

# Assessing the Impact of Digitalization on Internal Auditing Function

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**Abstract**—Over the past decades, the business environment has become increasingly digitized. Advances in new technologies are driving significant organizational change. Over the years, the internal audit as a governance actor, has adapted to meet the demands of the evolving business environment, and its role in consulting activities has been a significant topic of debate in the literature. This research aims to study the impact of the digitalization of organizations on the internal audit function. The method used to achieve this goal is a survey conducted with 175 internal auditors and managers working for companies in various sectors. The results indicate the existence of a positive relationship between the level of digitalization of the organization and the diversion of risks. This requires greater agility on the part of internal audit, through strengthening the digital skills of auditors, particularly in data analysis, to meet the needs of different stakeholders. The results also indicate that the level of digitalization of the organization has an indirect effect on the level of integration of consulting missions in the internal audit plan, a new role that internal audit is developing to support added value.

**Keywords**—Digitalization, data analytics; organization; Internal Audit Function (IAF); agility

## I. INTRODUCTION

Today's organizational environment is characterized by a multitude of changes that condition the competitiveness of players. These changes take many forms: technological, social, and environmental progress with an ecological dimension, and associate companies with the notion of vulnerability and the use of advantages. Moreover, a company is confronted with new challenges as a dynamic system that interacts with its environment. The study [1] has shown that business problems are constantly evolving. Faced with the difficulties of organization, financing, circulation, and reliability of information linked to the globalization of economies and new information and communication technologies, companies find themselves obliged to adapt their ways of thinking to sustain their profitability and economic growth. One way of doing this is to find ways of strengthening investor confidence, optimizing resources, and defining responsibilities.

With a view to helping companies achieve their objectives effectively and efficiently, by identifying new and emerging risks as effectively as possible, the role of internal auditing is to provide a mechanism for assessing the effectiveness of governance, risk management and control processes, as well as the company's level of resilience and its ability to ensure its business continuity plan in a context of uncertainty marked by crisis.

In such a situation, the internal audit function finds itself obliged to introduce new processes and imbue itself with new procedures that will enable it to pinpoint the key elements of each of these crises as accurately as possible, to provide the most objective and accurate picture possible of the various levels of risk involved.

New technologies for data analysis [2], [3], [4], [5], [6], artificial intelligence [7], [8] and RPA [9], [10] remain an opportunity for the internal audit function to respond to the multitude of expectations by quantifying impacts, predicting and valuing financial stakes, and proposing relevant recommendations. According to several authors [2], [11], auditing is one of the domains affected by the immersion of new technology. As a result, it is undergoing a critical turning point in the wake of advances in information technology and its rapid penetration of companies [11]. As a result, the audit profession is in a period of transition from traditional paper-based auditing to a more digitized audit with automated and dematerialized processes [11].

Recent market developments have removed several barriers to the use of Big Data technologies. These technologies now make it possible to process significant volumes of data and to visualize them, with the deployment of tools such as Qlik and Power BI which have made it easier to handle and share analyses in a synthetic way.

Nonetheless, digitalization has changed risk levels at corporate level. Several observations have been made in this respect:

Firstly, the integration of new technologies can introduce new risks to which the company was not previously exposed. For example, the growing use of ICT's can increase cybersecurity risks, such as hacker attacks, data breaches or online fraud attempts [12].

Secondly, digitalization has led to more complex processes and systems. This can make it more difficult to identify, assess and manage risks. For example, the introduction of interconnected systems or data platforms can make information flows more complex, which can make it difficult to gain an overall understanding of risks and coordinate appropriate control measures [13]. Thirdly, digitalization has impacted on the pace of change within the company, whether in terms of technologies, processes, or business models. This can lead to risks associated with managing change, adapting to new technologies and market developments. Companies need to be

aware of these risks and put in place appropriate mechanisms to manage and adapt quickly to these changes [14].

This study contributes to research on internal function in two ways. First, the derivation of risks following the integration of digital into organizational processes through the evolution of their criticality. Secondly, the level of digitalization of the company has an indirect effect on the internal audit function on several levels. In addition, the internal audit function must be able to adapt to technological developments, new risks, and organizational changes. To achieve this, the function needs to be agile [15]. In other words, internal audit must be able to respond quickly to the following factors demands or priorities within the organization, adjust audit plans accordingly and adapt to changing circumstances.

The article is organized as follows. Firstly, the presentation of the theoretical framework for the digitalization of the internal audit function is given in Section II. Next, the methodological approach used in Section III and present the findings in Section IV. Finally, the paper is concluded in Section V

## II. THEORETICAL BACKGROUND AND RESEARCH QUESTIONS

### A. Risk Diversion in the Age of Digitalization

The adoption of digital technologies has significantly altered the landscape of risks to which companies are exposed. In the same vein, risk derivation refers to the process by which traditional risks are transformed or exacerbated by digital technologies and practices [16]. As digital transformation continues to shape society and the economy, new risks are emerging and existing ones are being amplified.

Several studies have been carried out providing important insights into the impact of digitalization on risk, helping companies, decision-makers, and researchers to better understand the challenges and opportunities associated with this transformation. To illustrate, a few examples are detailed in Table I.

However, it is essential to point out that digitization is not a new phenomenon. It is an old wave that has affected the business world. [17]. Firstly, the integration of computers has

had an impact on the way organizations operate, through the gradual replacement of paper. Secondly, the use of the Internet has revolutionized the world. Today, the world is experiencing a new wave of recent technologies such as data analytics, IA, and cloud computing). None of these technologies is a source of problems. However, the confluence of these technologies has changed the way to do business, and what constitutes this digital transformation is as follows [17].

The emergence of digital technologies continues to overwhelm the market every day and continually influence the environment [18] that enable machines and equipment to monitor and analyze their own functioning as well as make autonomous decisions and self-optimize, leading to more efficient production and predictive maintenance. Digitalization is always psychologically linked to instability, complexity, and uncertainty.

Indeed, digitalization are constantly making their presence felt in the corporate environment, forcing organizations to follow this trend progressively to survive in a competitive environment [19].

Digitalization converges the speeds of organizational change, and in turn, implies a series of changes to organizational map [20] leading to more digitized and automated business processes [21]. The persistence of business models is based on proactive strategies that combine regular, gradual modification of the skills map with the structuring of a digital integration model.[22], [23], as well as the search for a sustainable strategic positioning, by focusing on digital technologies and their various technical aspects [24]. In other terms, integrating digital into an organization's strategy remains the cornerstone of digitization, and is a step change that necessitates ongoing organizational evolution [21], [25].

Just as some civilizations were still in the Stone Age and others in the Bronze Age at the same point in history. In the same way, not all companies are at the same level of evolution. As the digital environment rapidly evolves, organizations are also striving to follow the same expansion curve. These actions enable companies to improve their processes and use new technologies to continue their numerical expansion and ensure business continuity [24], [26].

TABLE I. EXAMPLES OF PREVIOUS STUDIES

Title of study or survey	Organization involved	Year of publication	Objectives
Global Risks Report	World Economic Forum	2023	Examine emerging trends and risks on a global scale.
			Highlight the impact of digitalization on risks, including cybersecurity, data privacy, misinformation, and technological disruptions.
Cost of Cyber Crime Study	The Ponemon Institute	2016	Examine the financial costs and operational impacts of cyber-attacks and data breaches, providing an understanding of the scale of the risks associated with digitalization.
Tech Trends	Deloitte	2023	Present technological trends and their impact on business.
			Investigate technology-related risks, such as security, data confidentiality, ethics, and governance, offering valuable insights into the impact of digitalization.
Digital Transformation and the Risk of Commoditization	Harvard Business Review	2021	Explore the risks involved in the process of digitalization of companies.
Digital Disruption: The Growth Multiplier	McKinsey & Company	2018	Focus on the challenges of increased competition, business model disruption and loss of differentiation in an increasingly digitalized world.

Therefore, there is a semiquinone condition for success. These include the involvement and development of HR capital and the establishment of a flexible organizational culture [27]. Moreover, the implementation of digital strategy will impact the entire organizational value chain. For example, business processes will be impacted first and foremost by the adoption of digital technologies. On the other hand, the digitization of other support processes, such as the internal audit function, can be held up. For example, the integration of data analytics tools into internal audit engagements is not yet standardized. Recent reports indicate that internal audit functions are not exploiting the potential of new technologies and that there is still much to be done. For example, the integration of data analytics tools into internal audit engagements is not yet standardized [28].

Previous research has yet to assess the impact of digitization on the role and activities of the internal audit function [29], [30]. This research aims to examine how the use of digital technologies at the organizational level has affected the internal audit function.

- H1. There is a relationship between the use of technologies at organizational level and the evolution of risks. Consequently, the audit scope is required to cover the resulting risks and measure their impact on the organization.
- H2. New technologies impact the role of the internal audit function.

### B. The Digitalization of the Environment

This dynamism and complexity of the corporate environment have been amplified by the omnipresence of digital technology. Today, all companies process their information using digital solutions. What is more, the amount of information processed or stored in this way is growing, even exponentially. This prevalence of digital technology means that auditors must adapt to the specificities of this context.

Nonetheless, the digital transformation of any function aims to improve performance in terms of effectiveness and efficiency [14]. To this end, several authors [14], [21], [27] have confirmed that these technological evolutions offer the auditor the opportunity to use much more advanced techniques, enabling him to achieve his mission in line with standards and creating added value for his stakeholders.

### C. Evolution of the Internal Audit Role

Over time, the internal auditing has undergone a remarkable evolution to become a broader, more strategic function within organizations. At the beginning of the 20th century in the United States, large American companies used external auditing firms to certify their annual accounts [1]. The services provided were considered costly and burdensome for these companies. Consequently, the efforts are focused on finding a way to reduce these expenses, by analyzing the nature of the work conducted by the external auditors. Therefore, some of the tasks will be carried out in-house by company employees [31]. The external audit firms agreed, subject to a certain amount of supervision.

It was not until the 1970s and 1980s that the scope of the function's intervention began to expand [32], with objective

and independent reviews of operational aspects and internal control systems going beyond financial issues alone [33].

In this regard, internal auditors have begun to play a key role in risk assessment, corporate governance, regulatory compliance, and process management [34]. In the 1990s and 2000s, the internal auditing profession gained in recognition and professionalism. The creation of professional associations and institutes were key to the evolution of the profession, through the development of standards, codes of ethics and qualifications for internal auditors.

Over the past few decades, internal auditing has taken on an increasingly strategic dimension. Internal auditors have become essential partners for senior management and boards of directors, providing independent assurance and helping to improve operations, control systems and risk management. The function has also begun to play a more consultative role, providing advice to management [35]. Internal audit is involved in areas such as enterprise risk management, compliance auditing, IT auditing, sustainable development and corporate social responsibility.

In the wake of financial crises and scandals, the internal audit function has undergone a significant evolution. The repercussions of these crises highlighted the need to strengthen corporate governance, financial transparency, and risk management within organizations [1]. These significant events have underlined the importance of continuous risk assessment and monitoring, with the aim of improving processes, helping the company to identify vulnerabilities and implement appropriate control measure [33].

Analysis of internal auditing research shows that variations in the economic circumstances in which organizations manage seem to have an impact on the evolution of internal auditing [34], [36]. By way of illustration, the concentration of the internal audit function on insurance activities is merely the consequence of the global economic crisis or a financial scandal [1]. In addition, internal audit's commitment to consulting activities stems from changes in the economic and regulatory environment [12]. Today, following the emergence of information technologies and information systems, internal auditing has also had to adapt to manage the risks arising from digitalization and its impact on organizations. It is now time to examine how the integration of digital technologies at a corporate level has shaped the internal audit function. Digitalization can be seen as one of the environmental factors affecting a company's organizational structure [12], [37].

The review of existing literature has shown that previous research focuses much more on the digitalization of external auditing [25], using technologies such as data analysis by external auditors [38], [39].

The theoretical foundations presented prompt to focus on the digitization of the internal audit function, as this is an area of research that has yet to be explored [40], [41]. This research therefore aims to understand how the risks that have been evolving because of the integration of new digital technologies have had an impact on internal auditing.

- H3. Digitalization has pushed the internal audit function to perform functions outside its functional perimeter, through consulting assignments.

### III. METHODOLOGY

#### A. Data Collection

In line with previous research, the paper is based on an online survey. The survey consisted of three sections. In the first section, respondents were asked to answer questions relating to their organization's internal audit function. In the second section, questions were asked about their organization's level of digitalization. The final section included questions related to their organization's sector and the size of the internal audit function. The survey was submitted to a total of three hundred internal audit directors working in various sectors. A total of 175 responses were received, representing a response rate of 58%.

#### B. Measures

A four-part scale is used to measure the level of digitization of the organization in which the respondents work: the organization's strategy is geared towards digital development, business processes are digitized, the organization prioritizes digital solutions to enhance processes, the organization deploys

digital solutions available on the market. These items were measured on five-point Likert scales.

Table II shows two tests that indicate the adequacy of the data for detecting structure. The Kaiser-Meyer-Olkin measure of sampling adequacy is a statistic that indicates the percentage of variance in variables that can be caused by subjacent factors. KMO values of up to 0.776 considered high (close to 1) indicate that factor analysis may be useful for the sample data. The "Bartlett" test of sphericity tests the assumption that the correlation matrix is an identity matrix, which would indicate that the variables are unrelated and therefore inappropriate for detection of structures. In the case of this study, the significance level is below 0.05, indicating that factor analysis is strongly recommended for data reduction.

By using principal component analysis, the variables were clustered under two factors. The Cronbach's alpha of this ad hoc scale was above the critical value of 0.7, and the percentage of variance explained was 83% (see Table III). The eleven items can be grouped under two factors describing "the level of digital integration», called DIGITAL and "the degree of agility of the internal audit function ", called AGILITY calculate this new variable. Tables III, IV and V summarize the results of this analysis.

TABLE II. TEST OF BARTLETTE AND KAISER-MEYER-OLKIN

Kaiser-Meyer-Olkin Index	Bartlett's test	% Explained variance
0,776	Khi 2 : 511,143 ddl : 3 Bartlett(a) : 0,0000	0,83034

TABLE III. SCORE OF ITEMS (1)

Items	1	2	3	4	5	Mean	Min	Max	SD
The ability to quickly communicate audit results and recommend corrective actions in a digital environment	4	22	0	130	19	3,789	1	5	0,88
The use of digital tools and technologies	10	6	0	100	59	4,097	1	5	0,99
The internal audit plan focuses on digital issues	13	12	0	124	26	3,789	1	5	1,02
The internal audit function is successfully anticipating the risks associated with digital transformation	14	12	2	129	18	3,714	1	5	1,01

TABLE IV. SCORE OF ITEMS (2)

Items	1	2	3	4	5	Mean	Min	Max	SD
Integration of digital technologies to manage internal operations	0	6	8	131	30	4,057	1	5	0,594
Use of data management and analysis systems (BI, Data Analytics...)	1	10	1	118	45	4,12	1	5	0,729
Automating operational processes with digital solutions	0	1	19	116	39	4,103	1	5	0,588

TABLE V. VARIABLES DESCRIPTION

Variables	Definition	Measurement
DIGITAL	<b>Organizations level of digitalisation</b>	Variable with a value between 1 (low level of digitalisation) and 5 (high level of digitalisation)
AGILITY	<b>Agility of internal audit function</b>	Variable with a value between 1 (low level of digitalisation) and 5 (high level of digitalisation)
RISKS	<b>Digital risks</b>	Variable with a value between 1 (minor risks) and 5 (major risks)
SKILLS	<b>Digital skills</b>	Variable with a value between 1 (low qualifications) and 5 (high qualification)
MATURITY	<b>The level of digital maturity in the organization</b>	Variable with a value between 1 (low level of maturity) and 5 (high level of maturity)
CONSULTING	<b>Degree of consulting activities</b>	Percentage of the internal audit planning dedicated to consulting activities
SECTOR	<b>Sector of the organization</b>	Dummy variable with a value of 0 (organization from the non-financial sector) or 1 (organization from the financial sector)

The nature of the sector of activity is included as a variable, as the financial sector is highly regulated compared to the rest of the sectors, which will certainly influence the performance of the internal audit function [42]. Respondents specify the organization's sector of activity. Consequently, a new variable is created (0=> non-financial sector, 1 => financial sector).

#### IV. RESULTS

##### A. Test of Hypothesis

For each variable, a two-group T-test was performed, comparing the mean exactly below the median with the mean equal to or above the median.

Tables VI and VII highlight the percentages of digital maturity at organization level, as well as consulting and data analysis activities by sub-group.

T-test results (RISKS: Sig= 0.06 >0.05 and T-test = 2.56), (DIGITAL: Sig= 0.07 >0.05 and T-test = 10.76) and (AGILITY: Sig= 0.06 >0.05 and T-test = 14.81) confirm the null hypothesis of variable equality.

The research results confirmed the research hypotheses cited. Digitalization has a considerable effect on audit risk, changing the nature of the challenges facing internal auditors. Increased complexity makes it difficult to fully understand and audit these systems, increasing the risk of omissions or errors. Business process automation and systems integration can improve efficiency but can also introduce risks associated with algorithmic errors or over-reliance on technology. As a result, the level of digital maturity has a significant impact on risk trends. As a result, the audit scope must cover the resulting risks and measure their impact on the organization [43].

Clearly, the level of digital maturity reflects a clearly defined strategy aligned with the effective use of digital technologies to achieve its objectives [44] Digital transformation is integrated into the company's vision and mission, as is the successful adaptation of digital technologies. In other words, the organization is characterized by the automation of business and support processes and the use of data analytics for decision-making. Moreover, data is collected, managed, and used in an integrated way at all levels of the company. Data analysis is used to make informed decisions and anticipate market trends [45].

What is more, in a digital environment, organizational agility is paramount. As a cross-functional function, the agility of the internal auditing; is key to the success of its day-to-day missions [46]. This quality refers to its ability to adapt quickly and effectively to changes in the business environment, emerging risks, technological advances, and the changing needs of the organization [47].

By integrating advanced new technologies, such as real-time data analysis, artificial intelligence, and automation, to enhance the effectiveness and relevance of audits. Moreover, in an environment characterized by digital maturity, the agile internal audit function will be able to detect and react rapidly to significant changes in the business environment, such as regulatory changes and technological developments. Moreover, this agility manifests itself in its ability to adjust its audit plans in line with the organization's changing priorities, emerging

risks and identified opportunities [48]. It also translates into a focus on creating value for the organization [49]. This means aligning with strategic objectives and identifying opportunities for continuous improvement.

Table VII summarizes the T-test results (DIGITAL: Sig= 0.07 >0.05 and T-test = 2.68) and (SKILLS: Sig= 0.06 >0.05 and T-test = 1.03) confirming the null hypothesis of equality of the variables.

In this sense, the results confirm that digitalization can be considered as just one of the environmental issues impacting the scope of action of the internal auditing [25]. Furthermore, the internal audit function can play an important role in providing consulting services to company management, in addition to its traditional audit activities. These consulting activities aim to add value to the company by helping to improve its operations, risk management and internal control. Ipso facto, the function can advise that this may include recommendations on risk management policies, risk assessment processes and the implementation of preventive measures, as well as participation in the development and review of strategic plans, providing an objective view of the risks and benefits associated with the implementation of strategic initiatives [50].

TABLE VI. PERCENTAGE OF MATURITY BY GROUPS

Variables	Groups	N	Mean	SD	T-Test	Sig.
<b>RISKS</b>	<b>&gt;= median</b>	159	4,02	<b>0,74</b>	2,56	0,06
	<b>&lt; median</b>	16	1,50	<b>0,52</b>		
<b>DIGITAL</b>	<b>&gt;= median</b>	159	0,20	<b>0,72</b>	10,761	0,07
	<b>&lt; median</b>	16	-1,99	<b>1,21</b>		
<b>CONSULTING</b>	<b>&gt;= median</b>	159	3,96	<b>0,84</b>	3,648	0,01
	<b>&lt; median</b>	16	2,56	<b>1,50</b>		
<b>AGILITY</b>	<b>&gt;= median</b>	159	0,24	<b>0,69</b>	14,812	0,06
	<b>&lt; median</b>	16	-2,35	<b>0,35</b>		
<b>SKILLS</b>	<b>&gt;= median</b>	159	3,03	<b>1,06</b>	5,711	0,02
	<b>&lt; median</b>	16	1,50	<b>0,52</b>		

TABLE VII. PERCENTAGE OF CONSULTING ASSIGNMENT BY GROUPS

Variables	Groups	N	Mean	SD	T-Test	Sig.
<b>RISKS</b>	<b>&gt;= median</b>	150	<b>3,81</b>	0,93	1,78	0,06
	<b>&lt; median</b>	25	<b>3,64</b>	1,50		
<b>DIGITAL</b>	<b>&gt;= median</b>	150	<b>0,08</b>	1,01	2,68	0,07
	<b>&lt; median</b>	25	<b>-0,49</b>	0,83		
<b>MATURITY</b>	<b>&gt;= median</b>	150	<b>4,35</b>	0,58	6,79	0,01
	<b>&lt; median</b>	25	<b>3,40</b>	0,96		
<b>AGILITY</b>	<b>&gt;= median</b>	150	<b>0,10</b>	0,90	3,26	0,06
	<b>&lt; median</b>	25	<b>-0,59</b>	1,32		

## V. DISCUSSION AND CONCLUSION

Today, digitalization is having a profound impact on businesses [12], redefining their operating models, customer interactions and growth strategies. According to [51], digitalization is fundamentally transforming the way businesses operate by automating processes, improving operational efficiency, and creating new opportunities for innovation. Companies that fully embrace digitalization can benefit from greater agility, faster decision-making. However, there is a limited understanding of how digitization is shaping the activities and working practices of the internal audit function [41]. The aim of this research is to understand how internal audit function is changing its activities and practices because of the integration of new technologies. It is a continuation of the research conducted on the digitalization of the internal audit function [41]. In this respect, the internal auditing is reconfiguring its mode of operation by adopting an agile strategy. This agility is defined by the incorporation of technologies like Data Analytics at the level of these missions and the use of agile methodologies.

The literature review and empirical study confirm that there is a significant positive correlation between the digitization of businesses, the integration of new technologies and increased levels of risk. In such a situation, the internal audit function must adopt a nimble approach in response to the diverse demands of stakeholders and reconfirm its role as one of the control measures guaranteeing good corporate governance as result, the more digitized organizations become, the greater the impact on internal auditors' activities [12].

The most widely used digital tool is data analysis. This technology offers internal auditors the ability to raise precise findings, achieve efficiencies in their activities, make sound hypotheses, feedback relevant information and formulate effective recommendations.[52].

What is more, digitalization has enabled the internal audit function to support its added value through the integration of consulting activities with corporate governance bodies. However, it is crucial that the internal audit function retains its independence and objectivity, even when providing consulting services. This ensures that the advice provided is impartial and aligned with the organization's overall objectives.

From a managerial perspective, the findings reveal an increase in the use of data analysis by internal auditors because of digitalization. Consequently, it is becoming essential for the new generation of internal auditors to develop their skills and acquire new knowledge in digital technology, which calls into question their basic training.

While organizations can set up programs to strengthen auditors' digital skills, it is suggested that the internal auditing degree should focus more on digital and IT skills, for a better university/company partnership to reduce the "Expectation gap" in auditing. This approach would enable future internal auditors to develop more advanced digital awareness. Consequently, it is becoming imperative for companies to recruit and retain professionals with advanced digital skills [53].

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