along with the strict application of professional and technical standards to ensure transparency, accountability, and legal conformity throughout the transformation process.

4. Artificial Intelligence Technologies and Their Importance in Internal Auditing:

Artificial intelligence technologies play a pivotal role in enhancing the efficiency and accuracy of internal audits. This is due to the fact that traditional and periodic internal audits are not sufficient to address risks in real time. These technologies, specifically machine learning, natural language processing and process extraction (Mahmood, 2025), enable auditors to process and analyze huge amounts of data, detect anomalies, and generate predictive insights that traditional methods cannot easily detect, among the key AI techniques used in internal auditing are:

Machine Learning: AI and machine learning are reshaping the auditing landscape, offering numerous benefits while also presenting distinct challenges. The ability of AI to analyze large datasets quickly leads to enhanced audit efficiency and accuracy. Auditors can focus on interpreting data trends rather than merely verifying figures, allowing for a more strategic approach to risk assessment. Machine learning algorithms can learn from historical data, improving their ability to detect anomalies and potential fraud. This transformation supports auditors in their quest for higher quality outcomes and deeper insights into an organization’s operations.

Neural Network: Neural networks contain a new AI technology that simulates

the human brain on a computer. These systems are based on parallel, distributed processing and deviate significantly from algorithmic computing. Parallel design allows neural networks to become particularly specialized at analyzing problems with many variables. These systems differ from expert systems in that they learn directly from examples (learning). Instead of an information engineer, the user can provide training by showing examples of inputs to be matched with the output he has submitted to the system (Ali & Abdullah, 2022).

Robotic Process Automation (RPA): Robots used in Robotic Process Automation (RPA) refer to digital programs that operate on a virtual or physical machine. RPA represents a form of Business Process Management (BPM) that allows engineers to design a set of predefined instructions for software bots powered by artificial intelligence to execute tasks automatically. These bots can mimic human interactions with digital systems, such as data entry, reconciliation, and report generation, thereby reducing human error, saving time, and increasing efficiency in internal audit operations (Abdel-Fattah & Abu Al-Nasr, 2024).

It is used in the field of internal auditing to automate routine processes such as data collection and report preparation, which saves time and minimizes human errors (Ali & Abdullah, 2022).

5. Case Study: The Use of IDEA Software in Bank Loan Analysis

The internal control system serves as the cornerstone and first line of defense that ensures the protection of financial information and provides a reliable foundation for making sound administrative and financial decisions (Jumaa, 2009, p.193).

The analysis of bank loans is considered one of the most critical areas of internal auditing within financial institutions, due to its essential role in assessing compliance with loan-granting procedures set by the Central Bank, verifying the accuracy and integrity of financial and administrative data related to loans, and detecting exceptions and irregularities in customer files (such as duplication, credit limit violations, and payment delays). These procedures aim to reduce the risks of default and fraud.

Given the massive volumes of sensitive and complex data being processed, it has become imperative for financial institutions to integrate automated analytical tools and artificial intelligence technologies into their internal control systems. This strategic shift enhances transparency, minimizes errors, and improves control efficiency in line with the requirements of modern financial governance.

Among the most prominent of these tools is the CaseWare IDEA software.

5.1 CaseWare IDEA Software:

CaseWare IDEA (Interactive Data Extraction and Analysis) is a professional software application designed for data extraction, analysis, and audit automation. It is widely used by internal and external auditors to perform data-driven audits, detect anomalies, and evaluate the effectiveness of internal controls. Developed by CaseWare International, IDEA has become one of the leading tools in Computer-Assisted Audit Techniques (CAATs).

5.2 Role of IDEA in internal control:

- **Comprehensive data analysis:** IDEA enables internal auditors to import and analyze large volumes of transactional data from multiple sources such as ERP systems, Excel, and database files with high speed and precision;
- **Error and anomaly detection:** The software applies statistical and logical tests – including Benford's Law – to identify irregularities, potential fraud, or control breakdowns;
- **Testing internal controls:** IDEA assists in verifying compliance with internal procedures by comparing accounting entries to actual transaction data, ensuring the reliability of the internal control environment;
- **Automation of audit procedures:** Routine audit tasks (such as duplication testing, stratified sampling and exception analysis) can be automated using IDEA scripts, reducing human intervention;
- **Analytical reporting:** The software generates professional analytical reports and visual dashboards, facilitating the presentation of audit findings to management and audit committees.

5.3 Main interface of CaseWare IDEA:

The IDEA software features a clean and structured interface designed to facilitate efficient data analysis and auditing. Its layout allows internal auditors to manage large datasets, perform analytical tests, and visualize results within a single environment. The main interface is divided into several key components, each serving a specific function in the audit workflow.

The CaseWare IDEA software features a clean and structured interface designed to facilitate efficient data analysis and auditing.

Its layout allows internal auditors to manage large datasets, perform analytical tests, and visualize results within a single environment.

The structured design of the IDEA interface helps internal auditors move seamlessly through the audit process, from data importation to analysis, visualization, and report generation, all within a single integrated platform.

The main interface is divided into several key components, each serving a specific function in the audit workflow:

5.3.1 Ribbon Menu (Top Toolbar):

Figure N°01: Ribbon Menu



Source: https://www.caseware.com/ca/fr/produits/idea/

The ribbon menu is the primary control center of IDEA. It includes the following main tabs:

- File: used to create new projects, open existing ones, and import or export data from various sources (Excel, Access, SQL…).
- Analyze: provides tools for performing statistical analyses, duplicate detection, gap analysis, and Benford's Law testing.
- Audit: contains audit sampling tools and procedures for internal control testing.
- Visualization: enables the creation of analytical charts and graphs.
- Macros and scripting: allows automation of repetitive audit tasks using IDEA script (VBScript).

5.3.2 Project Overview Panel:

Located on the left side of the screen, this panel organizes all elements of the current audit project. It typically includes the following folders:

- Databases: stores imported datasets (Loan_Records_BNA)
- Results: contains outputs generated from analyses (Duplicate Loans, Benford analysis)
- Graphs: holds all visual outputs and analytical charts.
- History: records all steps performed by the auditors, providing a trandparent audit trail.

5.3.3 Data View Area:

This is the central workspace of IDEA, where the data tables are displayed. From this section, the auditor can:

• Sort and filter fields.

• Create derived fields for advanced calculations.

• Apply analytical tests such as field statistics and gap detection.

5.3.4 Output and Visualization pane:

Located on the right or bottom of the interface, this area displays:

- Analytical results (Benford's Law outputs, duplicated loans, exceptions)
- Graphical visualization such as bar charts and pie charts showing trends and risk distributions across branches or loan types.

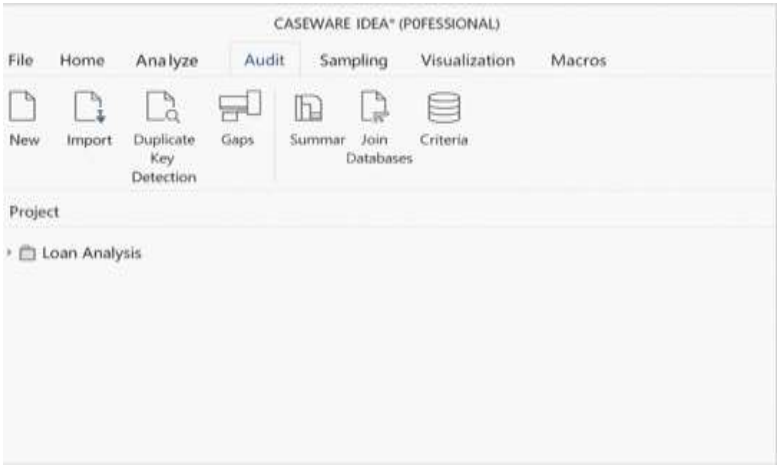
5.3.5 Status Bar:

Displayed at the bottom of the screen, it shows project status, active records, and progress during data processing operations.

5.4 Audit Tab in CaseWare IDEA:

The instructor opens the Audit tab located on the top ribbon of the Caseware IDEA interface. This tab is specifically designed to support auditors in performing data analysis and control testing tasks efficiently.

Figure N°02: Audit Tab



Source: https://www.caseware.com/ca/fr/produits/idea/

Field Statistics: the field statistics command allows auditors to quickly generate summary statistics for selected data fields – such as mean, minimum, maximum, and standard deviation – which provide an overview of data integrity and variability.

Duplicate key detection: this tool identifies repeated entries in key fields, for example, duplicate loan IDs or customer numbers in a loan database. This feature helps auditors detect potential data input errors or fraud risks.

The Gaps function scans sequences in numeric or date fields to detect missing values, such as skipped loan numbers or unrecorded transaction dates – a common sign of incomplete records.

The summarization command groups and aggregates records based on chosen fields (branch name or loan type), calculating totals and overages. This is crucial for comparative analysis between branches.

The join database function merges two datasets – for instance, linking the loan master file with repayment data – enabling cross-verification and deeper and audit insight.

Through the criteria dialogue, auditors can define specific filters, such as isolating loans above a certain threshold or overdue accounts, supporting focused risk analysis.

Finally, the audit tab integrates all these tools into a cohesive environment that enhances audit efficiency, transparency, and accuracy. By combining statistical, logical, and relational tests, IDEA enables auditors to transform raw data into meaningful evidence for decision-making.

6. CONCLUSION:

In recent years, the internal auditing profession has been undergoing a transformational shift toward digitalization and the adoption of intelligent systems. The integration of artificial intelligence technologies and specialized software such as CaseWare IDEA has significantly enhanced the quality and efficiency of internal auditing within financial institutions.

These technologies enable automation of repetitive tasks, reduce operational costs, and allow internal auditors to focus on strategic and analytical responsibilities rather than routine ones such as document verification, data matching, and the examination of large datasets.

Furthermore, AI-powered tools can detect anomalies, such as suspicious transactions hidden among thousands of banking operations. This analytical capability empowers auditors to deliver objective, data-driven insights, develop predictive models, and anticipate potential risks, thereby strengthening decision-making and supporting proactive risk management within the organization.

Despite the significant advantages of intelligent systems and AI-based software in internal auditing, there remain several challenges that internal auditors must address, including:

- Difficulty in understanding AI algorithms and interpreting the decisions made by intelligent systems, which requires auditors to develop

mechanisms for understanding the logic and decision-making processes of these algorithms;

- Identifying the potential risks associated with AI technologies, particularly those related to decision bias, cyber-security threats, and data breaches;
- Ensuring that the organization has established policies for AI governance, focusing on the responsible and transparent use of automated systems;
- Verifying compliance with ethical standards and international regulatory frameworks issued by professional and supervisory bodies to ensure integrity, fairness, and accountability in AI-assisted auditing.

Based on the above, a set of recommendations were presented, which we mention as follows:

- Promote digital transformation within internal audit departments through the adoption of advanced data analysis tools.

- Provide continuous training for internal auditors in artificial intelligence and data analytics to enhance audit quality.

- Develop technological infrastructures in financial institutions to ensure seamless integration between smart control systems and accounting information systems.

- Encourage applied research focusing on the impact of AI on the efficiency of internal control systems.

- Update international auditing standards to align with emerging technological advancements and digital audit practices.

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