

Effects Of Digitalization On Internal Audit Activities And Practices: A Systematic Literature Review

karimallah Khawla¹, Drissi Hicham²

¹ Hassan II University, Ecole Nationale de Commerce et de Gestion de Casablanca, LIFGOD (Laboratoire d'Ingénierie Financière, Gouvernance et Développement)

Kh.karimallah@gmail.com

² Hassan II University, Ecole Nationale de Commerce et de Gestion de Casablanca, LIFGOD (Laboratoire d'Ingénierie Financière, Gouvernance et Développement)

H.drissi@encgcasa.ma

Abstract

The rapid emergence of digital technology is pushing organizations to rethink their business models and processes.

Due to the increasing innovations in digital technology and in the face of the rapid changes in the socio-economic environment and the multiple requirements that this implies (Efficiency, Adaptability, Innovation, Creativity, Agility, Speed...), it seems appropriate to look at the effect of this digitalization on the internal audit function, which is considered as one of the guarantors of good governance within the organization.

The main goal of this paper is to give a general review of a systematic literature on the effect of digitalization from a previous study to the latest ten years.

The results of the systematic literature review allow us to state that technological developments and digitalization have a significant impact on the profession, offering new opportunities and introducing new challenges for internal auditors.

Index Terms— Internal audit function, Digitalization, New technologies, Effect of digitalization, Internal auditor.

INTRODUCTION

In recent years, digital transformation has emerged as an important research topic[1]. The digital world has been able to impose itself on all

levels, encompassing several fields of activity and rapidly investing all aspects of economic and social life. This importance was further confirmed by the COVID 19 health crisis which accelerated this transformation[2]. Nowadays due to the rapidly evolving business landscape, organizations face increasing pressures to adapt to the digital age. As technology continues to advance, businesses are compelled to embrace digital transformation across various functions to remain competitive and enhance their operational efficiency. One crucial area undergoing significant changes is the internal audit function. Digitalization has revolutionized how internal audits are conducted, shifting traditional practices towards more automated and data-driven approaches.

The digitalization of the internal audit function involves leveraging technological advancements such as artificial intelligence, data analytics, robotic process automation, and cloud computing to streamline audit processes, improve risk assessment, and enhance decision-making. By harnessing these digital tools, internal auditors can access and analyze vast amounts of data more efficiently, identify patterns and anomalies, and provide valuable.

insights to support informed decision-making at all levels of an organization.

Given the increasing importance of digitalization in internal auditing, it is essential to gain a comprehensive understanding of the existing literature on this topic. Therefore, this article presents a systematic literature review aimed at exploring the current state of knowledge regarding the digitalization of the internal audit function. By synthesizing and analyzing relevant academic research and survey, this study aims to identify key themes, trends, challenges, and opportunities associated with the digital transformation of internal audits.

Overall, this article seeks to shed light on the transformative potential of digitalization in the realm of internal auditing and emphasize its significance in enhancing audit quality, risk management, and organizational decision-making. By synthesizing the existing literature, this study aims to provide valuable insights and recommendations for researchers, practitioners, and organizational leaders seeking to harness the power of digital technologies in their internal audit practices. In this respect, the results of this systematic literature review have enabled us to create a conceptual framework to synthesize the fields of impact generated by digitalization.

LITERATURE REVIEW

Gartner (2020) defines digitalization as “the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business”. De facto, the waves of change resulting from digitalization have had a significant

impact on the way many organizations operate, as well as their business model (Loebbecke and Picot, 2015).

As a result, these technological advances could threaten audit function in particular as the volume of data produced by companies has multiplied and diverged thanks to digital technology [3], [4], [5], [6].

Based on the study conducted jointly by NC states university's ERM Initiative and Protiviti, we conclude that the threats and challenges facing organizations are increasing, particularly those related to the emergence of digital technology.

The survey was conducted among 1.304 managers and committee members worldwide from all industries.

- The scope and scale of the survey is as follows :

Fig. 1. Scope of the survey

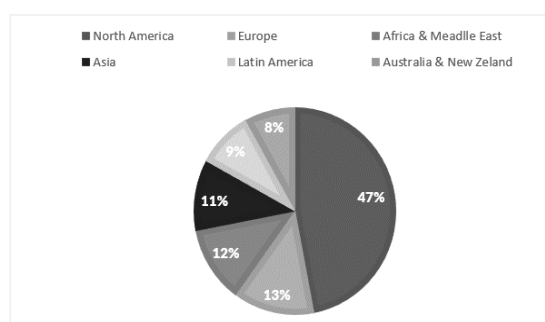
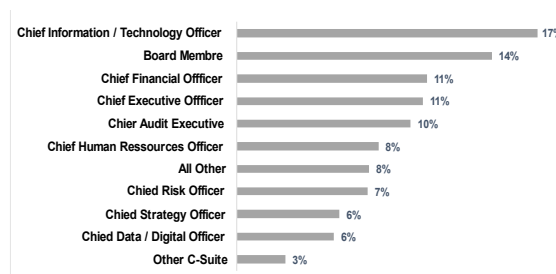


Fig. 2. Classification of participants by executive position



The analysis of the study results led us to raise the following findings:

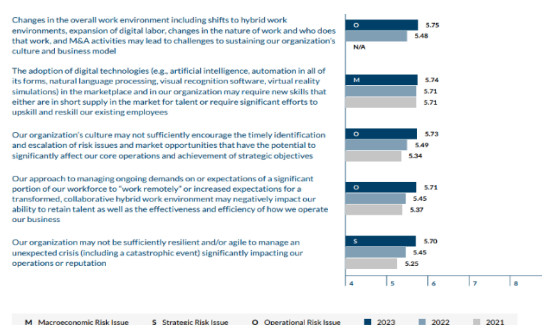
- The The risk classification matrix :

Table I: Risk classification matrix

<i>Risk classification</i>	<i>Risk with an average score of</i>
<i>Significant Impact</i>	<i>6.0 or Higher</i>
<i>Potential Impact</i>	<i>4.5 through 5.99</i>
<i>Less Significant Impact</i>	<i>4.49 or lower</i>

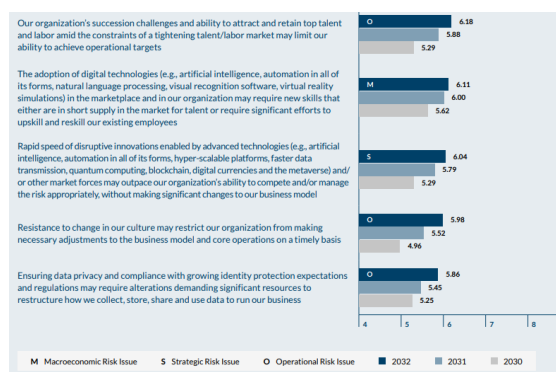
The list of the top 10 global risks for 2023, as rated by all survey participants, is shown in Figure 3, along with the score obtained in the years 2022 and 2021 for comparative purposes:

Fig. 3. Top for 2023. (Executive perspectives on top risks 2023 & 2022, Research conducted by NC States University's ERM Initiative and Protiviti)



- The top 10 risks for 2032 are presented in Figure 4, along with the scores obtained during the two surveys conducted in previous years:

Fig.4. Top Risk for 2032. (Executive perspectives on top risks 2023 & 2032, Research conducted by NC States University's ERM Initiative and Protiviti)



The reconciliation of risk ratings affirms the criticality of risk families related to the adoption of digital tools, the related organizational change, need for skilled profiles, the evolution of business models, etc. These risks have evolved from potential impact to significant impact level.

The risks assessed as significant in 2032 reflect a long-term concern about the company's ability to keep up with technological advances and the speed of innovation to create value in a competitive environment without making significant changes to its business model. As a result, retaining the best talent needed to compete and thrive in a disruptive environment has

become imminent. They must accompany the company in reinventing its market positioning, integrating emerging digital technologies, executing complex strategies, and reinventing the business models that will support the organization's relevance and growth over the next decade. This reality triggers a strategic concern that companies will no longer be able to keep up with the rapid pace of innovation.

Due to its role and positioning at the organizational level, the internal audit function also receives its partial impact and challenges due to the rapid pace of digital evolution. In this regard, the digital skills of internal auditors must necessarily converge with those of the organization, to maintain their level of acuity in measuring risks[7].

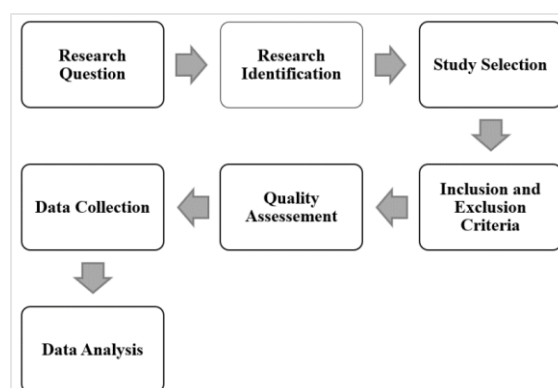
According to Lombardi, Block & Vasarhelyi the auditing profession is one of the areas most affected by this digital disruption, consequently it is undergoing a critical turn (Lombardi et al., 2014) due to the progress of information technologies and their rapid penetration in companies.

In order to maintain its position and added value, auditing will have to produce high quality reports allowing the identification of risks as well as the business and operational issues.

RESEARCH METHODOLOGY

In order to fully understand the potential impacts of digitalization on the audit, we opt for a systematic literature review. This type of literature review is more methodical compared to narrative reviews and establishes an in-depth description of the steps taken to select, examine and analyze relevant sources with the aim of minimizing bias and increasing transparency. Fig.5 shows the seven steps of systematic literature review.

Fig. 5. Systematic literature review method



A. Research Question

The main question of this research :

- ✓ How the use of digital technologies can impact the Internal Audit function ?

To answer this question, we need to first address the following questions:

- ✓ What is the meaning of digitalization?
- ✓ What are the main digital technologies related to internal audit?
- ✓ In which manner can the digital technologies act on the internal audit function?

Table II: Research Question motivations

Ref	Research Question	Motivation
RQ1	What is the meaning of digitalization?	Identify the general and conceptual framework of digital technologies
RQ2	What are the main digital technologies related to internal audit function?	Select from the variety of digital technologies those that are relevant to the internal audit function
RQ3	In which manner can the digital technologies act on the internal audit function?	Identify the impact of digital technologies on internal audit

B. Research Identification

This step helps to examine and evaluate research on digital transformation based on the above research questions (step one).

C. Study Selection

The following step is an important phase to determine the selection criteria. We have defined the following selection criteria in the aim to achieve the study, such as:

- ✓ The papers should be focus on digital transformation;
- ✓ The papers must be written in english and french;
- ✓ The articles should be available in a scientific journal.

D. Inclusion and Exclusion Criteria

In this step, we will briefly present the selection criteria taken into consideration for the definition of the concepts of inclusion and exclusion.

Table III: Research Criteria

Type Criteria	Criteria	Filter
Inclusion Criteria	Index terms	<i>Digitalization</i> , <i>Internal Audit</i>
	Constraint	<i>Subject (name, summary, writer, keywords)</i>
	Type of Document	<i>Review articles, Research articles, Book chapters, Book reviews, Case reports.</i>
	Language	- <i>French</i> - <i>English</i>
Exclusion Criteria	Non-peer-reviewed research articles, white paper, technical report	
	Abstract and short Paper	

We started this study by searching the articles published in the Scopus database using the two keywords "Digitalization" and "Internal Audit" based on the abstract, the index terms, the title in order to answer the above research questions. Through this approach we found the results summarized in table number IV.

Taking into consideration the previously defined selection rules, the final list of publications considered from different digital libraries is approximately 26 articles. Out of all articles published in the last ten years, we retained 15 of the articles due to time constraints for quality assessment.

E. Quality Assessment

This step verifies and assesses the accuracy and reliability of the selected items or document's reliability of the selected items or documents. The valuation criteria are based on the work of [8] [9] [10] [11], we formulated the following questions as criteria:

- ✓ Is the purpose of the research sufficiently explained?
- ✓ Is the purpose of the research clearly defined?
- ✓ Are the standards and evaluation criteria used in the study consistent with the research question?
- ✓ Is the literature review appropriate and sufficient?
- ✓ Are the data collection and measurements appropriate?
- ✓ Are the research questions clearly addressed?
- ✓ Is the data analysis sufficiently precise?
- ✓ Does the paper discuss limitations or validity?

F. Data Collection

The data sources used in this research are extracted from reliable sources to answer the above research questions. They are mainly from journals, conferences, proceedings, books and theses.

G. Data Analysis

We used a descriptive analysis to provide brief information about the articles included.

FINDINGS AND DISCUSSION

This section discusses the results of the impact of digitalization on the internal audit function.

A. Facts and figures

Table IV shows the distribution of articles that address our research topic.

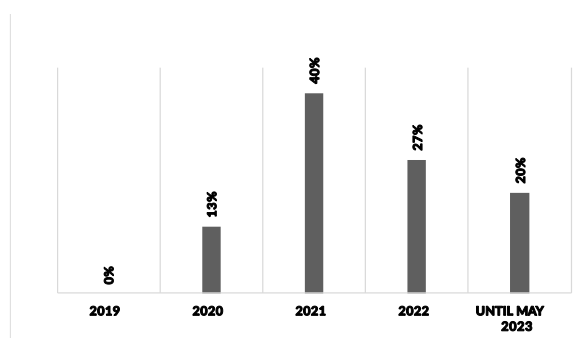
Table IV: Articles by year of publication

<i>Year of publication</i>	<i>Number of articles and Books</i>	<i>References</i>
2017	0	-
2018	0	-
2019	0	
2020	2	[12], [13]
2021	6	[14], [15], [16], [17], [18], [19]
2022	4	[20], [21], [22], [23]
Until May 2023	3	[24], [25], [26]

Following the results of the table above, as well as the graph below, the percentage of articles and books per year in Fig. 2 shows that the highest result of articles and books is 40% in 2021.

This result indicates that the number of articles published on the impact of digitalization on the internal audit function remains a topic that appeals to the scientific community.

Fig 6. Percentage of articles and Books by year



B. Digitalization

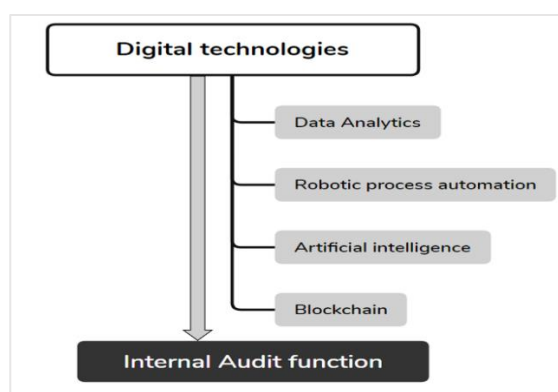
Looking at the existing literature, several definitions can be associated with digitalization. For some authors digitalization can be considered as the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business. For others, it refers to the way in which many domains of social life are restructured around digital communication and media infrastructures[1],[3], [4], [30].

Although there are many definitions of the concept of digitalization, they all converge on the same basic assumption: the digitalization is not limited to the use of digital technologies, but also involves a break with traditional business processes and relationships based on capabilities digital, thus transforming the business model, operational processes, and customer experience [31].

Regarding digital transformation, the authors define it as the use of technology to radically improve business performance. It corresponds to the changes that digital technology causes or influences in all aspects of human life. Digital transformation is now commonly interpreted as such a use of information and communication technologies, when not trivial automation is performed, but new capabilities are created in companies, public administrations, as well as in the lives of individuals and society[4][6]

C. Digital technologies at the service of audit

Fig 6. Digital Technologies



▪ Data Analytics :

Data Analytics is one of the technologies that can contribute to the success of the audit mission by ensuring its quality. It is characterized by the ability to analyze a large volume of heterogeneous data in a short period of time. This technology can be defined as « data sets whose size is beyond the ability of typical database software tools to capture, store, manage, and analyze »[5] [35].

Thanks to the opportunities offered by data analytics, the auditor can better manage anomaly detection, fraud, operational risks, and adapt his audit approach to his scope to provide reasonable assurance to stakeholders. This tool is considered important to improve risk assessment, trend analysis to make relevant judgments[36]through the possibility to perform prescriptive analysis.

▪ Robotic process automation:

According to the Institute of Electrical and Electronics Engineers (IEEE), robotic process automation (RPA) can be defined as « A preconfigured software instance that uses business rules and predefined activity choreography to complete the autonomous execution of a combination of processes, activities, transactions, and tasks in one or more unrelated software systems to deliver a result or service with human exception management» [37],[38],[39].

▪ Artificial Intelligence:

The AI can be defined as « An intelligence exhibited by machines compared to the inherited intelligence of humans and animals »[40],[41]. The effect of AI on auditing can be summarized as follows:

- ✓ Provide automatic monitoring of financial transactions.
- ✓ Stimulate the fraud identification process by training sophisticated machine learning (ML) based models.
- ✓ Interpret various data sources such as emails, social media, and audio files from meetings for example.
- ✓ Optimize time, energy, and resources.

The AI can be used to help internal auditors automate certain tasks, such as data collection, data analysis, and report creation. Chatbots can also be used to answer employee questions about company policies and procedures.

▪ Blockchain:

The blockchain can be used to ensure the security and integrity of data and documents, creating an immutable and verifiable record of all transactions. Blockchain is a type of distributed ledger technology (DLT) that is still in an aborning stage but so far shows great promise to radically change how organizations conduct their business and thus, how they get audited [42],[43].

D. Impact of digital technologies on the internal audit function

▪ Improve audit quality:

Digitalization has brought many improvements to the internal audit function, enabling better quality and efficiency through intelligent analysis and continuous auditing.

With the help of modern analytical and robotic tools as well as robotic automation of processes, the auditor will avoid repetitive and redundant tasks with low added value. As a result, the number of errors is reduced considerably.

Cognitive technologies such as artificial intelligence allow listeners to make the right decisions by automatically performing particular tasks and providing them with situations based on their historical experiences [44].

Ultimately, these digital interventions allow for a shift from a risk-based approach to an all-encompassing data analysis approach, which helps auditors produce a smarter, more relevant outcome for the benefit of stakeholders [44].

- Efficiency and agility:

The agility of the internal audit function has become essential in a constantly changing and complex environment. Agility enables internal auditing to adapt quickly to changes, to meet new challenges and to provide added value to organizations.

Thanks to the contribution of digitalization, internal audit is able to adapt quickly to new priorities, changing stakeholder demands and evolving risks. This implies flexibility in audit planning, the ability to quickly reallocate resources as needed, and responsiveness to urgent requests.

In addition, the adoption of appropriate technologies, such as data analysis tools, automation of repetitive tasks, audit management platforms, etc., can enhance internal audit agility. These tools can speed up processes, improve the quality of work, and provide real-time information, contributing to faster and more informed decision-making.

- Reducing expectation gap:

Digitalization now plays a key role in reducing the audit expectation gap by improving the transparency of the audit process[45]. Digital tools facilitate the collection, analysis, and presentation of data, allowing auditors to provide a clearer view of the audit results.

- Automation of low-value tasks:

Digitalization automates repetitive, low-value audit tasks such as manual data collection, verification of calculations, etc. This frees up time for auditors to perform their tasks and focus more on more complex tasks requiring their expertise and judgment. This increased focus on higher value-added tasks helps to improve the quality of the audit and meet the expectations of the various stakeholders[46].

In addition, the use of these tools improves the reliability of audit findings and helps to close the gap between expectations and audit results.

- New auditor profile:

One of the biggest challenges that digitalization brings to auditing is the imminent need to develop the skills of auditors and professionals in the field.

In addition, this new profile is a clear departure from the classic paper and Excel spreadsheet. However, the level of mastery required does not require to be computer programmers or experts in technological development [47]. Notwithstanding, they will need to have a level of practical experience and be able to manage new tools to process and analyze data [47].

As highlighted by professionals and practitioners, the auditing community lacks the technical skills and knowledge to audit technologically advanced infrastructures.

In the same vein, researchers such as Harvard accounting professor Robert Kaplan recommend that universities "...contribute to advancing the profession's body of knowledge, especially when innovation is high and major changes are occurring in the practice environment of the profession"[48].

Even more, the presence of a gap that has existed for over thirty years between the professional and academic communities[49]. This has been further amplified with digitalization. Moreover, this gap is seen as a real barrier that needs to be addressed by audit professionals.

CONCLUSION

The aim of this research is to study the evolution of internal auditing in an increasingly digitized environment. This paper contributes to the internal audit function literature in three levels:

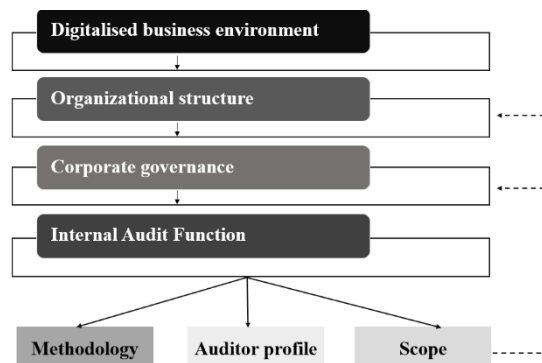
Firstly, the internal audit function can keep pace with development through agile planning and a good grasp of the company's digital environment to cope with the risks posed by digitalization. From a second perspective, the integration of new technologies for the benefit of the internal audit profession implies a certain level of digital expertise on the part of internal auditors to enable them to fulfil their missions. This adaptability is conditioned by the ongoing training of auditors, as well as considered in the light of the dynamic capabilities approach, which emphasizes the importance of good human resources management on the one hand, and the implementation of a dynamic capabilities approach, which emphasizes the importance of adapting processes to meet the challenges brought about by rapid technological change. Dynamic capabilities approach, which emphasizes the importance of adapting processes to meet the challenges brought about by rapid technological change.

Secondly, in a similar context, stakeholder demands are increasing. Today, internal auditors are seen as partners in ensuring good governance within the organization, through their involvement in consulting activities. This demand for consulting activities seems to be growing in the changing environment of digitized companies.

Furthermore, in addition to its affiliation with the audit committee, the internal audit function benefits from a strategic positioning within the organization. It has unlimited access to all information and information systems, providing an overview of operations. The position of the internal audit function in the organizational structure, in connection with top management but reporting to the board of directors, offers the opportunity to bring significant value in terms of strategic risks. However, the exercise of advisory activities seems to create tensions for some internal auditors who are torn between maintaining their independence and the added value generated by performing advisory activities. The digitization of the business environment appears to have exacerbated this trend towards advisory activities. In turn, it also increases objectivity issues. It widens the gap of expectations between the requirements stipulated by the code of ethics for the function and the internal audit charter on one hand, and the expectations of companies for better support in the face of emerging risks on the other hand.

In conclusion, the results highlight the potential of new technologies to support the internal audit function. Through the integration of digital technologies, the audit approach becomes significantly more fact-based compared to traditional sampling methods. However, to leverage these technologies in their daily work, internal auditors must possess appropriate digital skills. In this context, we observe a shift in emphasis towards the development of hybrid skill sets that auditors need to acquire. Internal audit departments are moving towards attracting digital profiles rather than financial or accounting professionals to meet these new requirements. Existing research emphasizes the advantages of having internal auditors, suggesting that they have greater expertise and familiarity with the organization's business processes and risks. Figure 7 presents a conceptual model summarizing the key influences of digitization in the environment on the internal audit function.

Fig.7. A conceptual model summarising the research finding.



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