

Effects of digitalisation of organisations on internal audit activities and practices

Nathanaël Betti and Gerrit Sarens

*Louvain Research Institute in Management and Organizations,
Université catholique de Louvain, Louvain-la-Neuve, Belgium, and*

Ingrid Poncin

*Louvain Research Institute in Management and Organizations,
Université catholique de Louvain, Mons, Belgium*

Abstract

Purpose – This paper aims to investigate how the internal audit function (IAF) modifies its activities and practices in relation to the digitalisation of the organisation. This paper specifically examines the use of data analytics and the performance of consulting activities by internal auditors.

Design/methodology/approach – This paper is based on a survey conducted with 82 chief audit executives based in the USA and members of the institute of internal auditors.

Findings – Results indicate a positive relation between the organisation's level of digitalisation and the use of data analytics by internal auditors during their missions. Results also indicate that the organisation's level of digitalisation has an indirect effect on the proportion of the internal audit planning dedicated to consulting activities. Specifically, the use of data analytics mediates the relationship between the organisation's level of digitalisation and the proportion of the internal audit planning dedicated to consulting activities.

Research limitations/implications – This research was conducted amongst internal auditors based in the US. Future research could investigate the insights of other internal audit stakeholders and investigate different legal contexts.

Practical implications – Results show that digitalisation increases the use of data analytics by internal auditors and the performance of consulting activities. The results, therefore, highlight the importance of these two aspects for the IAF to continue to bring value to organisations.

Originality/value – This research provides more insights on internal audit working practices. The digitalisation of the organisation leads the IAF to use more data analytics and perform more consulting activities.

Keywords Survey, Consulting, Digitalisation, Data analytics, Internal audit

Paper type Research paper

Introduction

Over recent decades, the business environment has increasingly become digitalised (Beasley *et al.*, 2018). New technologies arrive on the market continuously and are integrated into every aspect of private and business lives. Digital technologies cause changes in consumer behaviour (Kannan and Li, 2017; Verhoef *et al.*, 2021), forcing organisations to adapt their way of doing things. Organisations are altering their business models, leading to changes in their strategy, information technology (IT), marketing and supply chains by integrating increasingly digital technologies (Verhoef *et al.*, 2021). Data analytics are part of new technologies that organisations are or will be integrating in the future (PwC, 2018).



The digitalisation of the business environment and the growing use of digital technologies facilitate the standardisation of business processes (Ardolino *et al.*, 2018; Green *et al.*, 2018; Kokina and Blanchette, 2019; Troshani *et al.*, 2019) and the uptake of competitive advantages for organisations (McKinsey, 2016). However, digitalisation also brings challenges and risks for organisations (Craigén *et al.*, 2014; ECIIA, 2019). Digitalisation is associated with high levels of volatility, uncertainty, complexity and ambiguity (Schoemaker *et al.*, 2018) and induces emerging risks that the internal audit function (IAF) helps to manage. From this perspective, the IAF has a role to play in helping organisations face these emerging risks.

Over the years, the IAF has evolved to meet the requirements of the changing business environment (Castanheira *et al.*, 2010; Soh and Martinov-Bennie, 2011) and its involvement in consulting activities is highly debated in the literature (Soh and Martinov-Bennie, 2015; Spira and Page, 2003; Stewart and Subramaniam, 2010). Even though their involvement was consequential before the financial scandals and economic crisis of the 2000s, the role of the IAF has changed and has refocused its scope towards assurance activities (Hass *et al.*, 2006; Hermanson, 2002). Furthermore, the literature points out the importance of the IAF being closer to strategic risks (Allegrini and D'Onza, 2003). However, Industry 4.0, which is characterised by the presence of technologies in every aspect of private and professional lives (Bloem *et al.*, 2014; IDC, 2018), appears to require modifications to the activities that the IAF has conducted in past years. The rapid growth of digitalisation raises questions about the role of the IAF in this changing environment. According to PwC (2018), its function should evolve and integrate new technologies and digital knowledge. From this perspective, the IAF could bring more value to organisations by helping them face the risks related to digitalisation (Coleman *et al.*, 2018) and to lever the advantages of such technologies in their internal audit missions (PwC, 2018).

Although digitalisation has become a critical topic for the IAF in recent years (ECIIA, 2019; IIA, 2019), it appears that the IAF does not always align its activities and its role with the digitalisation of the business environment. Digital expertise has become critical for internal auditors, but departments are lacking these kinds of skills (IIA, 2018, 2019). Organisations still ask for the expertise of external service providers to mitigate the lack of digital skills in internal audit departments. In the current digitalised context, the IAF should build its activities around IT and digital challenges. Furthermore, digitalisation also represents an opportunity for the IAF to evolve. Digital tools offer multiple possibilities for the IAF to improve its way of working. Data analytics are examples of digital tools that the IAF could use. Recent reports indicate that high performing internal audit departments are using these kinds of technologies. However, they also indicate that internal audit departments do not use new technologies enough, despite their adoption in other departments (Deloitte, 2018; PwC, 2018, 2019).

Prior research has mainly investigated the digitalisation of organisations outside the internal audit field (Beasley *et al.*, 2018; Kane *et al.*, 2016; Verhoef *et al.*, 2021). Although a recent qualitative study by Betti and Sarens (2020) explored how the IAF evolves in a digitalised context, and specifically how its scope of work has evolved, its role and the working practices of internal auditors, there is a lack of empirical research on the evolution of the IAF's activities and practices (Betti and Sarens, 2020; Roussy and Perron, 2018). Therefore, Betti and Sarens (2020) call for further research to test the relationship between the level of digitalisation of the organisation and IAF's working practices. To address these gaps, the present research intends to investigate how the IAF modifies its activities and practices in relation to the organisation's level of digitalisation at two levels: the kind of activities performed by the IAF and the use of data analytics by internal auditors.

This research contributes to research on internal audit activities and practices in two ways. Firstly, we find a positive relation between the organisation's level of digitalisation and the use of data analytics by internal auditors during their missions. Secondly, we find that the organisation's level of digitalisation has an indirect effect on the proportion of the internal audit planning dedicated to consulting activities, the use of data analytics by internal auditors mediating the relationship between the organisation's level of digitalisation and the proportion of the internal audit planning dedicated to consulting activities.

Our paper is organised as follows. Firstly, we present the theoretical backgrounds of digitalisation and the IAF. Then, we detail the methodology used and present the results. Finally, we discuss our theoretical and managerial contributions and present the limitations of the study and avenues for future research.

Background and hypotheses

The digitalisation of the environment

We often confuse “digitisation” and “digitalisation”. “Digitisation” refers to the “technical process of converting analogue signals into a digital form, and ultimately into binary digits” (Legner *et al.*, 2017, p. 301). “Digitalisation” is defined as “the manifold sociotechnical phenomena and processes of adopting and using these technologies in broader individual, organizational and societal contexts” (Legner *et al.*, 2017, p. 301) and specifically relates to the way these technologies alter existing business processes (Verhoef *et al.*, 2021). Therefore, the technical process of digitisation concerns only one portion of digitalisation. Indeed, digitalisation refers to the pervasive use and broad development of technologies in organisations and society (Bloem *et al.*, 2014).

Contrary to popular belief, the digitalisation of the business environment is not a new phenomenon. Society has already faced several waves of digitalisation (Legner *et al.*, 2017). The first wave comprises the use of computers and the progressive replacement of paper. The second wave begins with the emergence and use of the internet. The current wave concerns SMACi technologies (social, mobile, analytics, cloud computing and the internet of things) and refers to continued miniaturisation, increased processing power and expanded communication bandwidth (Legner *et al.*, 2017). Also known as Industry 4.0 (Bloem *et al.*, 2014), this third wave of digitalisation is characterised by the presence of technologies in every aspect of private and professional lives (IDC, 2018) with the result that the business environment is increasingly digitalised (Al-Htaybat and von Alberti-Alhtaybat, 2017; Hérault and Fortin, 2013). New technologies emerge in the market every day and continuously reshape the environment, for instance, the introduction of cyber-physical systems such as smart objects (Stearns, 2013). Digitalisation is also associated with a more volatile, uncertain, complex and ambiguous environment (Schoemaker *et al.*, 2018). SMACi technologies are increasingly present in the business environment and are reshaping it, which forces organisations to adapt and progressively digitalise themselves to survive. Moreover, the development and use of digital technologies involve technical changes and a certain level of digital capabilities (Kane *et al.*, 2016), that increases the complexity of the phenomenon.

Digitalisation involves an array of changes for organisational processes and tasks (Verhoef *et al.*, 2021) leading to business processes that are more digitised and automated (Bouwman *et al.*, 2018; Brennen and Kreiss, 2016; Canning *et al.*, 2018; Tschakert *et al.*, 2016). Considering digitalisation only as advanced digitisation is not enough (Ross, 2017; Unruh and Kiron, 2017). Investing in new technologies and their technical aspects is a necessary, but insufficient, condition (Parviainen *et al.*, 2017). Organisations also tend to orient their strategy towards digital aspects (Bouwman *et al.*, 2018; Canning *et al.*, 2018; Tschakert *et al.*, 2016), which notably, includes offering digital services and the transformation of

physical channels into digital channels. Including digital in an organisation's strategy is the cornerstone of digitalisation and is a change that requires continuous organisational development. As technologies rapidly change, organisations also make an ongoing effort to discover new digital solutions to improve their business processes and take advantage of emerging digital technologies to further their digital development (Laudien and Pesch, 2019; Parviainen *et al.*, 2017). Consequently, the digitalisation of organisations implies the development of digital resources and an agile organisational structure (Gupta *et al.*, 2020; Verhoef *et al.*, 2021). Employees need to adapt their working habits and integrate digital technologies into their daily professional lives (Kane *et al.*, 2015). As a result, "digitalisation" refers to the willingness of organisations to implement digital technologies in their strategy and processes. They are, however, challenged by their ability to implement such technologies.

The digitalisation of organisations impacts departments directly involved in the value chain. For instance, the development, production and distribution of new digital goods or services will directly impact research and development departments and supply chain divisions. However, the digitalisation of other areas, such as the internal audit department, can be delayed (Wang and Cuthbertson, 2015). Recent reports indicate that IAFs do not exploit the potential of new technologies and that there is much room for improvement. For example, the use of data analytics for the IAF is not yet standard (IIA, 2018, 2019). Prior research has primarily studied the evolution of the IAF from the perspective of institutional pressures, such as normative, coercive and mimetic forces (DiMaggio and Powell, 1983). However, the importance of environmental changes, such as the technological context, has been underexplored (Betti and Sarens, 2020; Lenz and Hahn, 2015). This research, therefore, aims to investigate the effect of the digitalisation of organisations on the IAF, especially on its role and working practices.

Internal audit function and data analytics

In a competitive environment, organisations consider digital technologies and the methods derived from them as sources of competitive advantage and as a means to increase profit margins (Accenture, 2014; LaValle *et al.*, 2011; Tschakert *et al.*, 2016). Technologies such as data analytics enable them to automate and facilitate day-to-day work (Legner *et al.*, 2017). Data analytics are defined as "the use of data, information technology, statistical analysis, quantitative methods and mathematical or computer-based models to help managers gain improved insight about their operations, and make better, fact-based decisions" (Davenport and Harris, 2007, p. 7). Specifically, organisations use such methods to analyse large, unstructured sets of data and to perform advanced analyses (Rickett, 2016; Tschakert *et al.*, 2016) that enable them to evaluate past events and predict future events (Al-Htaybat and von Alberti-Alhtaybat, 2017) with the goal of improving decision-making processes (Gandomi and Haider, 2015; Rickett, 2016).

Recent reports indicate that internal auditors have begun to embrace new technologies, such as data analytics, to automate internal audit practices (Deloitte, 2018; PwC, 2018, 2019). When talking about data analytics for the audit function, the American Institute of Certified Public Accountants refers to "the science and art of discovering and analyzing patterns, identifying anomalies, and extracting other useful information in data underlying or related to the subject matter of an audit through analysis, modelling, and visualization of planning or performing the audit" (AICPA, 2017, p. 1). Although the use of data analytics is expanding in internal audit departments, the IAF still struggles to harness its full potential (Deloitte, 2018; PwC, 2018, 2019). Digitalisation could lead the IAF to integrate data analytics in its working practices, but IAFs face barriers in the implementation of digital

technologies such as the costs of implementation and use, mainly regarding the digital skills required by internal auditors to use data analytics technologies (Betti and Sarens, 2020). However, the literature suggests that using this technology could bring accuracy and productivity value to the audit function (Tang *et al.*, 2017; Wang and Cuthbertson, 2015). Data analytics could, for instance, support internal auditors throughout their missions during the risk assessment and testing phases by processing higher volumes of data and performing continuous auditing (Tschakert *et al.*, 2016). Such a method could facilitate predictive or prescriptive analyses based on historical data and provide more precise insights and recommendations (Al-Htaybat and von Alberti-Alhtaybat, 2017; Lee *et al.*, 2014; Tschakert *et al.*, 2016). Although internal auditors tend to make limited use of technologies (Wang and Cuthbertson, 2015), we nevertheless assume that the level of digitalisation of the organisation as a whole will influence the use of data analytics by internal auditors. Because digitalisation involves departments adapting and integrating digital technologies into their daily work (Kane *et al.*, 2015), we posit that the more an organisation is digitalised, the more its IAF will tend to use data analytics in its missions. Thus, we hypothesise:

- H1. There is a positive relation between the organisation's level of digitalisation and the percentage of use of data analytics by the IAF.

In addition to changing working practices, the digitalisation of the organisation can change the role of the IAF.

Internal audit role

The role of the IAF has progressively changed in recent decades. Although the activities of the internal audit have remained within the scope of finance and accounting (Cooper *et al.*, 1994; Gupta and Ray, 1992), they were expanded in the 1990s to include the management area (Jin'e and Dunjia, 1997). The role of the IAF has thus evolved accordingly. Beyond assurance activities, internal auditors began to embrace a consulting role that provides consulting activities for management (Hermanson, 2002; Krogstad *et al.*, 1999). However, the periods following US scandals and crisis in the 2000s have reshaped the activities performed by the IAF. The implementation of regulations to prevent future risks (i.e. the Sarbanes-Oxley Act in the USA and the Turnbull Report in the UK) has led the IAF to refocus on assurance activities with internal controls rather than on consulting activities. In the 2010s, the question was raised of increasing consulting activities to provide management with relevant feedback about processes beyond simply controlling them (Chambers and Odar, 2015). In this period, consulting activities increased and focussed on business improvement processes and efficiencies (Soh and Martinov-Bennie, 2011; Stewart and Subramaniam, 2010).

Digitalisation raises questions about the evolution of internal audit activities, which comes with a certain degree of complexity and uncertainty for organisations (Schoemaker *et al.*, 2018). The digitalisation of the business environment makes business processes more complex (Nuijten *et al.*, 2015) and people are increasingly using digital devices, networks and cloud computing (Kahyaoglu and Caliyurt, 2018). This environment, where big data are continuously generated and new technologies constantly emerge, is increasingly interconnected with organisational systems (Appelbaum *et al.*, 2017; Flora and Rai, 2015). These changes generate new risks for organisations that need, for instance, to prevent IT breaches, intrusions and breakdowns (Appelbaum *et al.*, 2017; Deloitte, 2017; Flora and Rai, 2015; Kotb *et al.*, 2014). Therefore, one could expect that IAF would perform more assurance activities related to these emergent and complex risks, especially IT and cybersecurity risks. Nevertheless, the follow-on complexity of digitalisation could lead organisations to ask for more guidance from the IAF (Roussy, 2013). A recent qualitative study conducted by

Betti and Sarens (2020) suggests that in a digitalised context, the demand for consulting activities tends to increase. Prior research indicates that the performance of consulting activities by internal auditors raises questions about the independence and objectivity of internal auditors (Lenz and Hahn, 2015; Roussy, 2013; Soh and Martinov-Bennie, 2011). However, although some internal auditors can be torn between the added value of consulting activities for management and the preservation of their independence, they still perform consulting activities to bring additional value to organisations (Betti and Sarens, 2020). For example, internal auditors could play a more proactive role in the early stages of implementing new IT developments (Kahyaoglu and Caliyurt, 2018) or when implementing new technologies (Flora and Rai, 2015). Internal auditors could also provide advice and insight on cybersecurity programmes and risk prevention (Dixon and Singer, 2011; Kahyaoglu and Caliyurt, 2018), thereby performing more consulting activities. As a result, we believe that digitalisation will lead to internal auditors shifting to a greater consulting role. We, therefore, posit that the demand for consulting activities will increase with the organisation's level of digitalisation and hypothesise:

- H2.* There is a positive relation between the organisation's level of digitalisation and the percentage of consulting activities performed by the IAF.

The use of data analytics in internal audit missions may also change the role of internal auditors. The use of data analytics could standardise practices and increase the efficiency of work (Kidron *et al.*, 2016; Warren *et al.*, 2015). In addition, the ability to test full data sets with data analytics makes reports more substantive and increases the relevance and value of the findings (Betti and Sarens, 2020). Adopting digital tools such as data analytics allows internal auditors to perform their tasks faster and more efficiently (Betti and Sarens, 2020; PwC, 2018). As a result, the IAF could redirect its taskforce to other projects such as consulting activities (PwC, 2018). From this perspective, we hypothesise the following mediation effect (Zhao *et al.*, 2010):

- H3.* The percentage of use of data analytics by the IAF mediates the relationship between the organisation's level of digitalisation and the percentage of consulting activities performed by the IAF.

Methodology

Data collection

Consistent with prior research (D'Onza and Sarens, 2018), we conducted an online survey in collaboration with the institute of internal auditors to test our hypotheses. In mid-November 2017, the institute of internal auditors sent its first email to members of the institute in the USA containing a link to the online survey. They sent a reminder email two weeks later. The questionnaire included three sections. In the first section, participants were asked to answer questions related to their IAF. In the second section, they answered questions related to the level of digitalisation of their organisations. The last section included questions related to the sector of their organisation and the size of their IAF. The survey was submitted to a total of 5,922 chief audit executives. We obtained answers from 160 respondents; a response rate of 2.7%. In light of recent studies using internal audit surveys, this response rate seems quite reasonable (D'Onza and Sarens, 2018; Gros *et al.*, 2017). However, we excluded 78 answers due to missing data. The final sample was thus composed of 82 respondents at an adjusted response rate of 1.4%. Organisations from the financial and non-financial sectors were included in the sample. We were not able to test the non-response bias. As the

questions related to the sector of their organisation and the size of their IAF were at the end of the survey, we were not able to collect the sectors and IAF sizes of the respondents who did not complete the survey. All respondents who left the questionnaire prematurely did so before reaching the section on the sector of their organisation and the size of their IAF. As a result, this study may suffer from non-response bias (Gros *et al.*, 2017). Nevertheless, we compared the responses between respondents who completed the survey after the first email and those who completed it after the reminder sent two weeks later (D’Onza and Sarens, 2018; DiGabriele, 2016; Svanberg *et al.*, 2018). We found no significant difference between the early and later responses.

Measures

We measured the organisation’s level of digitalisation in which the respondents worked with a four-item scale: the organisation follows a strategy mainly based on digital developments; the business processes are digitised and automated; the organisation first thinks about digital solutions to improve business processes; the organisation fully uses digital solutions available on the market. These items were measured on five-point Likert scales. Scale anchors were: 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree) and 5 (strongly agree). Table 1 presents the scores for each item.

Using the principal component analysis (PCA), we grouped these four items under one factor (i.e. D’Onza and Sarens, 2018; Svanberg *et al.*, 2018). The Cronbach’s alpha of this *ad hoc* scale was above the critical value of 0.7 (score = 0.781) and the percentage of the explained variance was 60.584%. Consequently, we could group these four items under one factor describing “the organisation’s level of digitalisation”, named *DIGITAL*. To compute this new variable, we averaged the four scores. Table 2 presents the results of the PCA analysis.

We assessed the use of data analytics by asking the respondents to indicate the percentage of the planning for which the internal audit department uses data analytics in its missions. We also measured the performance of consulting activities by asking respondents

Table 1.
Scores of each item
included in the
DIGITAL variable

Items DIGITAL	N	1	2	3	4	5	Mean	SD
The organisation follows a strategy mainly based on digital developments	82	7	30	24	17	4	2.77	1.034
The business processes are digitised and automated	82	6	20	24	29	3	3.04	1.024
The organisation first thinks about digital solutions to improve business processes	82	0	18	27	32	5	3.29	0.882
The organisation fully uses digital solutions available on the market	82	3	36	22	18	3	2.78	0.956

Table 2.
Results of the PCA

Variable DIGITAL	# of items	Kaiser-Meyer-Olkin index	Bartlett’s test	% Explained variance	Cronbach’s α
Organisation’s level of digitalisation	4	0.784	Chi ² : 84.311 ddl: 6 <i>p</i> -value: 0.000***	60.584%	0.781

Note: *** Significant at the 0.01 level (two-tailed)

Table 3.
Description of the
variables

Variables	Definition	Measurement
DIGITAL	Organisation's level of digitalisation	Variable with a value between 1 (low level of digitalisation) and 5 (high level of digitalisation)
CONSUL	Performance of consulting activities	Percentage of the internal audit planning dedicated to consulting activities
DATA_AN	Use of data analytics	Percentage of the planning for which the internal audit department uses data analytics in its missions
IAFSIZE	Size of the IAF	Number of full-time equivalent employees working in the internal audit department
SECTOR	Sector of the organisation	Dummy variable with a value of 0 (organisation from the non-financial sector) or 1 (organisation from the financial sector)

to indicate the percentage of the internal audit planning dedicated to assurance and consulting activities, stating that the total should be equal to 100%.

Finally, we controlled for the sector and size of the IAF. The financial sector is highly regulated, which can influence the activities performed by the IAF (Gras-Gil *et al.*, 2012; Koutoupis and Tsamis, 2009; Naheem, 2016). The sector in which organisations operate was, therefore, included as a control variable. We asked the respondents to indicate the sector of the organisation in which they worked. Then, we created a dummy variable (0 = non-financial sector; 1 = financial sector) based on the standard industrial classification codes. Moreover, the size of the internal audit department can also influence the activities performed by the IAF (Rönkkö *et al.*, 2018; Sarens and Abdolmohammadi, 2011; Sarens *et al.*, 2012). The size of the internal audit department was thus also included as a control variable. To assess this variable, we asked the respondents how many full-time equivalent employees worked in the internal audit department. Table 3 presents the variables used during the analyses.

Results

Descriptive results

Tables 4 and 5 show the descriptive characteristics of the variables.

We, firstly, observed that the average percentage of consulting activities is 26.68%. However, the standard deviation (16.722) indicates that the percentage of consulting activities varies between organisations. Secondly, the average use of data analytics during internal audit missions was quite low. On average, data analytics were used in less than 20% of these organisations during internal audit engagements. Given the current technological developments and the emphasis highlighted in the literature (Bouwman *et al.*, 2018; Canning *et al.*, 2018; Tschakert *et al.*, 2016), we had expected a higher percentage. It

Table 4.
Descriptive statistics
of continuous
variables

Variables	<i>N</i>	Mean	SD	Min.	Max.
CONSUL	82	26.68	16.722	0	90
DATA_AN	82	19.74	18.927	0	90
IAFSIZE	82	17.87	71.780	1	650
DIGITAL	82	2.97	0.758	1.5	4.25

shows that the use of data analytics in the internal audit profession is still not standard and that there is room for improvement, as highlighted in recent reports (IIA, 2018, 2019). Thirdly, the average score of the *DIGITAL* variable is 2.97, which is very close to the neutral score. In total, 38 respondents presented a *DIGITAL* score below the average and 44 above it. In total, 30 respondents had a *DIGITAL* score equal to or above 3.5. This means that only a third of the respondents considered their organisation to be digitalised in at least two aspects out of the four that formed the *DIGITAL* variable. Finally, it is evident that there is a good representation of sectors in the sample.

Tables 6 and 7 highlights the percentages of consulting activities and data analytics by sub-groups. We performed a *t*-test between two groups for each variable. For the continuous variables, we made a comparison between the average strictly below the median and the average equal to or above the median. The median for the *IAFSIZE* variable is 5 and for *DIGITAL* it is 3. It is evident that the IAF uses more data analytics in their missions in more digitalised organisations. This shows an initial link between the organisation's level of digitalisation and the use of data analytics by the IAF. This relation will be further discussed in other analyses. Also, results indicate that the percentage of consulting activities is higher in smaller IAFs.

Table 5.
Descriptive
statistics of
dichotomic variables

Variables	<i>N</i>	Groups	<i>N</i>	(%)
SECTOR	82	Non-financial sector	41	50
		Financial sector	41	50

Table 6.
Percentage of
consulting activities
by sub-groups

Variables	Groups	<i>N</i>	Mean	SD	<i>t</i> -test	Sig.
SECTOR	Non-financial sector	41	28.05	14.827	0.738	0.231
	Financial sector	41	25.32	18.509		
IAFSIZE	Size < median	35	30.03	16.272	-1.578	0.059*
	Size >= median	47	24.19	16.787		
DIGITAL	Digital < median	38	23.55	13.846	1.624	0.054*
	Digital >= median	44	29.39	18.591		

Note: *Significant at the 0.1 level (one-tailed)

Table 7.
Percentage of data
analytics by sub-
groups

Variables	Groups	<i>N</i>	Mean	SD	<i>t</i> -test	Sig.
SECTOR	Non-financial sector	41	21.56	22.829	0.868	0.194
	Financial sector	41	17.93	14.052		
IAFSIZE	Size IAF < median	35	20.17	19.730	-0.175	0.430
	Size IAF >= median	47	19.43	18.515		
DIGITAL	Digital < median	38	15.63	15.744	1.856	0.033**
	Digital >= median	44	23.30	20.824		

Notes: **Significant at the 0.05 level (one-tailed)

Test of hypotheses

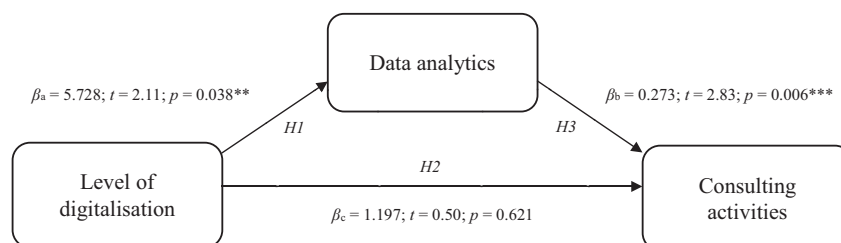
To test the effect of digitalisation on the performance of consulting activities and the mediating role of data analytics in the relationship between digitalisation and consulting activities, we used the macro process by Hayes (2017) (Model 4; bootstrapped samples = 5,000). The results show that the organisation's level of digitalisation had a significant and positive effect on the use of data analytics ($\beta_a = 5.728$; $t = 2.11$; $p = 0.038$). The effect of the use of data analytics on the performance of consulting activities was also significant and positive ($\beta_b = 0.273$; $t = 2.83$; $p = 0.006$). The direct effect of the organisation's level of digitalisation on the performance of consulting activities was non-significant ($\beta_c = 1.197$; $t = 0.50$; $p = 0.621$). Finally, the indirect effect of the organisation's level of digitalisation on the performance of consulting activities through the use of data analytics was significant and positive [$\beta_a * \beta_b = 1.562$; 95% confidence interval based on 5,000 iterations: (0.028; 3.906)]. However, the direct effect of the organisation's level of digitalisation on the performance of consulting activities was non-significant when the mediator was included in the model [$\beta_c = 1.197$; 95% confidence interval based on 5,000 iterations: (-3.602; 5.996)]. This result indicates a full mediation (Zhao *et al.*, 2010). Consequently, *H1* and *H3* are supported. Figure 1 summarises the results.

In a subsequent analysis, the potential effects of the sector and the size of the internal audit department were tested by including these variables as covariates. No significant effects were observed.

Discussion and conclusion

Digitalisation is increasingly impacting organisations and changing working practices. However, we have limited knowledge about how digitalisation influences IAF activities and practices (Roussy and Perron, 2018). In this research, we investigated how the IAF modifies its activities and practices in relation to the organisation's level of digitalisation. This paper contributes to research on the IAF in two ways.

Firstly, this research responds to the call for research on internal audit working practices (Betti and Sarens, 2020; Roussy and Perron, 2018). In a digitalised business environment, the IAF reconfigures its way of working by using data analytics in its missions. Our results show that digitalisation of the business environment is positively related with the use of data analytics for internal auditors: the more organisations are digitalised, the more it impacts how internal auditors work. Data analytics technologies offer the possibility for internal auditors to increase the accuracy and efficiency of their activities, to make forecasts and predictions about future events (Al-Htaybat and von Alberti-Alhtaybat,



Notes: **Significant at the 0.05 level (two-tailed); ***significant at the 0.01 level (two-tailed)

Figure 1.
Results

2017) and perform continuous monitoring (Tschakert *et al.*, 2016). In turn, the recommendations following internal audit engagements are more likely to be relevant for auditees. In this regard, data analytics can be considered a powerful tool for internal auditors to provide valuable insights into the organisation and to be closer to the business reality. In a digital environment, organisations are required to integrate digital technologies within their different departments to be able to gain a competitive advantage (Gupta *et al.*, 2020; Verhoef *et al.*, 2021). However, the results show that the use of data analytics is still limited in the IAF and that there is room for improvement to completely harness the potential of data analytics and other new technologies. Whilst the benefits of new technologies are undeniable, these results question that organisations should have the ability to do so, which is not always the case (Betti and Sarens, 2020; Gupta *et al.*, 2020). The implementation of new technologies comes with many challenges for organisations. It leads to a high degree of uncertainty and represents significant costs. In addition, it raises challenges in terms of change management. Organisations and their employees must exhibit adaptability and flexibility to use and accept new technologies (Betti and Sarens, 2020; Gupta *et al.*, 2020).

Secondly, although prior research debates the added value of performing consulting activities (de Zwaan *et al.*, 2011; Lenz and Hahn, 2015; Roussy, 2013), our results indicate that the organisation's level of digitalisation positively influences the performance of consulting activities because the IAF uses more data analytics technologies. Organisations facing digital transformation need to deal with changes regarding risks, processes and strategy. Within this increasingly digitalised context, the performance of consulting activities by internal auditors could be a means for the IAF to demonstrate its added value by helping the organisation with its business performance and anticipation of risks. These results question the final objective of internal auditing in a swiftly changing digitalised environment and the meaning of assurance activities. Bringing assurance to something that will change or will not exist tomorrow would not be valuable. Organisations are facing a highly uncertain and volatile environment (Schoemaker *et al.*, 2018). Helping organisations face this uncertain environment could require a change in the fundamental definition of the IAF, especially regarding the use of advisory and consulting activities. Digitalisation implies a flexible organisational structure (Verhoef *et al.*, 2021). The above result highlights how the IAF could play a role in helping the organisation as a change agent. However, the growing use of consulting activities also raises questions about the objectivity and independence of the IAF (Lenz and Hahn, 2015; Roussy, 2013; Soh and Martinov-Bennie, 2011). The results also indicate that the percentage of consulting activities is higher in small IAFs. However, the proportion of consulting activities undertaken represents a reasonable part of the internal audit planning in small and large IAFs in the sample and the size of the IAF had no significant effect in the tested model.

From a managerial point of view, the above results show that digitalisation increases the use of data analytics by internal auditors. Therefore, it becomes crucial for internal audit departments to have the appropriate level of digital expertise to adopt such technologies and calls into question the training of internal auditors. Although organisations could put in place programmes to increase the digital expertise of their employees, internal audit master's programmes should be developed around digital and IT skills. Subsequently, new internal audit employees will have higher digital awareness and expertise. In the end, this could increase the global level of digital expertise of internal audit departments from the bottom upwards. Additionally, it raises the necessity for internal audit departments to attract and retain high-quality digital profiles (Bartlett *et al.*, 2016, 2017; Burton *et al.*, 2015).

Digital profiles such as these, however, may be more likely to be interested in far more digitally oriented jobs than internal audit roles. Therefore, the IAF could first integrate digital aspects into internal audit day-to-day activities. Developing an advisory role could also increase the motivation of internal auditors. They will potentially move away from a “watchdog” role, a role that is often negatively perceived by other departments, to a “helper” role (Roussy, 2013).

This research project opens avenues for future research. It is based on a survey conducted in the USA, which is a very regulated country (i.e. Sarbanes–Oxley requirements). Future research should investigate the evolution of the IAF’s role and working practices in countries with different regulation systems and cultural contexts such as European countries. Additionally, this research provides insight into the current role practices of the IAF but does not address the organisational motivations behind this role and these practices. Future research should therefore investigate these motivations and the realities of different organisations with varying case studies. Additionally, the data on which the analyses are based is declarative. The level of reliability of the responses in relation to reality and the level of confidence the participants have in their ability to provide the information are unknown. Furthermore, we were not able to collect the IAF size and sectors of the respondents who did not complete the survey. As a result, this study may suffer from non-response bias (Gros *et al.*, 2017). The relation between the organisation’s level of digitalisation and internal audit practices are the focus of this research, but we were not able to test causality. Future research could study causality by, for instance, investigating the effect of using digital technologies coupled with the performance of consulting activities by internal auditors on the perceived quality of the IAF by different stakeholders (Trotman and Duncan, 2018) using experimental designs. The digitalisation of the organisation requires a high degree of organisational agility. This paper investigated organisations’ level of digitalisation, focussing mainly on the development of a digital strategy and the digitalisation of business processes. Future research could investigate the use of data analytics and the performance of consulting activities in relation to the level of flexibility in the organisational structure (Verhoef *et al.*, 2021). Finally, the recent COVID-19 pandemic has pushed organisations to use digital tools. As a result, the use and reliability of digital tools have become even more critical. Entire countries have had to face lockdowns and teleworking has been put forward and even become mandatory since the beginning of the pandemic for many jobs within organisations. This also applies to internal auditors that have had to conduct their missions remotely from home (Martinelli *et al.*, 2020). Organisations have had to adapt and be more flexible. The COVID-19 pandemic has created a context of uncertainty, forcing organisations to react quickly to the evolution of governmental measures. Future research could investigate the impacts of the COVID-19 pandemic on the IAF and how such a context of uncertainty could influence the expectations towards the IAF in terms of assurance and consulting activities and how it impacts the level of digitalisation of organisations and the use of new technologies by the IAF.

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Corresponding author

Nathanaël Betti can be contacted at: nathanael.betti@uclouvain.be