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A Review of the Literature on Internal Audit in the Era of Digital Transformation

Soumia THAROUMA[1*], Moussa OUDAI [2]

[1] Business School ESC, Laboratory of management, governance, innovation and performance of organizations, Algeria, s_tharouma@esc-alger.dz

[2] Business School ESC, Laboratory of management, governance, innovation and performance of organizations, Algeria, m_oudai@esc-alger.dz

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Abstract:

Digital transformation's (DT) potential for disruption has been widely discussed in scholarly literature and practitioner-driven discourses. The internal audit (IA) function is a pillar of the corporate governance function, as it maintains transparency in the dissemination of information and provides oversight and consulting services that assist companies in achieving their goals.

The challenges created by the DT to IA are twofold: the increase in the volume of data and the automation of processes. The purpose of this paper is to present the latest research findings on the impacts of digital transformation on the internal audit function. By conducting a literature review, a summary of the most frequently discussed literature attributes is also presented in this paper. This review ultimately reveals that internal audit quality in light of digital transformation contributes to business value creation and reporting quality improvement. Employing digital transformation mechanisms helps the internal auditor perform a comprehensive assessment and prepare periodic reports that incorporate highlights.

Keywords: Digital Transformation (DT), Internal Audit (IA), Internal Auditors.

(JEL) Classification : M42, O33.

1. Introduction:

The world's governments and businesses are undergoing an unprecedented transformation as they redesign their business models. The emergence of new disruptive digital technologies has generated a movement toward exceptional digital services. Digital tools are being used to improve processes, capture new markets, transform business models, and, most importantly, influence the extent to which companies or even countries are perceived as competitive. In today's digital world, technology is not a choice, but a fundamental business strategy that must be integrated into every part of the organization, creating a demand to transform processes, business models and the organization as a whole (Doukidis, Spinellis and Elbert, 2020). Transformation can enable better collaboration within and between organizations, more personalized ways to connect with different stakeholders, and insights from data that help a business grow and give it a chance to succeed.

Digital transformation is a complex and demanding process that requires the commitment of all company resources: human, technological, physical, organizational, and financial (Stark Kutnjak et al, 2020), With an increasing number of processes moving from paper to digital, more data is being generated within companies (Reinsel et al, 2018). A study by International Data Corporation (IDC) predicts that the global amount of data will reach 175 zettabytes by 2025, more than five times the

* Corresponding author

amount of data that existed in 2018 (Reinsel et al, 2018).

Nowadays, there are cloud-based systems that are increasingly cheap and easy to use; these new technologies are based on analytical applications, artificial intelligence, big data, internet of things, robotics, among others. Nevertheless, technology alone does nothing, it is necessary to know the environment that surrounds digital transformation; it is a change in the organization, culture and business (Stark, 2020).

Digital transformation is also affecting the entire scope of accounting work in taxation, financial accounting, management accounting, auditing, internal control, risk management, corporate governance, and other areas of accounting work, experiencing changes in both business processes and related work systems (Rini, Sri, Yudi & Gowon, 2021).

The internal audit function is a mainstay of the corporate governance framework (Hazera, Tabash, Khatib, Ahun, & Al-Kuhali, 2020). It was deemed as a critical function that plays a pioneering role in the governance process (Vadasi, Bekiaris, & Andrikopoulos, 2019). Its function is to provide monitoring and advisory services that help companies achieve their goals (IIA, 2017).

Internal auditors should have an understanding of key IT risks and controls, according to IIA Standard 1210.A3. The IIA's Internal Audit Competency Framework establishes several IT competencies. These include applied expert-level knowledge and skills related to IT tools and techniques to support audits and data analysis procedures (Lake Mary, 2021). Data analytics and machine learning approaches are changing the field of auditing, they can be used to find anomalies in large amounts of data (Kokina and Davenport, 2017) and are becoming an important part of the audit toolbox (No et al., 2019).

Two main challenges facing internal auditing which are the increase in data volume and process automation (Chiu et al., 2018). As it stands, auditing still relies mainly on drawing samples of transactions to verify processes during audit engagements (Byrnes, 2018). The main drawback of this approach is that relevant information could be found in transactions that were not selected for audit. With the increasing amount of data, this approach becomes both obsolete and the risk of sampling is compounded (Chiu et al., 2018). In internal auditing, on the other hand, process labels do not exist most of the time. This is due to the risk-based approach of selecting areas, departments, or processes for audit (Institute of Internal Auditors [IIA], 2017). Selection criteria are, for example, the turnover of a business area, but also the length of time an area has not been audited (Krüger & Hattingh, 2006; Jans et al., 2007; Kim & Kogan, 2014).

Notwithstanding the challenges, the internal audit profession recognizes the potential benefits that can result from moving to the cloud. Enhanced collaboration within internal audit and across the organization is one of them. Similar to the finance department's adoption of a cloud-based enterprise resource planning (ERP) system, internal audit's migration to the cloud should accelerate.

The overarching aim of this article is to shed light and provide findings on how internal auditing operates in the era of digital transformation; the research used a deductive methodology by conducting a literature review to uncover the impact of digital transformation on internal auditing.

2. Theoretical Foundation:

2.1. Digital Transformation “DT”:

Digital transformation is one of the most prominent topics for business, academia, and society in the same way (Reis et al, 2018; Hanelt ET AL, 2020). Previous studies have stated that it is important to

differentiate between the terms "digitization" and "digitalization" when describing the use of technology. Digitization refers to “the technical process of converting analog signals into a digital form, and ultimately into binary digits”, whereas digitalization is “the process of introducing digital technologies, which essentially deal with changes caused by information technologies” (Bettim Nathanael and Gerrit Sarens, 2021). A clarification of the difference between "digitalization" and "digital transformation" is also required, as misrecognition of these terms is prominent, as highlighted by (Bosilj Vuksic et al. 2018). While "digitalization" has already been defined in the foregoing lines as the use of new technologies in organizations (Spremic, 2017), "digital transformation" is a holistic concept that includes digital and other technologies as well as organizational and strategic changes.

Numerous authors have defined Digital Transformation. For instance, “Liere-Nethler, et al. (2018)” define DT as “the use of new digital technologies “(e.g. cloud computing), perspective computing (e.g. internet of things IOT, cyber-physical systems), mobile computing, social media, as well as new tools and methods to exploit data (e.g. business analytics, machine learning)”. To enable major business improvement (such as enhancing customer services, streamlining operations or creating new business models)”. Furthermore, Vial (2019, p. 127) considers DT to be "a process that aims to improve an entity by triggering significant changes in its properties through combinations of information technology, computer communication, and connectivity."

These illustrative definitions provide a valuable insight that DT has the potential to fundamentally change the way markets, business models, internal organization, and procedures operate (Matzler et al, 2018; Endres, Stoiber, & Wenzl, 2019; Lois et al, 2020).

Under Doukidis, Spinellis, and Ebert's (2020) conceptual model, which was derived by broadening previous published models (Westerman, Bonnet, & McAfee, 2014; Sebastian et al., 2017). The DT comprises four pillars (Kraus & Schlegel, 2021):

- Business processes transformation deals with digitalizing the business processes and improving performance management;
- Business model transformation is important to create innovative revenue streams based on digital activities;
- Customer experience transformation refers to comprehending the needs of customers and enhancing their experience in a digital sales process;
- Organizational transformation that accompanies the business transformation by respective changes to strategy, organization and workforce.

The research conducted by (Nambisana S, et.al. 2019), reported that the introduction of digitalization has also forced government agencies and other public institutions to rethink laws, regulations and policies related to a wide range of issues, including intellectual property rights, data privacy and security, consumer rights, worker skills and regional/local economic development. The Social and Economic goals of Digital Transformation are illustrated in the table below;

Table (01): Digital Transformation Goals

Perspective	Objective
Social	Foster the development of a more innovative and collaborative culture in industry and society
	Change the education system to provide new skills and future orientation to persons so that they can achieve excellence in digital work and society

	Create and maintain digital communication infra-structures and ensure their governance, accessibility, quality of service and affordability
	Strengthen digital data protection, transparency, autonomy and trust
	Improve the accessibility and quality of digital services offered to the population
Economic	Implement new and innovative business models
	Increase income generation, productivity and value addition in economy
	Improve the regulatory framework and technical standards

Source: (Ebert and Duarte, 2018)

According to an interview conducted by Baslyman Malak (2022) with participants with several years of DT experience, the main objective of implementing DT is to optimize current business processes, production, internal functions, and workforce. The second main objective is to increase and sustain business growth. Another important objective is winning or sharing winning with competitors, improving customer satisfaction, increasing customer loyalty in order to increase revenues and continuity of a business.

2.2. Internal Audit:

In this review, we are going to center on one of these internal functions, which is internal auditing, the main objective of internal auditing is to ensure the accuracy and effectiveness of the company's processes and to reduce risks (The Institute of Internal Auditors, 2018). To fulfill this aim, the internal auditor performs audits through set audit engagement (IIA, 2017). While conducting these, the auditors identify, evaluate, and document adequate information to achieve the objectives of the engagement (IIA, 2017). As a result, they can uncover waste, fraud, and wrongdoing (Lipman and Lipman, 2012).

As a profession, auditors are experiencing the new challenges of DT being more focused on advanced analytical skills underpinned by innovative technologies. Such as; Internet of Things/Robotic Process Automation «RPA» (which is a software robot that can be programmed to do the work of a normal human in order to free up audit staff to focus on more important things). Big Data analysis/predictive analytics, and Data Mining (which is the process of identifying and analyzing patterns in massive data sets, and then simplifying those patterns so that humans can learn new insights). Artificial intelligence that enable auditors to take detective, preventive, and prescriptive action by ingesting information and instructions (European Audit Committee Leadership Network, 2017).

The adoption of DT in organizations comes with both risks and costs.

2.3. Risks:

At its core, digital transformation is a discipleship process that tends to take companies into novel business realms. Many organizations have leaped headfirst into the world of digital transformation, are ahead of the game, whereas others, unnerved by the upheaval, are slow, and guarded in their implementation. The difference in velocity of adoption arises from the real and perceived risks of digital transformation. A wholesale digital transformation typically entails new and uncharted operations and can reshape entire business models. The risks resulting from digital technologies are driven by four main trends (Industrial IOT, 2019)":

- **Technology risks:** It affects both systems and processes, and can be associated with obsolete technology or the upgradeability of deployed technology.
- **Cyber risks**: The ever-looming specter of a potential unauthorized intrusion is one of the main concerns of all organizations. Monitoring, application security and even network architecture can influence this type of risk.

- **Strategic Risks:** Strategic risks are closely tied to brand, reputation and customer experience. The implementation of technologies such as RPA can automate processes that were previously "high touch" and can affect a customer's perception of a company.
- **Third-party risks:** many companies operate with tight integration with vendors and suppliers, particularly in areas such as the supply chain. This is based on suppliers' access to key internal systems.

2.4. Costs:

Nowadays, all companies measure their performance by improving the implementation of their digital transformation plans, as it leads to cost savings by using cloud computing, i.e. the process of Maintenance, Storage, Management, Processing, analytics and data security by leveraging a network of Internet-based servers. The data is not saved on physical but in the cloud, helping companies better manage administration, streamline processes and reduce costs. Manage administration, streamline processes, improve productivity, optimize costs and enhance the digital customer experience (IDC, 2018).

3. Research Methodology:

To consolidate the existing knowledge on the field of Digital Transformation and its impact on Internal Audit we review the extant literature by applying a systematic review methodology. Google Scholar and other electronic databases were used for search with keywords, extract abstracts and finally full texts; the methodology drawn up in our paper was inspired by the work of (Teichert Roman, 2019). The research was restricted to a period [2018-2022].

The first chart below outlines the literature search process followed to screen the existing literature

Table (02): Search process documentation

Data Source	Search process documentation
Google Scholar	• Date of search : 10 March 2022-10 May 2022 • Preliminary search by using defined keywords (TAB II),limited in time [2018-2022] • First hit results sorted by relevance, most cited literature is ranked higher • All search results were saved and retained in personal Drive
Research Gate, IEEE, Explore Digital Library, Science Direct, Emerald	• Recover and screen abstracts by inclusion criteria (secondary screening). • Recover and screen full text by inclusion criteria (final screening).
Reference Lists	• Reviewing reference lists of already included papers • Fetch identified articles (Google) • Review of identified articles against inclusion criteria

Source: Prepared by the researcher based on the study by (Teichert Roman, 2019).

The second table displays the most relevant terms used to search for previous studies related to our topic.

Table (03): Search terms used

Search terms
« Digital Transformation » / « DT » / « Digitalization » / » Artificial Intelligence » / « Data Analytics » /« Big-data» /« Industry 4.0 » / «Blockchain»/ « Internal audit »/« Internal Auditing»/ « Internal Auditors»

Source: Prepared by the researcher based on the study by (Teichert Roman, 2019).

The last table lists the inclusion criteria used to filter the studies and articles to be selected for our research.

Table (04): Inclusion criteria used

Reviewing phase	Inclusion Criteria
Primary Screening	1. English language 2. Keywords identified in the title or text of the search result displayed. 3. Limited to a specific period [2018-2022]. 4. Top 15 results ranked by relevance 5. Academic literature (not textbooks) 6. No duplicates
Secondary Screening (Abstract, Keywords)	1. A research/study/survey 2. Internal audit's approach in the context of digital transformation.
Final Examination (full-text availability assessment)	1. Full article available 2. Secondary screening criteria.

Source: Prepared by the researcher based on the study by (Teichert Roman, 2019).

Search terms that address the concept of digital transformation and internal auditing (Tab. 3) were used to identify applicable articles and documents. This search strategy generated 178 initial results sorted by relevance after performing the preliminary search guided by the defined inclusion criteria (Tab. 4). The applicability of the results was assessed by checking whether all the keywords used were identified in the displayed title or in the text of the search result. After this first selection phase, 35 studies remained. In the secondary selection phase, the abstracts and associated keywords of the remaining studies were assessed for eligibility against the concept of DT and IA. The full texts of the remaining 35 articles were retrieved, read in their entirety, and rechecked to ensure that they met the inclusion criteria. In the end, 9 eligible studies remained.

To increase the robustness of the systematic literature review and to avoid missing important articles on the topic, an additional search was performed. For this, the reference lists of the 9 included studies were screened, which identified 2 additional studies describing the impact of DT on IA. Finally, a total of 11 studies were amenable to data extraction and were successfully retrieved from the data sources used.

Selected articles and research results are highlighted below.

4. Literature Review:

Previous Studies related to digital transformation and internal audit:

- **Study of Monzer Mohamed Ali (2022),** "The Impact of Digital Transformation on the Internal Audit Quality and its Reflection on Enhancing the Quality of Financial Reporting an Empirical Study", reached out, that the application of digital technologies in operational audit activities helps the auditors to conduct a comprehensive evaluation and prepare periodic reports. That comprise the most important observations, which contributes to provide information recommendations and appropriate corrective actions to decision makers in order to improve the quality of financial reporting within the company.

- **Study of Hassan Radwan; Alumed Zeidan and Haitham Elbasuony, (2021),** "The impact of Digital Transformation on Internal Audit" concluded that, while new regulations are needed to govern digital transformation, the profession needs to leverage its strategic ways of working to the new generation of

technology to justify the reduced cost of DT. In the same study, it is stated that digital transformation has a major impact on internal auditing at several levels, such as internal audit planning, audit skills, audit methodology, data sharing, analysis and reporting of audit results.

- **Study of Nathanel Betti and Gerrit Sarens (2021)**," Understanding the Internal Audit function in a Digitalized Business Environment", revealed that the digitalization of the business ecosystem has three implications for the internal audit function. First, it affects its reach. The agility of internal audit scheduling and the digital knowledge required are expected to expand, and information technology (IT)-related risks are increasing in prominence, notably cybersecurity threats. Second, the request for consulting activities carried out by internal auditors is greater and third, digitalization is altering the work habits of internal auditors in their daily assignments. New technologies such as data analysis tools are gradually being implemented in internal audit departments and digital skills are seen as a key asset. Moreover, in order to help organizations, cope with the digitalization of the business environment, the internal audit function should develop consulting activities.

- **Study of Simone Pizzzi, Andrea Venturelli, Michele Variale and Giuesppe Pio Macrario, (2021),** "Assessing the Impacts of Digital Transformation on Internal Auditing: A Bibliometric Analysis" revealed four independent research areas: Continuous Auditing (which is defined by the IIA as the method used by auditors to perform audit-related activities on a more continuous or continual basis). Fraud Detection (one of the important roles of Internal Auditors is detecting fraud, using data analytics, fraud detection software and tools enables organizations to predict conventional fraud tactics, cross-reference data through automation, manually and continually monitor transactions in real time). Data Analytics (Internal Auditors are mostly aware of the importance of data analytics, the different methods of its implementation into the organization and its role in transforming internal audit function) and Technological Innovation (digital technologies such as automated robotic processes and advanced analytics also contribute to internal audit's ability to enhance its performance. Such technologies allow internal auditors to test an entire population rather than just a sample of transactions, and they can provide significant cost savings by automating routine tasks).

- **Study of Rini Rosa, Sri Rahayu, Yudi and Muhammad Gowon (2021),** "Internal Auditor Transformation Strategy in the Industrial Revolution 4.0 Era: Literature Review" concluded that considering the challenges faced in the Industrial Revolution 4.0 era (which combine more complex cyber, physical, and biological systems). A transformation strategy is needed for APIP (the Governmental Internal Supervisory Apparatus of Indonesia) to survive in this era. Strategies that APIP can carry out in facing the challenges of industry 4.0 include using data-collecting equipment such as sensors and software, having characters that become his trademark in completing his audit tasks and must be professional.

- **Study of Portzenheim, (2019).** "The Impact of Digital Transformation on The Internal Audit Process and Practices" stated that the most significant impacts of DT on the internal audit process and practices discovered are the implementation of continuous auditing, the emergence of new risks to be audited and managed in the internal audit process. Changes in control internal audit, governance objectives and the role of internal auditors. They can now provide a higher level of assurance with less effort, allowing them to fulfill their consulting role.

- **Study of Betti, N., DeSimone, S., and Gray, J., (2022).** "The Impacts of the Use of Data Analytics and the Performance of Consulting Activities on Perceived Internal Audit Quality" aimed that; managers

perceived the internal audit function (IAF) as more competent when it uses data analytics to accomplish its mission, because data analytics enable the IAF to carry out more targeted and in-depth analyses. Findings show also an interaction effect where the use of data analytics with the performance of consulting activities strengthens the perceived quality of the relationship between internal auditors and management.

- **Study of Caratas Maria Alina, Spatariu Elna Cerasela and Gheorghin Gabriela, (2018),** "Internal Audit Role in Artificial Intelligence" concluded that internal audit ought to use AI artificial intelligence in cognitive capabilities, which results in augmenting human thinking or replacing it, in a natural and intuitive way. AI leveraging AI can provide assurance to companies by helping them distinguish truth from falsehood, paying attention to ethics and aiming to improve internal control, risk management and governance.

- **Study of B R, Aditya, R, Hartanto and L E, Nugroho (2018).** "The Role of IT Audit in the Era of Digital Transformation" made a finding; that a digital transformation has an impact on IT audit practices, such as the increasing demand for IT audit and the opening opportunities for IT audit to improve their roles in order to make a real contribution to the development of business and organizations. On the other hand, DT also provides a number of issues and challenger for IT audit resulting in increased complexity of IT audit practices. In addition, an increase in the need for qualified IT auditors, as well as lack of support from existing IT audit frameworks, is also a problem in modern IT audit.

5. Results and discussion:

After reviewing all previous studies, we conclude the followings:

- Internal audit functions are aware of the need for DT and automation, including the growing use of cloud-based technology to successfully conduct their business. A 2021 survey by the Foundation for Auditing and the Auditing Council found that internal auditors use audit management and GRC (Governance, Risk, and compliance) software to handle new IA challenges, such as identifying and assessing new and emerging risks, collaborating with internal and external stakeholders, engaging with business owners, and saving time and costs. In fact, internal auditors have found that they have more time for strategic and consulting engagements when administrative activities are automated, while the impacts of DT are outstanding, a large swath of internal auditors do not fully understand how technology can be leveraged to generate value for the department and the business.

- As reported by the "Chartered Institute of Internal Audit, Sept. 2020 "Digital transformation is influencing internal auditing in several meaningful ways:

- **Collaboration:** The replacement of silo file systems with cloud based sharing systems heightens the need for robust controls, particularly when those systems can be opened up to external parties. Collaborative tools encourage fast decision making and agile project management, although appropriate due diligence is still required. Knowledge sharing are uncontrolled and the provenance of information may not be known, understanding the risks around this is critical to internal audit and decision makers.
- **Connectivity:** There is increased connectivity of people, data and systems, audit areas to explore around this include cybersecurity and data access. Increased access to data across the organization places cybersecurity and data privacy among the top risks. With connectivity comes creation and

the need to understand digital assets in order to protect them. Consumer marketing risks increase dramatically due to the business opportunities presented by technology.

- **Communications:** conversations on instant chat improve efficiency, ensuring all employees know the protocols for internal and external communications becomes critical to risk management in digital age.

- As a direct result of DT, there is a growing interest in the concept of continuous auditing, with employees and auditors understanding the strengths of continuous auditing such as the need for information systems and technology to support it. Auditors perceive that data collection is not considered as serious a problem in terms of wasted time as is typically found in the literature. The majority of auditors agree that due to the time required for data collection and geographic distances, continuous auditing will provide a distinct competitive advantage. The results indicate broad acceptance of the method, but at the same time serious difficulties in adopting it.
- Digital technologies such as robotic process automation and advanced analytics also help internal auditors enhance their performance. They enable internal auditors to conduct tests on an entire population rather than just a sample of transactions. However, these advantages will require new skills and more flexible approaches to audit forecasting.

6. Conclusion:

From the findings of the above research and discussion, it can be concluded that the implementation of digital technologies involves investing in cognitive technology, which includes analyzing big data, creating assumptions and making assessments, bringing together interaction, learning, and simulation of the human decision-making process that helps provide information to decision makers within the company. The quality of internal auditing in light of digital transformation helps to create value for the company and improve the quality of financial reporting. The use of digital transformation mechanisms helps the internal auditor to perform a comprehensive assessment and prepare periodic reports that include the salient insights. While the research related to this topic remains open, given the limited literature found.

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