

AUDITING IN THE NEW NORMAL: CONNECTING TECHNOLOGY TO AUDIT PROCESSES

EUROSAI PROJECT GROUP SURVEY ASSESSMENT REPORT



May 2023

Quality and Transparency Statement

This is to certify that <<Survey assessment report titled as “AUDITING IN THE NEW NORMAL: CONNECTING TECHNOLOGY TO AUDIT PROCESSES”>> has been developed by following the Quality and Transparency process stated in the “QUALITY AND TRANSPARENCY PROTOCOL FOR EUROSAI PRODUCTS AND DOCUMENTS ” as detailed below:

i. Representation of the membership of the PG/TF/WG or group elaborating the product:

Turkish Court of Accounts (TCA) is the leader of the PG launched under EUROSAI ESP SG1.2 and SG1.3; SAI Hungary acted as the PG member and SAIs of Estonia and Romania acted as PG observers. Feedbacks from 20 EUROSAI members were received for the Survey conducted and 3 member SAIs provided peer-review support.

ii. External stakeholder representation/contribution, if any.

IDI peer-reviewed the assessment report.

iii. ToR/Work plan: existence and approval of a ToR/Work Plan to develop the product.

ToR of the PG was approved by the EUROSAI Coordination Team in November 2021.

iv. Openness and transparency

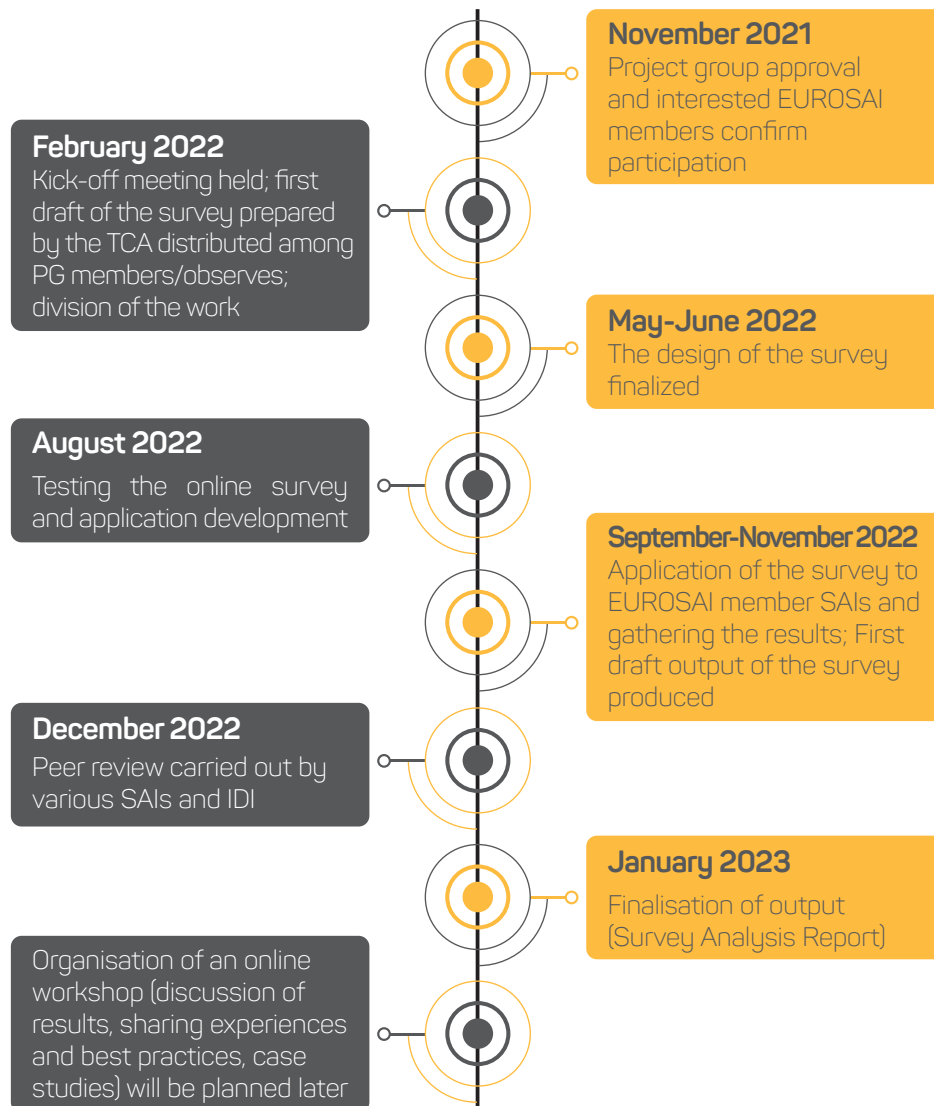
At GB Technical meeting and GB meeting held in October and November 2021 respectively, the context of the PG was introduced to all participants and the call for interested SAIs was made. Also negotiations with various SAIs mainly from the GB continued following the ToR's approval and they were invited to the PG via e-mail correspondence.

Progress regarding the output of the PG were presented on different occasions organized through the late 2021 and whole 2022, such as the EUROSAI Post-Congress Get-Together held in May 2022 (Brochure “A Quick Update on Project Groups Set by the TCA for ESP 2017-2024/2021-2022 PERIOD was prepared and delivered), EUROSAI GB meetings (both technical and presidential level) as well as EUROSAI SG1 meeting.

Survey was sent to EUROSAI members to ensure inclusiveness.

Feedbacks from the peer-review process were reflected in the document.

v. Work method



vi. Exposure:

The output document “AUDITING IN THE NEW NORMAL: CONNECTING TECHNOLOGY TO AUDIT PROCESSES” will be sent by e-mail to all EUROSAI members, and made available to EUROSAI community and external stakeholders on the EUROSAI website (database of products) as well as BIEP.



Metin YENER

President of the Turkish Court of Accounts

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INTRODUCTION

A- BACKGROUND INFORMATION

The world has turned digital with innovative and extraordinary developments such as blockchain, cloud computing, artificial intelligence, machine learning, the internet of things and analytics, which also accelerate and empower the development of other technologies at an unprecedented rate. Use of the newly developed information technologies, along with cheap and secure data storage opportunities, resulted in a large number of data inputs and outputs, bringing along a smarter industry and better foresight.

The age of industry 4.0, where the effects of digitalization are experienced, has triggered change in the world, both in the individual field and in the public and private sectors, and has created a serious transformation in the way institutions and organizations carry out their activities. The methods have been renewed, and public administration has entered a process of change and transformation with the advantages of technology.

During this process accounting, management, control, and information systems of institutions have been significantly affected. All organizations have faced pressure to offer digital solutions and develop their services with business models based on innovative technologies. These changes have affected the audit processes, the methods and procedures used, the workflow, the follow-up, and communication over time.

Digitalization, instant communication, and interaction opportunities have supported the development of the public administration system and its capacity. The rapid increase in the volume of data in the electronic environment, the automation of the activities of the institutions, and the processing and storage of more information, resulted in an environment where accounting units were heavily affected, and auditing entered into a new era. The audit methods, procedures, and outputs of Supreme Audit Institutions (SAIs) have entered a process of change accordingly and played an evolving role in increasing transparency and accountability.

In this context, digitalization provided an important resource for the development of both the public administration as a whole and the auditing profession. With digitalization, not only has the need for auditing increased, but the auditing process has also been heavily affected by technological developments, which has ultimately lead to the replacement of traditional auditing practices with digital ones.

As a result of comprehensive and holistic analyses, the use of electronic information environments has gradually increased as a fundamental approach, from obtaining audit data to identifying risks, detecting and reporting errors and frauds. While this approach does not fundamentally change the purpose and scope of the audit, it has transformed traditional audit methods by causing radical changes in the execution of all audit processes and the techniques used. Thus, digital audit experiences strengthen the confidence of financial information users in the information obtained and ensure a more effective and efficient use of resources.

While organizational processes and control methods were in a state of change with this new world order, new working conditions emerged as a result of the pandemic. The breakout has had significant effects on society, states and businesses as a whole and has turned many professions upside down. Countries have faced serious sustainability problems in many areas, from health systems to financial management systems, and the limited capacity of the current order against risks has been clearly seen. Thus, it was necessary to increase the resilience of institutions against risks and threats, to strengthen their management capacities, and to encourage strategies and approaches that will ensure sustainability.

Expectations from internal and external audit institutions have increased in order to make these systems safer, stronger and more sustainable. Due to its role in public administration, the external audit profession has come to the fore as one of the sectors that is most affected and needs to respond quickly.

The pandemic has pushed SAIs to work differently from standard practices and has forced them to implement innovative solutions. With the crisis;

- National and international travel restrictions, stay-at-home requirements and quarantine measures have emerged as mandatory sanctions, resulting in a variety of practical difficulties in audit tasks.
- The auditees had difficulties in the production, control, and presentation of all financial and non-financial data. As for SAIs, they had difficulties in data collection and processing, problems in communicating with institutions, and obstacles in the implementation of certain audit procedures have emerged on the side of the SAIs.
- Planned on-site audits were interrupted, including the validation/monitoring of the physical audit evidence accessible at the auditee's premises.
- The need to adapt the auditor's response to unexpected and systematic changes in such circumstances has emerged.
- With the changes in the scope, environment, and the implementation conditions of the audit, new risks have emerged and/or the importance of the existing risks has increased. Thus, the controls also changed and had to be adapted to the new situation.
- As a result of the need to evaluate the state aid programs envisaged due to economic uncertainties, new areas that need to be audited and require additional attention have emerged.
- Increased pressure on the management has resulted in greater incentives to override controls and heightened fraud risks.

From a broader perspective, new working conditions have led to changes in the audit approach, traditional practices have become inadequate, data collection, storage, and transfer difficulties have arisen as a result of scope limitations, and the risks of fraud and inaccuracy have increased.

Although the new conditions and consequent difficulties do not directly arise from the audit profession, given the current position of SAIs, we see that sudden crises have had a wide impact on the profession and that the capacity for rapid response is largely expected.

Particularly as a result of physical access restrictions and other accompanying limitations, significant surveillance controls and key controls have been imposed. These new and unique challenges require being more agile and creative while performing audits. In order to adapt to these new conditions, and in particular to make audit systems more sensitive, we need significant resources to invest more in much-needed tools, techniques, and human resources with digital skills and capabilities.

B- GOAL OF THE PROJECT

Despite the distorting consequences on all aspects of auditing, the pandemic has had a positive impact by accelerating digitalization and preparing the profession for potential future risks. The pandemic period has significantly accelerated digital innovation, which was already being incorporated into audits in many SAIs through the activation of new technology tools. The audit profession, and especially external audit bodies, increased their investments in digital capabilities and quickly adapted to the changing conditions with solutions such as remote working with innovative technology tools.

However, it would be unrealistic to claim that all SAIs around the world responded to the new conditions with the same speed and adapted with the same ease. It is obvious that communication and cooperation between SAIs should be further improved in order to be prepared for sudden and large-scale crises that may arise in the future. As a community, we must collaborate, learn from good practices to develop similar approaches, and join forces to overcome challenges.

In this respect, the EUROSAI Project Group (PG) on “Auditing in the New Normal: Connecting Technology to Audit Processes” has been established with the aim of identifying the current situation among SAIs in connecting technology to audit processes, sharing best practices, identifying the needs/gaps in this field and preparing a roadmap for the post-Covid-19 era by focusing on the developments of the pandemic period. The Project was launched in November 2021 by the SAI Türkiye as the PG leader, SAI Hungary as the PG member and SAIs of Estonia and Romania as PG observers.

The nature and aims of this PG are directly related to the Strategic Goal 1 in the EUROSAI Strategic Plan (2017-2024), objectives 1.2 and 1.3, which are as follows:

- ✓ To support the development of innovative approaches and methods in audit and governance of SAIs making use of new technologies
- ✓ To facilitate the sharing of knowledge and experience within EUROSAI and with external stakeholders and partners.

The result will be an important step in preparing the community for future crises by identifying the needs/gaps in the field and by sharing best practices. In the new normal, the aim will be to transform the whole audit process by using technology in order to be able to conduct a more efficient and quality audit.

C- METHODOLOGY

A survey consisting of 4 parts and 71 questions was applied:

- to understand the current organizational structure of SAIs for data collection, processing, and reporting;
- to obtain comprehensive and in-depth information about the audits carried out during the pandemic process; and
- to identify the difficulties and obstacles encountered in this period.

In the first part titled “Basic Information about the SAI”, the duties and structures of the participating SAIs were requested for a healthy evaluation of the answers given in the following sections. The second and third parts of the survey were titled “Information about Data Collection and Data Storage Processes” and “Information about Data Processing and Analytics Capacity”, respectively. In these two parts, we attempt to understand the respondents’ data collection and data storage processes, as well as their data processing mechanisms and analytical capacities. In the last part of the survey titled “The Use and Effect of Digital Technologies in Covid-19 Era”, we aim to learn the usage patterns of digital technologies in the Covid-19 period, their positive and negative results on the audit process, and the perspective of the SAIs on innovations in the post-pandemic period.

20 SAIs responded to the survey. We would like to thank them for their kind cooperation.



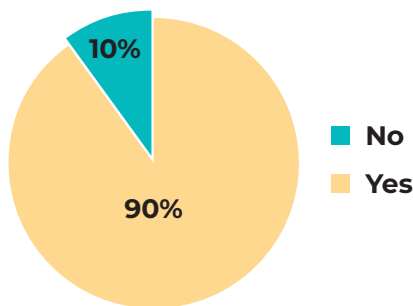
1. INFORMATION ABOUT DATA COLLECTION AND DATA STORAGE PROCESSES

Considering today's rapid digitalization and future expectations, auditing is in a state of transformation, and accurate and highly accessible data form and the basis of an effective digital audit.

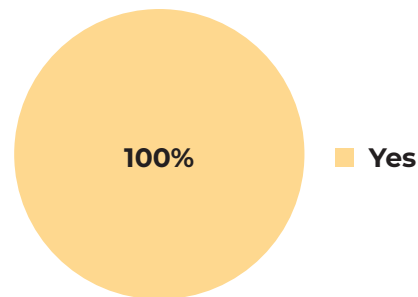
Therefore, the first part of the survey is devoted to the fundamentals of data collection and storage, such as legal, organizational and technological infrastructure and human resources capacity.

QUESTION

Have relevant laws, regulations, or other legal procedures been enacted to ensure that your SAI can effectively acquire audit data?



Do you think there is potential to improve the legal and regulatory framework for supporting digital transformation?



Effective data management is a crucial part of deploying information technologies that provide analytical insights into the audit process and its outputs. Especially in the public sector with large data capacity, it is important that the SAIs obtain data in a reliable, healthy and easy way, relying on a legal basis in particular. This basis also constitutes an important first step for the SAIs to create their unique digital roadmaps.

An effective legal and regulatory framework allows SAIs to set their strategies more effectively, communicate more efficiently between different departments or organizations, measure how well the systems are performing, and understand if their approach needs to be adapted or changed over the long term.

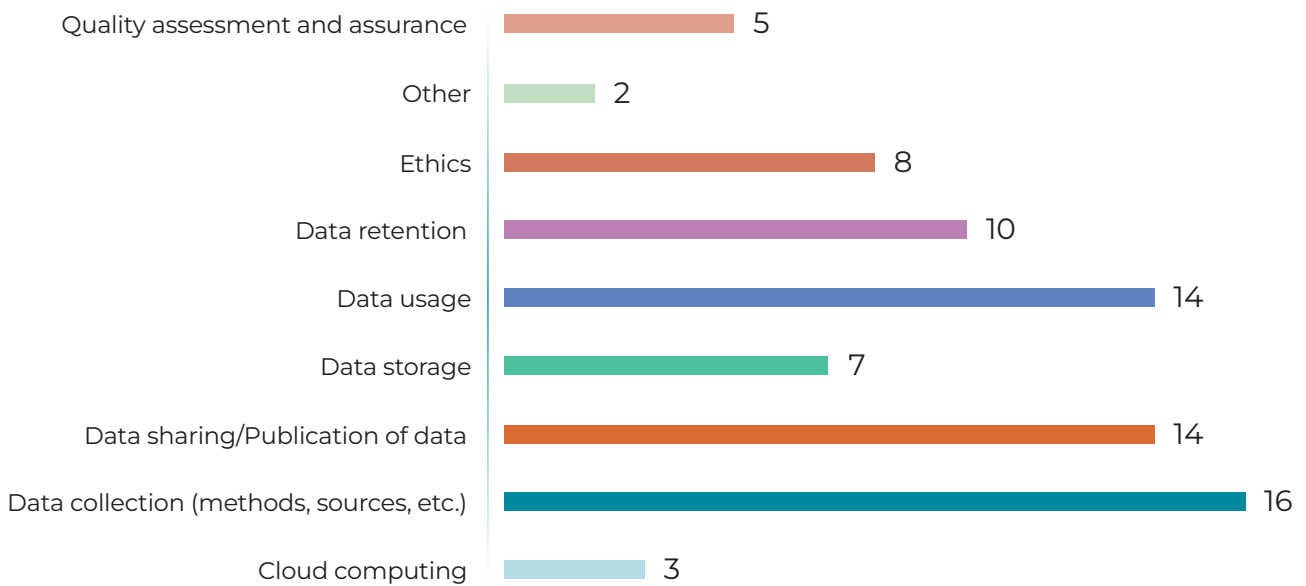
Survey results also prove the important role played by the legal framework in obtaining audit data. Ninety percent of respondents state that relevant laws, regulations, and/or other legal procedures have been enacted within their legal structure in order to ensure that the SAI can effectively acquire audit data.

On the other hand, all SAIs agree that there is still potential for improvement in the legal and regulatory framework to support digital transformation. Given the large quantity of data sources in their audit domain, the data acquisition process can only be efficient and productive when all factors are driven by a detailed legal and regulatory framework. An effective legal and regulatory framework will ensure a shared understanding in data collection processes, facilitate the implementation of policies that help prevent errors and abuse, and ensure compliance with data privacy regulations.

In this respect, the legal infrastructure should include a comprehensive description of the organizational structure and entitlements, detailed documentation of processes related to data (collection, preparation, processing, storage, etc.), clear policies to limit access to critical or sensitive data, a risk record listing data-related risks, and processes for resolving disputes.

QUESTION

Which of the following topics are covered by the legal framework? (Multiple choice)

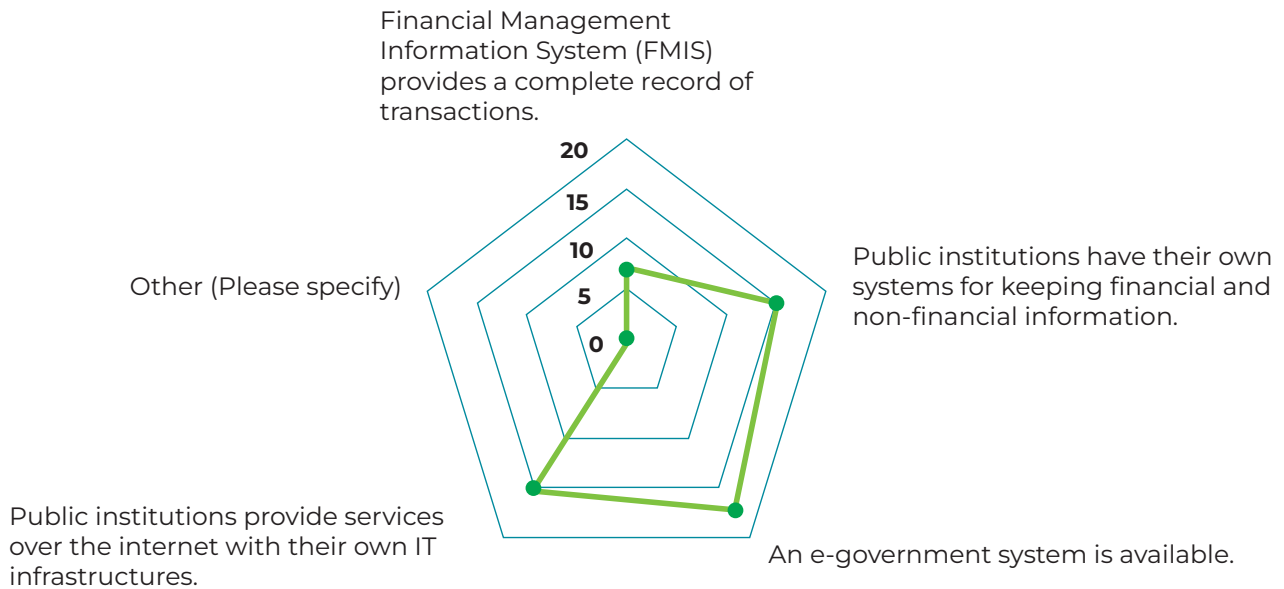


Issues related to data collection, such as audit data sources and collection methods, are the topics most frequently addressed in the current legal framework. These topics are followed by data usage procedures, sharing and publication of data, retention policies and ethics. One SAI additionally state that, only their right to audit and access data is covered by legislation whereas all other aspects are covered by specific working practices.

Based on the answers given, it is concluded that data storage and quality assessment and assurance of data are the topics that are not adequately addressed in the legal framework. On the other hand, given that new and rapidly developing storage technologies (cloud computing, blockchain, etc.) allow SAIs to access and secure audit data remotely, they should be addressed more frequently in the legal and administrative documents regulating the field. The incorporation of topics related to new technologies into legal documents will pave the way for adopting these technologies into audits in a quick and flexible way. This will also allow SAIs to inspect the technology used by auditees during auditing and provide sound audit criteria.

QUESTION

Which of the following best describes the extent to which digital technologies have been implemented in your country's public administration? (Multiple choice)



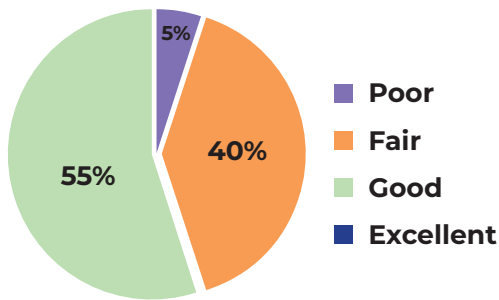
Since it is of great importance to keep the revenues and expenditures of public institutions accurately and completely in order to conduct public financial auditing in a transparent audit environment, the accounting data of the auditees should be recorded and stored in secure, reliable and accessible systems. When financial information is recorded, stored and is made easily accessible through digital systems, continuous and real-time auditing is ensured and the full-fledged operation of audit systems is supported.

As is evident from the survey results, the current situation supports the assumption. According to the survey, 85% of the SAIs have an e-government system in their country. Also, 75% of respondents state that public institutions provide services over the internet via their own IT infrastructures. In other words, the administrators, stakeholders and the general public's access to data has been facilitated in these countries.

In terms of financial data of auditees, 40% of countries have a Financial Management Information System that provides a complete record of the transactions of the auditees, whereas in 75% of countries the auditees have their own systems for keeping their financial and non-financial data.

QUESTION

How would you rate your SAI's data exchange and sharing capacity?

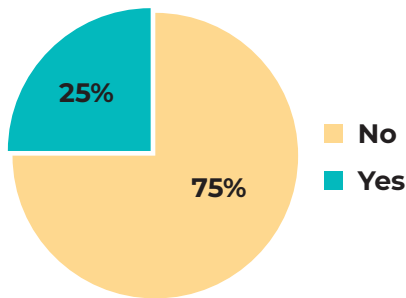


In addition to keeping the data of the auditees complete and easily accessible within the structure of the public administration, the data sharing capacity of the auditing organizations is also important. Accessing quality and reliable audit evidence in the digital environment and finding the opportunities for continuous auditing is an important part of the process. 95% of SAIs rate their data exchange and sharing capacity as either good or fair, leaving room for improvement.

At this point, it is an important goal to increase the data exchange and sharing capacities of the SAIs. This will result in more accurate, effective and efficient audit results, followed by better decision-making, reduced costs and tighter control over spending and policy implementation.

QUESTION

Does your SAI hold a position responsible for the collection, strategic management, storage, sharing and use of data (Chief Data Officer, Data Manager, etc.)?



Only 25% of SAIs hold a position responsible for the collection, strategic management, storage, sharing and use of data such as Chief Data Officer or Data Manager. Considering the need to benefit from smart systems, fibre-speed technologies, algorithms and many other technological innovations in digitalization of the audit, a new audit team structure, assignment of new roles, and audit process optimization should be ensured. While doing this, a structure fully compatible with the requirements of the audit organizations should be developed, integrating all the necessary hardware and software, the needs of audit teams and process standards. This will provide an advantage both in terms of the quality of the audit work and in terms of obtaining effective and efficient outputs.

In the first part of the survey, general information about organizational structures, human resources policies and the number and qualifications of existing personnel are obtained.

Half of the respondents state that the structure of their audit units are multidisciplinary, comprising of both auditors and technical staff. The remaining half of the SAIs state that the units are comprised of only auditors under a director.

When we evaluate the general recruitment policy of the SAIs, we see that although they are not assigned to specific roles, many of the auditors have high technical capacity, expertise and IT skills. Although it is against the division of labour and specialization, having personnel with knowledge in many fields is effective in minimizing the risks related to individuals. On the other hand, some of the SAIs state that, they are still in the process of hiring new staff.

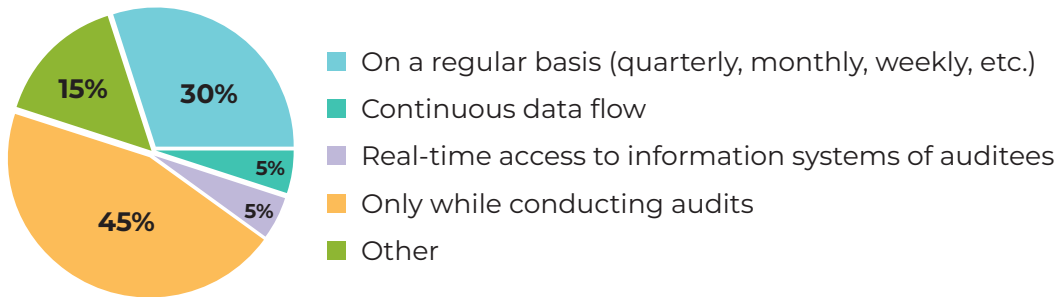
Looking at the numbers of personnel assigned to IT-related works, we see that IT specialists are recruited in most of the responding SAIs and there is an average of 9 personnel assigned to this duty. The average number of database administrators is 2, and the average number of data analysts is 5. Cyber security specialists exist in most of the responding SAIs with an average number of 1. On the other hand 40% of the responding SAIs do not have dedicated personnel to make data analysis, and 50% of them do not recruit network engineers.

45% of SAIs state that they have already established a structural department for the management of data (collection, production, distribution, etc.) and running audit data analytics, whereas 20% of them have recruited staff with technical skills who are assigned similar jobs and responsibilities in the relevant departments. One SAI responds that they have established a centre for innovation, technology and methodologies while another SAI states that they have a general directorate of automated information systems. Two SAIs have data/analysis hubs with the role to support audits via data management and analytics. And in one SAI, state budget and strategic analysis department is assigned with the role of performing audit data analysis. On the other hand, 35% of the respondents state that there is no department or personnel in charge of data management, with or without ongoing plans in this regard. The role and functions of the departments vary greatly and are spread over a wide range, showing the current level of professionalization in SAIs regarding data management. The responses stressed nine main roles and functions;

- Determination of data sets that must be obtained from public administrations in electronic environment,
- Collecting and storing data centrally,
- Interconnection with the automated information systems of auditees,
- Designation, development and management of automated information systems, integration and interconnection of the information systems in compliance with the standards,
- Data warehouse management,
- Development of technical analysis on accounting and non-accounting data of auditees; monitoring financial activity, trends and flows,
- Performing risk analysis in order to provide support for creation of annual audit programs,
- Supporting audit assignments, by building up mechanisms for digital audit,
- Strengthening technological innovation to improve the ability of data analysis.

QUESTION

How would you describe your SAI's data collection procedure?



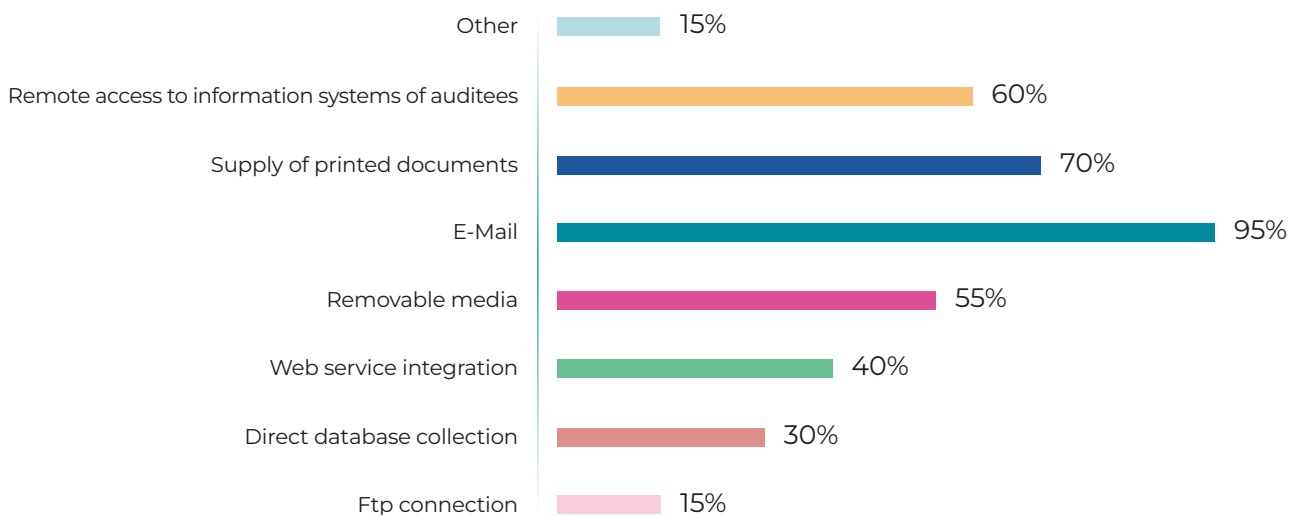
In the digital age, as a result of innovations in the way organizations do business and the digitalization of accounting systems, audit activities are mostly carried out on digital data. Therefore, assessments of the capacity to collect, store and process audit data is an indicator of the current level of digitalization.

In many SAIs, the data collection procedure varies between collecting data on a regular basis and collecting data only while conducting audits. Only 5% of SAIs have a continuous data flow and another 5% have real-time access to information systems of auditees.

75% of SAIs who rated their data exchange and sharing capacity “fair” and 27% of SAIs who rated their data exchange and sharing capacity “good” collect data only when they perform audits. This is considered a gap in SAIs’ relationship with data and shows the need for improvement.

QUESTION

Which of the following mechanisms does your SAI use in data collection? (Multiple choice)



Nearly all of the SAIs use e-mail as a way of collecting audit-related data. 70% of them still receive printed documents, and 55% get data using removable media. 60% of the respondents have access to information systems of auditees, which is a good but not perfect rate. Web service integration, direct database collection, and ftp connection are less commonly used methods for data collection.

Other mechanisms that set good examples mentioned by some SAIs are the use of secure cloud infrastructure, the government information exchange system, and the electronic interaction system of executive authorities. In addition, two respondents report using API exchanges and the X-road data exchange platform for data collection.

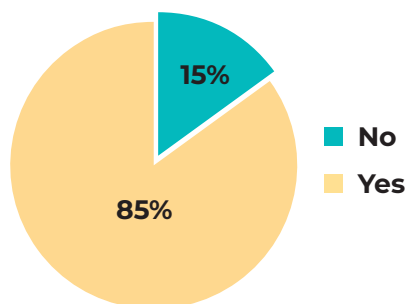
The organizational structure of the SAIs, the scope of the audit area, and the number of institutions within their jurisdiction all have a significant impact on the way the data are collected.

In the first part of the survey, where general information about the SAIs is obtained, 45% of the SAIs state that there are more than 1,000 auditees under their mandate. In addition, 65% of the respondents state that they have a centralized organizational structure. The remainder have branches in different regions and none of the respondents have independent local units.

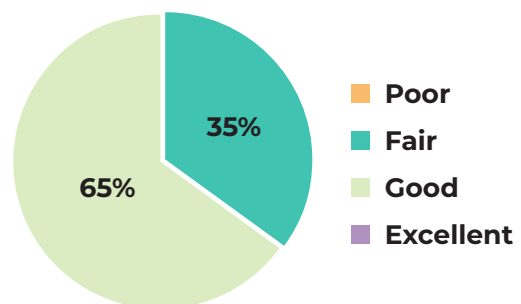
When data collection intervals and frequently used methods are evaluated together, it is clear that the use of new technologies in obtaining data should be expanded. Timely collection of data with the help of new technologies will positively affect the quality of audit outputs by allowing for continuous monitoring of risks, continuous collection of audit evidence, correction of errors immediately, and, detection and prevention of fraud. Automating data collection and processing will also relieve auditors of time-consuming manual data collection and analysis.

QUESTION

Does your SAI examine the quality of the data before starting the audits?



How would you rate the quality of the collected data?



In addition to variety, the reliability of the sources directly affects the quality of audit evidence and the accuracy of the results achieved in audits. 85% of SAIs state that the data collected for auditing purposes are reviewed for quality and completeness prior to use. All SAIs classify the overall rating as either good or fair, none of them rates the data collected as poor or excellent.

QUESTION

What are the measures taken to ensure consistency and integrity in the collected data?

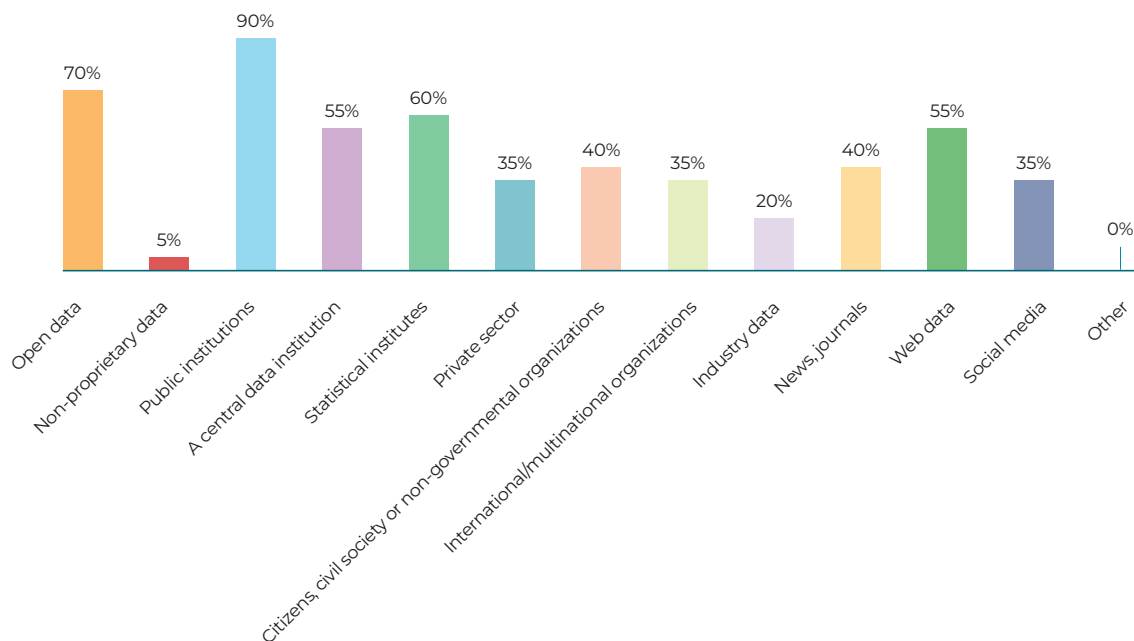
Failure to keep track of the collected, processed or deleted data can have a negative impact on audit processes and results of SAIs. Therefore, maintaining data integrity is a critical issue. In this respect, we asked the SAIs about the steps they take to ensure consistency and integrity in the audit data they collect, which requires focusing on specific areas that help safeguard the data of the organization.

The preliminary checks carried out by the SAIs to establish and maintain data quality and validity from the very beginning of the audit/process are listed below:

- ✓ Verification of accuracy and reliability of collected data,
- ✓ Risk assessment,
- ✓ Selecting appropriate systems,
- ✓ Comparison with other sources or control data,
- ✓ Performing data validation checks,
- ✓ Reconciliation of data/totals,
- ✓ Examining internal consistency of data,
- ✓ Checking whether the systems from which the data are received are audited,
- ✓ Double check proofing,
- ✓ Logical and marginal checks,
- ✓ Review of existing documentation and reports,
- ✓ Subjecting data to ETL processes,
- ✓ Frequent recording and archiving of data.

QUESTION

Please provide information about your sources of audit data (multiple choice).

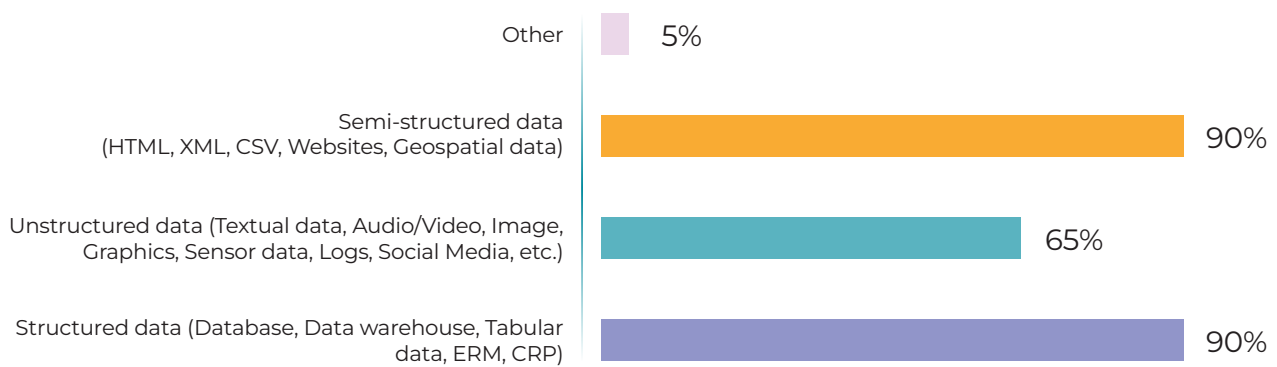


Digitalization allows for more integrated and larger-scale datasets for auditing. Survey results also confirm this situation. The traditional and frequently used data in audits are financial and non-financial data held by public institutions, open government data, data from statistical agencies or central data institutions, and data received from third-parties such as private sector.

However, as a result of the Industry 4.0 era, data sources have diversified and access to data has become easier. Thus, integrated web data (applications, sensors, and GPS), social media data, community data, and industry real-time monitoring data also became audit data sources in this period. As can be seen from the survey results, many SAIs have access to these data sources, and the information obtained from them can be processed and used as evidence in audits.

QUESTION

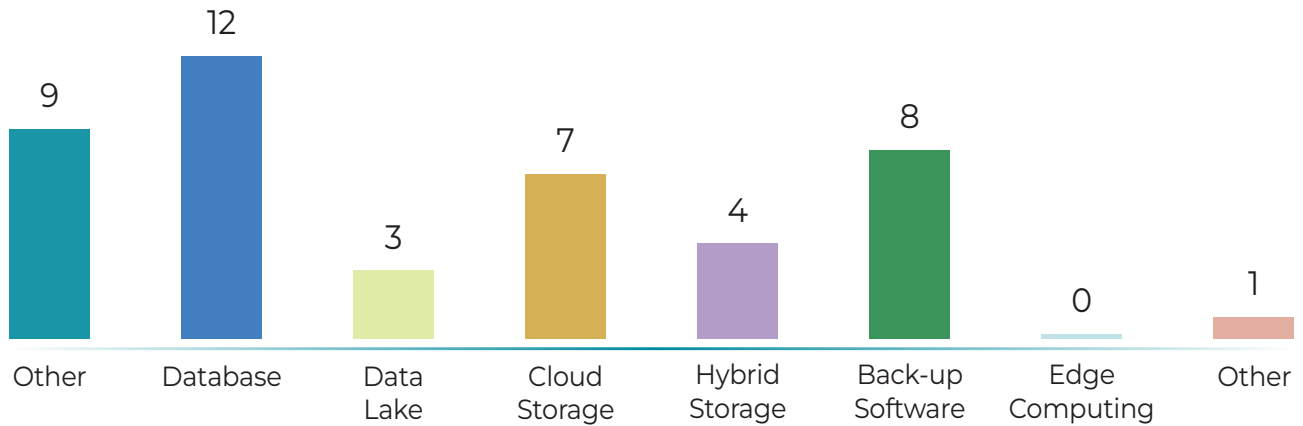
Please provide information about formats of the data collected & used (multiple choice).



Responses to the survey show that nearly all SAIs have the capacity to collect and process structured and semi-structured data. In addition, 65% of SAIs gather and use unstructured data such as audio recordings, videos, images, and logs and convert them into a readable and digitized format to extract insights. Thus, the documents that are counted become relevant and valuable for audits.

QUESTION

Which of the following methods are used by your SAI for data storage?



In addition to the quality and scope of data used, SAIs need to use secure and high-capacity storage platforms to be successful in digitalizing audits. According to survey results, databases, data centres, back-up software, and cloud storage are the technologies that are more widely accepted and frequently used by SAIs, while other technologies such as hybrid storage and data lakes are slowly being adopted. In addition, one SAI mentioned the use of local hard drives for data storage purposes.

Since both data structure and storage methods evolve over time, keeping audit data secure and accessible stands out as a goal, which includes the development of applicable data infrastructure solutions. Taken together with the fact that the data volumes continue to grow exponentially, effective data management stands out as an important need for SAIs. When we look at the average number of platforms used on an institutional basis, we see that an average of two different data storage methods are employed per SAI (while two SAIs use more than 5 platforms). This means combining the features of different storage methods, as each one has advantages over the other, and having more secure, higher capacity, and flexible systems that are adaptable to changing needs.

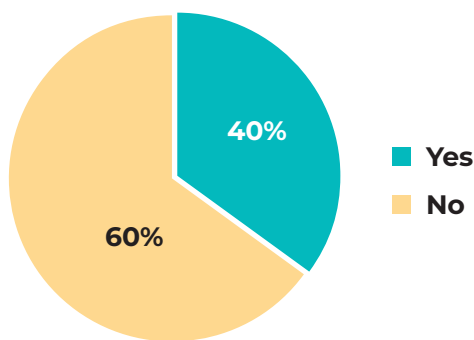
2. INFORMATION ABOUT DATA PROCESSING AND ANALYTICS CAPACITY

The purpose of the external audit function has not changed with the digital transformation. It aims to provide an objective and independent review and verify that financial statements are prepared fairly and accurately in accordance with the standards, as well as to increase stakeholders' confidence in the efficient, effective and economic use of resources by emphasizing accountability and transparency.

As a result, this part of the survey aims to review the relevant regulatory framework, methodology, and technology to ensure that they are responsive to digital reality.

QUESTION

Does your SAI has its own internal rules, standards or guidelines for conducting audit data analytics?



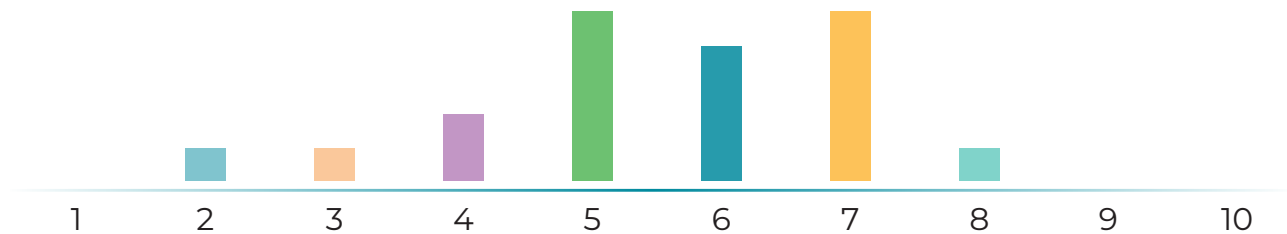
Considering constant production of information in the digital age, diversification of data sources, enormous increase in data size, and evolution of data formats, SAIs must have the right strategies to effectively use data and new technologies.

According to the survey results, only 40% of SAIs have their own internal rules, standards, or guidelines for conducting audit data analytics. Currently, there is no widely accepted standard for using data analytics in audits. As a result, developing a special regulation or guide covering all uses of data analytics within the scope of an audit will ensure standardization in the internal processes of SAIs and help them reach a certain level of quality.

QUESTION

About staff competency including knowledge, skills and personal attributes.

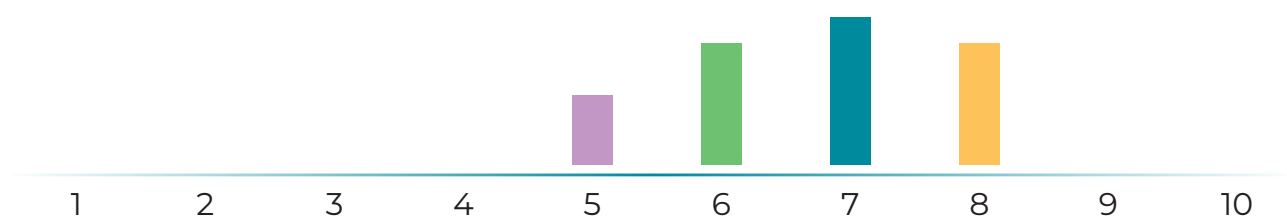
A. From 1 to 10, how would you rate the level of adoption of data science capabilities of your SAI's personnel?



Since auditing is a profession based on professional judgment, the human factor is also critical for digitalization of the profession as the final element in the process. Although technology assists in the implementation of the approach, it is the competencies of the auditors that primarily define the approach and determine the quality of audit outputs. Experts who have knowledge of information technologies, can use advanced statistical techniques and have high technological competencies are needed.

On a scale from one to ten, SAIs' ratings for data science capabilities of their personnel are concentrated between five and seven, and the average value is 5.5. The results show that, the human resources capacity of organizations is adequate, but there is still room for improvement. In this context, for a successful transformation process, the competencies of the auditors should be developed, and a new recruitment policy focusing on digital skills and new talents should be established for personnel at all levels.

B. From 1 to 10, how would you rate your SAI's tendency to develop data analytics and evaluation skills of personnel?



SAIs' answers to the survey questions show that many of them agree with the above proposition, and that they prioritize developing digital skills of the personnel. On a scale from one to ten, average rating given for the SAIs' tendency to develop the data analytics and evaluation skills of personnel is 6.7.

C. Please briefly state the ongoing capacity building activities to help auditors who lack data analytical skills (ex. training programs)

We asked about the capacity building activities carried out for the personnel with inadequate data analytics skills.

The ongoing activities mentioned in the answers are as follows:

- ✓ In-house and external trainings,
- ✓ Academic programs,
- ✓ Workshops,
- ✓ Webinars and seminars,
- ✓ Guidelines,
- ✓ Educational videos,
- ✓ Code review,
- ✓ Experience exchange by on the job coaching,
- ✓ Meetings and deep dive sessions,
- ✓ Sharing best practices at regular intervals,
- ✓ Integration in multidisciplinary teams,
- ✓ Hackathons.

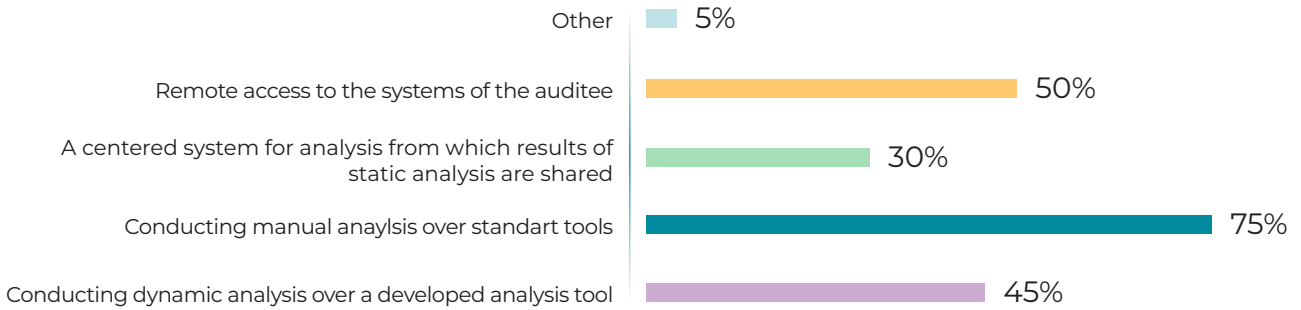
D. What do you think are the most effective ways to develop key data analytics skills of all types of staff members?

We went a step further and wanted to measure the SAIs' perceptions of the most effective ways to develop core data analytics skills for all types of staff. In addition to the existing practices, the following were suggested as effective methods:

- ✓ Maintaining an active community,
- ✓ Developing a data-driven awareness in all corporate activities,
- ✓ Developing a methodology for innovative analysis and mandating the use of new methods,
- ✓ Making practices on real data,
- ✓ Creating guides with internal learning materials containing practical examples,
- ✓ Providing compiled online resources and specific guidance.

QUESTION

Which of the following methods does your SAI use when conducting audit data analytics?
(Multiple choice)

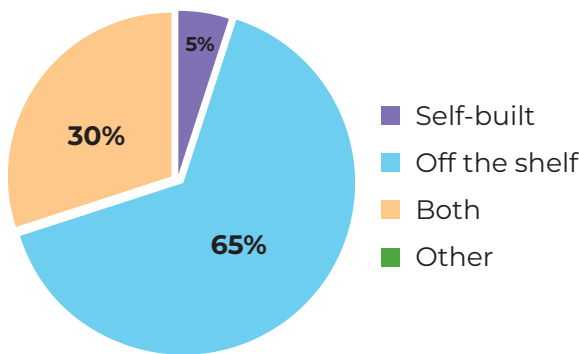


Considering data is one of the most important aspects for ensuring digitalization in auditing, choosing the appropriate platforms to process, analyse, and digitize data is essential for success. Without the right tools chosen with the right approach at all stages from data collection to processing and storage, digital transformation efforts might fail.

Survey results show that 75% of SAIs use a standard tool for conducting analytics on the data, while 45% of them use an advanced analysis tool, with a certain level of overlapping. In addition, half the SAIs have remote access to the information systems of the auditees, while 30% state that they have a centralized system built for sharing the results of the analyses.

QUESTION

The tools used for data analytics in your SAI are...

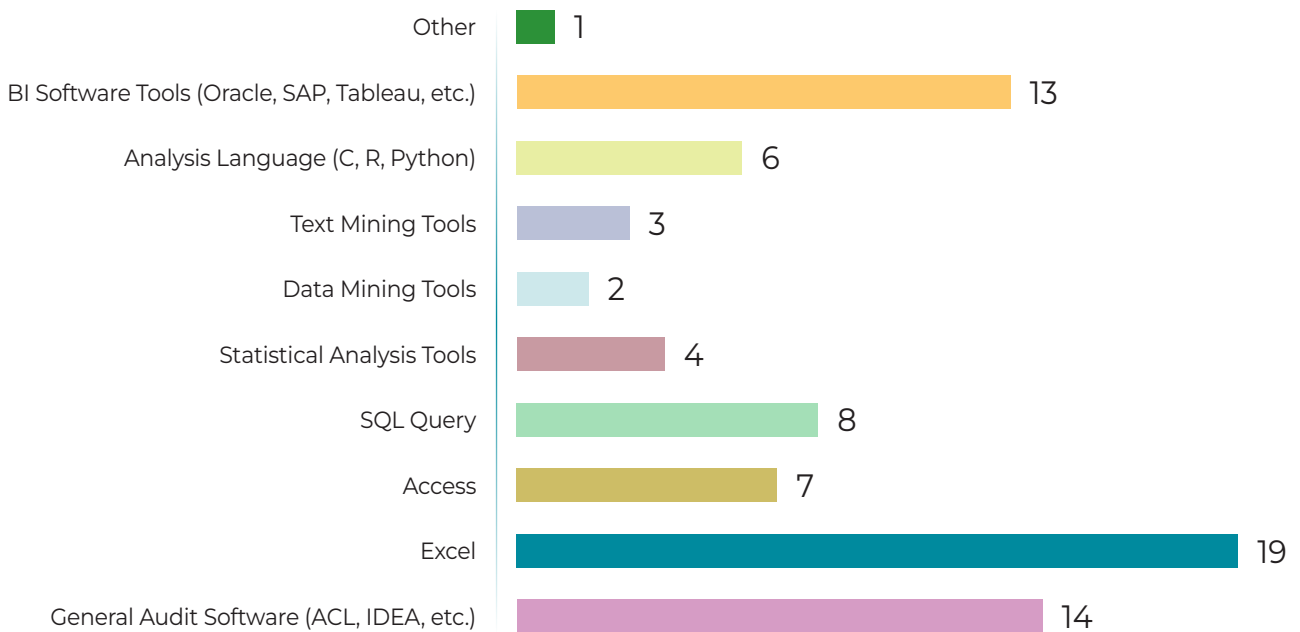


Using appropriate platforms to easily process diverse sources of audit data and generate deeper insights will also help improve audit quality. In this context, the tools used for data analytics in the majority of SAIs are off-the-shelf programs, whereas 30% of them use both off-the-shelf and self-built programs.

This result reveals the effort put in, especially in terms of sustainability and adaptation. SAIs not only integrate existing technologies into their audit processes, but some of them also develop tools that are appropriate for the data acquired through their own infrastructure.

QUESTION

From the list below please choose the tool/s used for audit data analytics (Multiple choice)



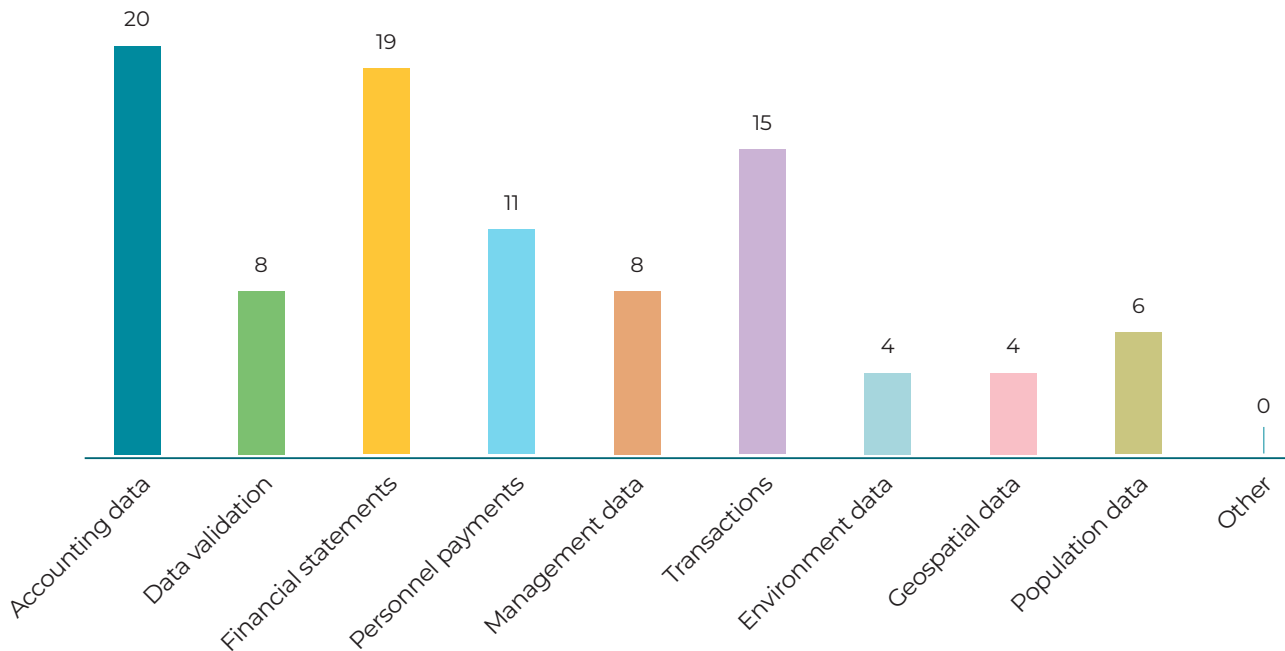
Dealing with the complexity and variability inherent in unstructured data will be more challenging in insufficient digital platforms. To achieve optimum performance, the basic requirements of the program can be counted as security, reliability, flexibility to handle new data types, having a user-friendly interface, requiring less technical support and offering continuous improvements.

As can be seen from the graph, nearly all SAIs use Excel as a standard tool for the analysis of audit data. However, on a more audit-specific level, 70% of SAIs use a general audit software such as ACL or IDEA, followed by BI software tools with 65%. In addition, SQL query, Access and analysis languages like C, R, Python are tools employed in one of every three institutions. There is still space to expand the use of text mining and data mining tools, which are used in fifteen and ten percent of SAIs respectively.

One SAI stated that they use geo-referencing software for audit data analytics. It is considered that the use of geo-referencing in audits will provide more reliable audit evidence and is an example of good practice, as it increases the consistency and completeness of the referenced spatial information.

QUESTION

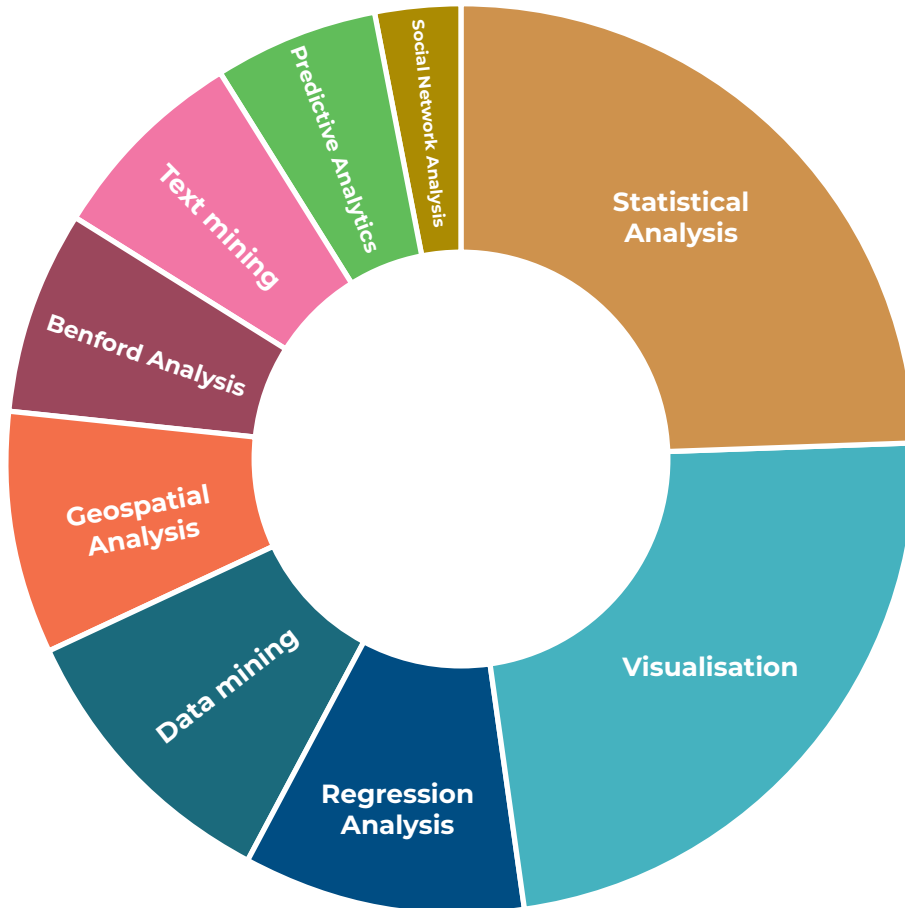
Which of the following are typical examples of areas that your organization is auditing through digital tools?



Besides accounting data and data of financial statements, the majority of SAIs use transaction data, personnel payment data and management data as typical examples of areas. Population data, geospatial data, and environment data are less common subjects that are audited through digital tools.

QUESTION

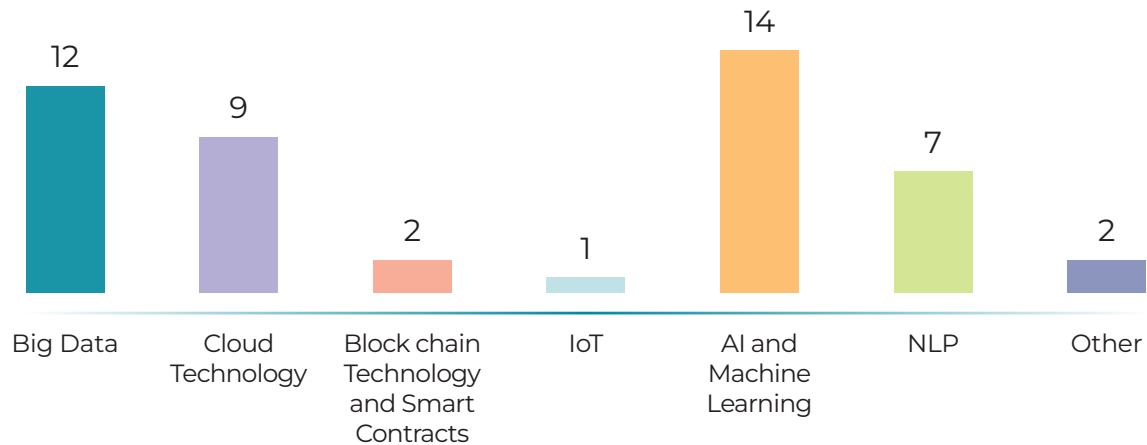
From the list below please choose the techniques used for analysing audit data (Multiple choice)



Statistical analysis and visualization stand out as the two most frequently used techniques for processing the available data and producing usable outputs. Data mining, regression analysis and geospatial analysis are other techniques commonly used by the SAIs. Based on the results of the survey, the striking point is that the use of artificial intelligence, machine learning and deep learning has not yet been integrated into audits in the SAIs.

QUESTION

Which of the following do you think are the most promising digital technologies to use in auditing practice? (Multiple choice)



Although it is stated that artificial intelligence is not yet used in audits in the SAIs, 70% of the respondents agree that it is one of the most promising digital technologies to be used in audit applications. Big data, cloud technology and NLP follow artificial intelligence with 60%, 45% and 35% respectively.

Blockchain technology, smart contracts, and IoT received little attention in this ranking. Along with these, other promising technologies cited by the SAIs in their responses are process mining and smart data sharing applications such as interconnected databases and api-type exchanges between government agencies.

QUESTION

How much potential do you think the newly emerging technologies have in public auditing?

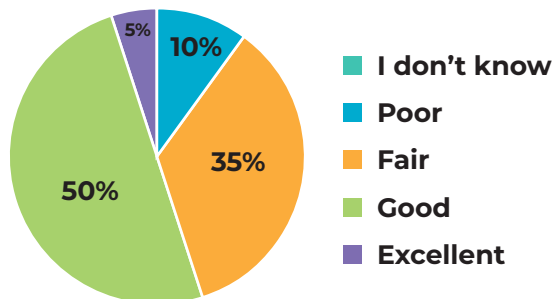
Respondent SAIs state that emerging technologies have great potential not only for public auditing but also for the public administration as a whole. It is also mentioned that digitalization of government services and the development of structured information systems provide more accurate results in audits, but data protection issues need to be resolved first.

The participants add that emerging technologies also provide the opportunity to make assessments in the digital environment and eliminate the sampling problem. These new tools have the potential to enable auditors to mine and analyse large volumes of structured and unstructured data consisting of an organization's financial information. This capability allows auditors to test the entirety of an organization's transactions, rather than just a sample of the population.

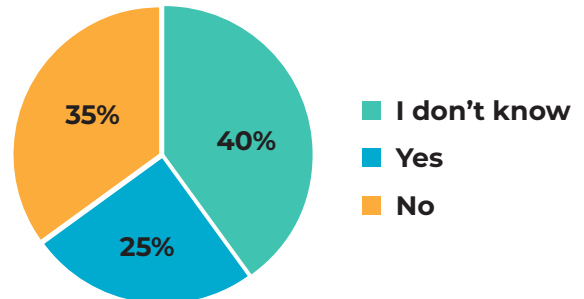
In particular, artificial intelligence, deep learning and big data are listed as having enormous potential in terms of financial auditing, risk analysis, merging huge datasets and predicting possible scenarios. However, it should be emphasized that the limited ability of machine learning algorithms to make professional judgments is a challenge. Their estimations cannot yet be considered as confirmatory evidence, but they can still provide auditors with exploratory insight. Therefore, deep learning and artificial intelligence can be a supportive tool for auditors in reaching professional conclusions.

QUESTION

Please evaluate the extent to which your SAI uses data analysis techniques and tools.



If you evaluate the use of data analysis tools and techniques poor, does your SAI plan to introduce use of new technologies in the short term?



We asked SAIs to evaluate the extent to which they used data analysis techniques and tools. In addition, we asked respondents who rated the use of data analysis tools and techniques as poor if their SAI plans to introduce new technologies in the short term.

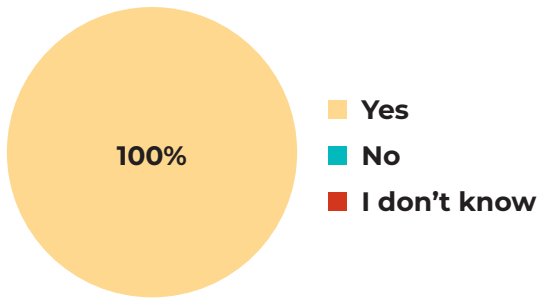
The self-evaluation results of SAIs on the use of data analysis tools and techniques show that the general situation is considered as fair or good by 85% of respondents, while 10% evaluate the existing capacity as weak.

Since sufficient information could not be obtained about whether the SAIs are planning to invest in data analysis tools and techniques in the near future, it could not be evaluated whether these results are reflected in their short-term plans.

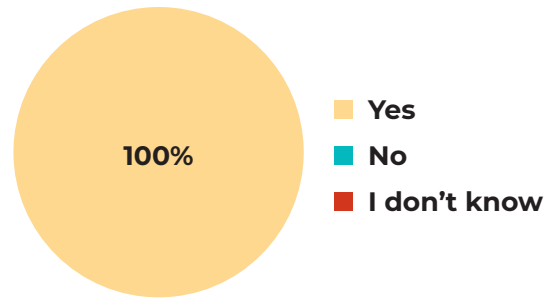
40% of the respondents state that they do not have detailed information. Thus, it is concluded that it would be appropriate for the SAIs to increase their investments in order to make their IT structure better, more reliable and more efficient. As a result, creating a culture of innovation, in which audit processes and tools are constantly updated, will help achieve higher quality audits.

QUESTION

Do you think digital transformation has an impact on the effectiveness and efficiency of audits?



Do you agree that the use of digital technologies is an important way to improve the performance of SAIs?



According to the survey results also confirms that all SAIs consider that digital transformation directly influences the efficiency and effectiveness of audits and that the use of digital technologies is an important way to improve the SAIs' performance.

QUESTION

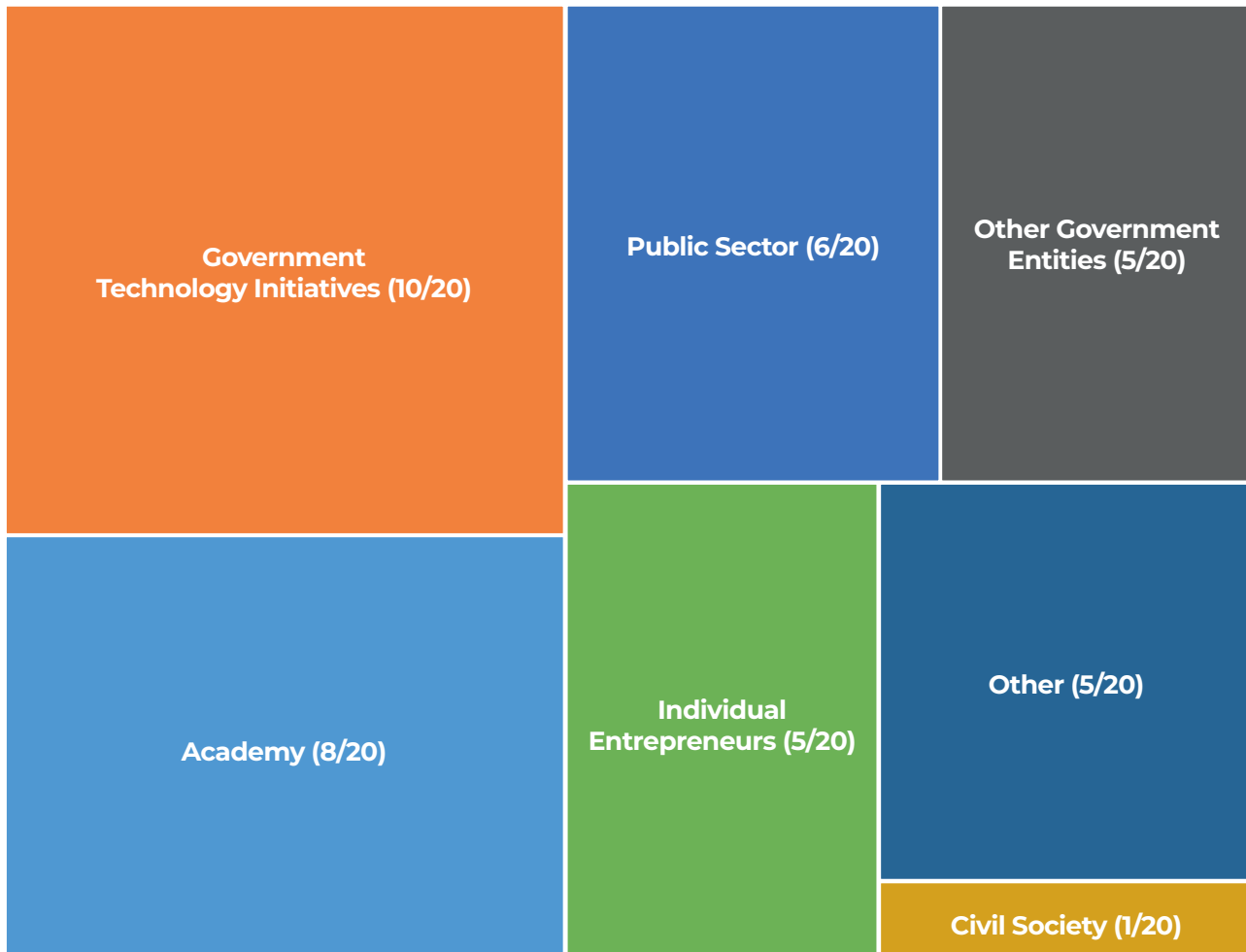
From 1-10 how would you rate the importance of using new and/or existing digital technologies in audits?

1	2	3	4	5	6	7	8	9	10
0%	0%	0%	0%	5%	0%	10%	25%	40%	20%

The responding SAIs rate the importance of using new and/or existing digital technologies in audits as 8.55 out of 10. This positive approach is an indicator of SAIs' willingness to use technology in their audit processes. It is clear that the SAIs' confidence in the use of automated tools and techniques is the key to success. When this confidence in relation to the use of technology in auditing is combined with agility, the tendency to adopt technology will increase.

QUESTION

Does your institution receive or plan to receive support from any of the following actors in the design or use of digital tools and technologies?

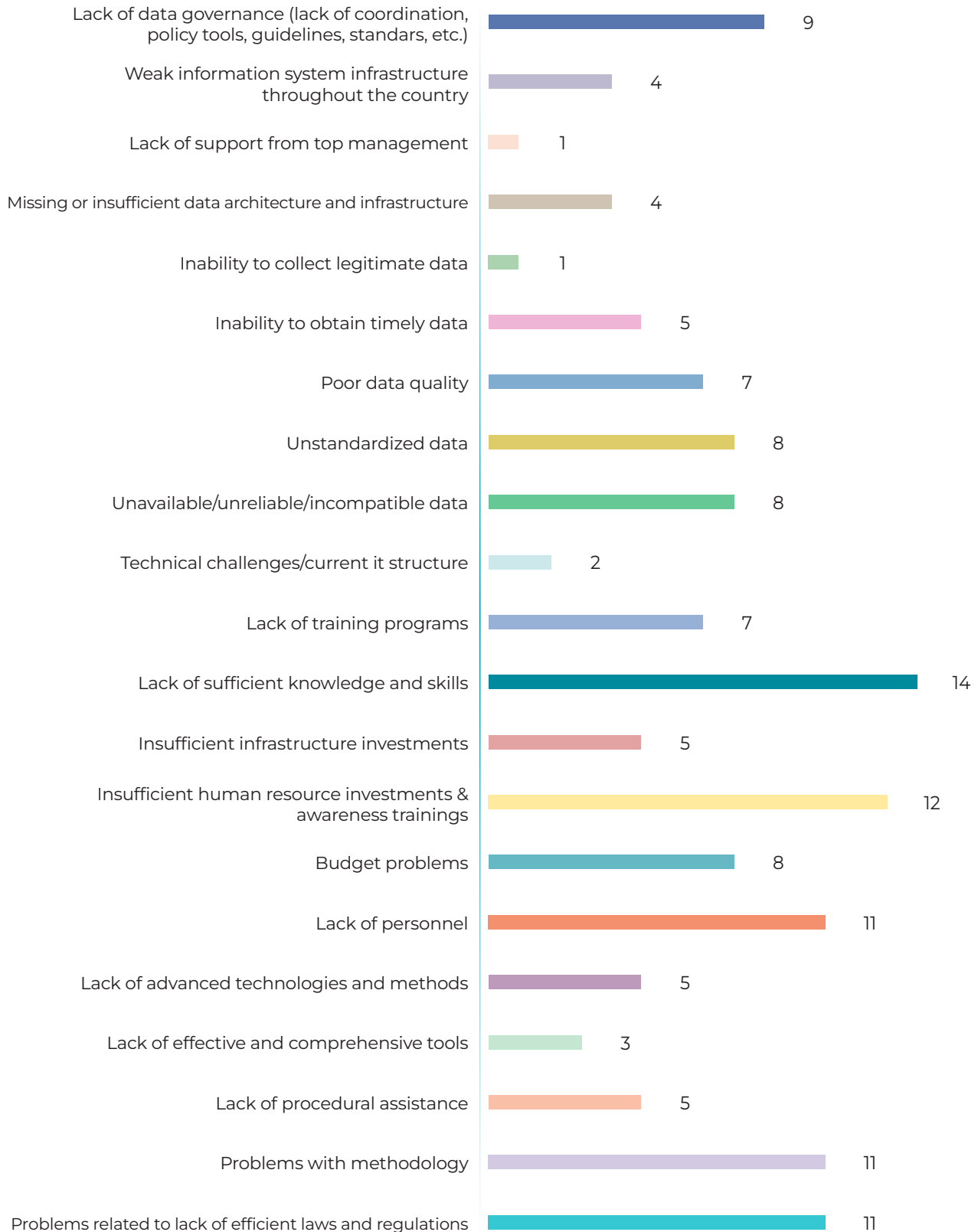


In addition to establishing effective internal processes, obtaining support from external sources is an important step towards technology adoption and management. Creating an external network is as significant as determining the roadmap and developing a plan, establishing the appropriate legal and regulatory framework, making internal assessments, determining key roles, organizing in-house trainings, and recruiting well-equipped personnel.

The results show that SAIs generally prefer to work with government technology initiatives or the academy as sources of external support in designing or using tools and techniques. In the selection made among the public sector, other government entities, and individual entrepreneurs, none of the actors stands out. Other parties that SAIs work with towards digitization as examples of good practice are the OECD, professional accounting bodies, commercial providers of audit services, and authors or distributors of tools and technologies.

QUESTION

Which of the following do you evaluate as one of the main challenges regarding the use of new technologies for audit data analytics? (Multiple choice)



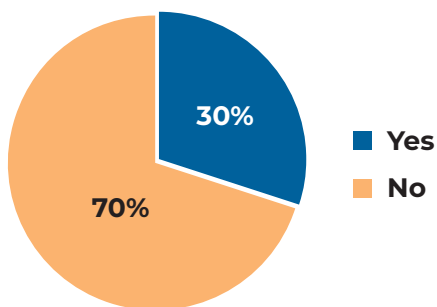
Regarding the use of new technologies for audit data analytics, one of the biggest challenges SAIs face is the lack of knowledge and skills of the personnel, which is underlined by inadequate human resource investments and awareness trainings. In connection with this, 55% of SAIs lack personnel and 35% lack training programs. Other issues commonly addressed by SAIs are problems arising from the lack of effective laws and regulations, and problems related to methodology. In this context, some participants also list the lack of procedural assistance as an obstacle.

In addition, we see that many SAIs experience data-driven difficulties in using new technologies. First of all, data governance issues are one of the main problems encountered due to the lack of coordination and inadequate policy tools, guidelines, standards, etc. Other issues faced by more than 25% of the respondents include: unavailable, unreliable, incompatible data (8 SAIs), unstandardized data (8 SAIs), low-quality data (7 SAIs), and the inability to obtain timely data (5 SAIs). Considering the question in Part 1, where we asked SAIs to rate the quality of the collected data, 65% of respondents answered that the data quality is good, and 35% answered that data quality is fair. When we evaluate the questions together, we see why none of the SAIs rate the data quality as excellent, and although the existing data is considered good or fair, it is not always sufficient for use with new technology tools.

Finally, less common but highly important issues include budgetary problems, and insufficient infrastructure investments.

QUESTION

Does your SAI evaluate the impact of use of digital technologies on the output of audit?



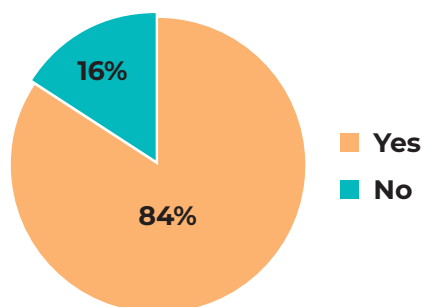
Only 30% of responding SAIs state that they evaluate the impact of the use of digital technologies on the output of their audits. It is concluded that before investing in new technologies or strengthening human resources, a roadmap should be developed, and the organizational processes should be redesigned accordingly in order to carry out the audits with a digital data focus.

3. USE AND IMPACT OF DIGITAL TECHNOLOGIES IN COVID-19 ERA

This section, aims to capture the changing perspectives of SAIs and measure their capacity to respond to sudden risk factors, their readiness for the next potential crisis and their resilience to possible risks.

QUESTION

Before the pandemic, were there ongoing efforts for integrating existing or newly emerging technologies into the auditing processes?



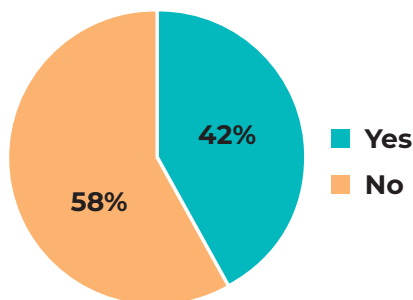
Before Covid-19, the audit profession, like many other professions, was already in the process of adapting to emerging technologies. According to the results, 84% of SAIs were already working on integrating existing or emerging technologies into audits before the pandemic. Investing in new tools and integrating digital innovation into their operations was on the agenda of the majority of the SAIs to perform higher-quality, more efficient, and more focused audits.

On the other hand, the unusual circumstances of the pandemic have led to a profound change in the function of the audit, the independence of the auditor, and the way in which audits are conducted.

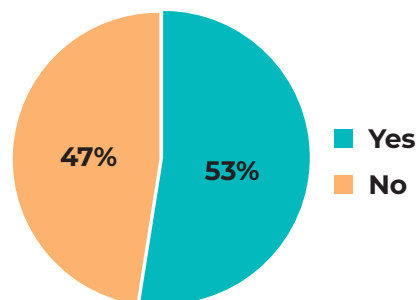
The restrictions and the new working conditions brought by the pandemic have triggered both risks and opportunities, accelerated the digitalization process, and forced SAIs to adopt digital technologies whether they are ready or not.

QUESTION

Has the covid-19 pandemic affected your SAI's overall strategy on data management regarding use of existing or newly emerging technologies?



Has your SAI's tendency to develop data analytics and evaluation skills of staff increased after the pandemic?



We inquired whether the Covid-19 pandemic has affected the digital management strategies of the SAIs and whether SAIs have increased their tendency to improve their personnel's analytical skills. 42% of SAIs state that there has been a change in their general data management strategies regarding the use of existing or emerging technologies in the post-pandemic period. In addition, 53% of the respondents report an increase in the tendency to improve data analytics and evaluation skills of the staff.

The results show that SAIs were already aware that they were expected to switch to more flexible working styles according to the needs of the auditees and stakeholders, and that they have already started to take the necessary steps before the pandemic.

In the general questions in the first part of the survey, we ask SAIs if they have a formal digital strategy to support their operations and policy goals, and if their answer is yes, we further ask them about the extent to which this digital strategy has been implemented.

60% of SAIs respond that they either have an independent digital strategy or a digital strategy integrated into the national digital strategy. Among these SAIs, one SAI reports that their digital strategy has been fully implemented, and nearly all the remaining SAIs defined the level of implementation of their digital strategies as adequate.

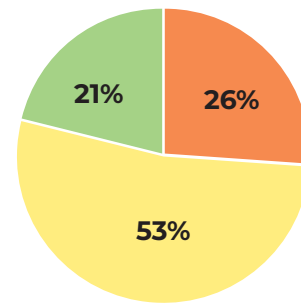
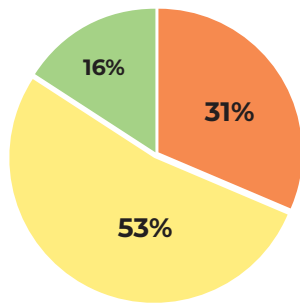
When evaluated together with the general results of the survey, it is seen that there is no need for major changes in the strategies of SAIs, which have been implemented to a large extent, due to the pandemic.

However, it will be an important first step for the remaining SAIs to make the necessary human resources investments and to carry out productive bilateral or multilateral cooperation at the national or international level in order to create an effective strategy in line with the new normal.

QUESTION

Regarding data collection and storage capacity and processes, have there been any changes in the understanding after the Covid-19 pandemic or are there new investments?

Regarding data processing and analytics capacity, have there been any changes in the understanding after the Covid-19 pandemic or are there new investments?



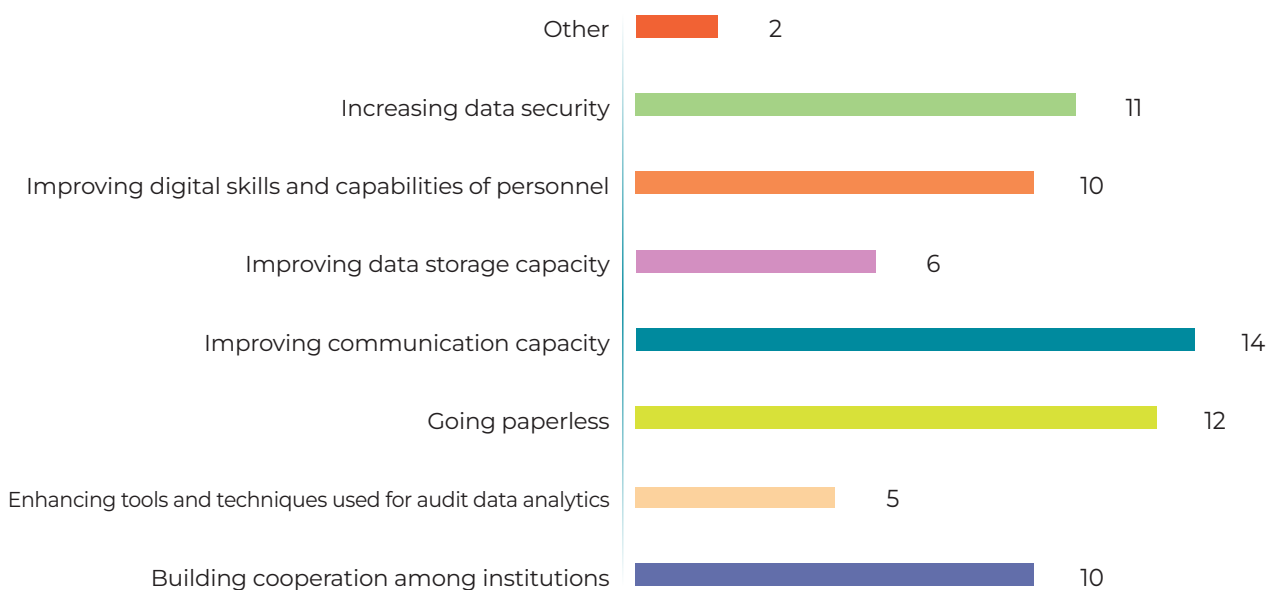
- Yes, we invested in new and/or existing technologies
- Yes, the importance given to new and/or existing technologies has increased
- No

- Yes, we invested in new and/or existing technologies
- Yes, the importance given to new and/or existing technologies has increased
- No

Approximately 31% of the SAIs report that they have made investments in new technologies after Covid-19 related to data collection and storage capacity and processes. On the other hand, in terms of data processing and analytics capacity, 26% of the participants refer to new investments. The importance given to both issues has increased in more than half of the participants even if they are not planning new investments.

QUESTION

If you answered yes to at least one of the above-mentioned questions, which of the following aspects has your SAI focused on during the pandemic?

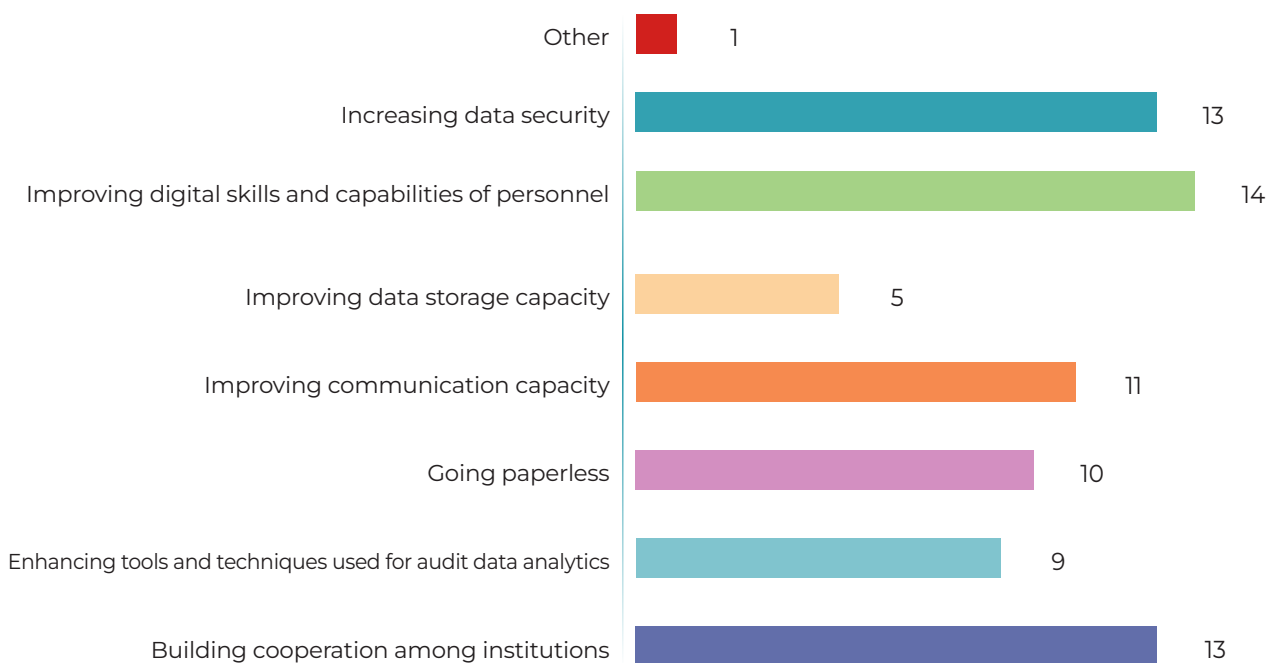


Due to the restrictions, the main focus of SAIs during the pandemic period has been to strengthen their communication capacity within the framework of the new understanding and increasing investments.

Based on the measures, other investment priorities for this period were determined as transitioning to a paperless environment and increasing data security. Additional topics that became the focus of attention in at least half of the SAIs during this period were improving digital skills and capabilities of the personnel and strengthening cooperation among institutions.

QUESTION

Which of the following aspects does your SAI prioritize for getting prepared for future crises?

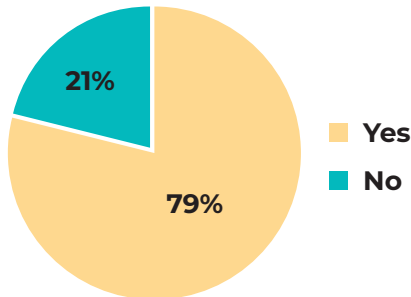


SAIs state that they prioritize enhancing personnel capacity by improving their digital skills and capabilities, strengthening cooperation among institutions and increasing data security among all the above-mentioned issues in order to not only successfully overcome the current crisis period, but also to be prepared for future crises. Other issues that about half of the SAIs attach importance to are improving their communication capacity, transitioning to a paperless environment, and enhancing the tools and techniques used for audit data analytics.

However, issues related to data storage capacity were not prioritized both during and after the crisis. It is concluded that they were either already resolved or did not receive the necessary attention.

QUESTION

Did your SAI perform remote audits during the pandemic? (If any part of the audit is performed by remote auditing tools, please consider it as remote)

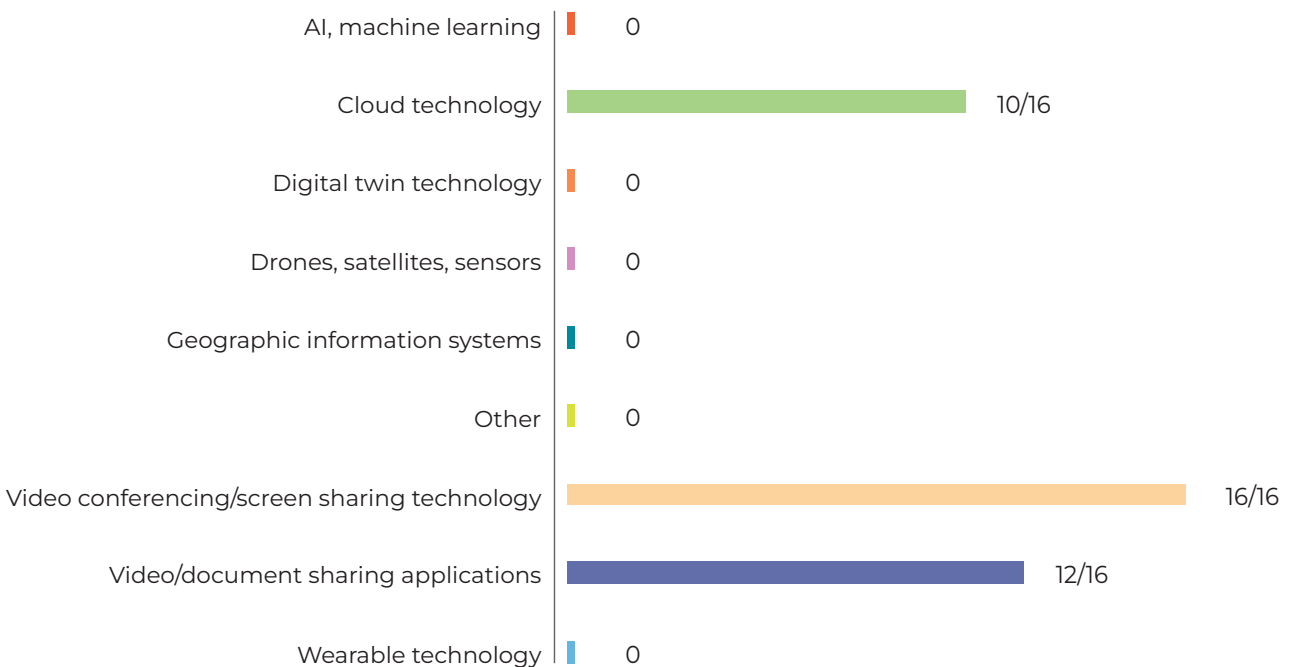


The pandemic has drastically changed the way auditors work and forced them to adopt new approaches, resulting in an increase in remote audits. As an activity performed outside the location of the audit object, remote audits became a new topic for most SAIs. 79% of the responding SAIs reported conducting remote audits during the pandemic period.

QUESTION

If your answer to the above question is yes, please provide information about;

A. The technology used for conducting remote audits (multiple choice)



We asked the SAIs, who stated that they conducted remote audits during the pandemic period, about the technologies they used most. All of the respondents state that they used videoconferencing methods or screen-sharing technologies while performing remote audits.

As other common practices, 12 SAIs used video and document sharing applications, and 10 SAIs used cloud technology. Innovations such as wearable technologies, monitoring and recording systems such as drones, satellites and sensors, or digital twin technology, on the other hand, were not used by any of the participants.

B. How audit programs/plans were prepared?

The majority of SAIs stated that the preparation of audit programs or plans and the formation of audit teams continued as before, while others made adjustments to meet the requirements of the new period. Video conferencing, online meetings, and phone or mail communications have been among the new applications that have gained prominence.

C. How audit teams were formed and managed?

In connection with the previous question, some respondents say they chose a hybrid method of team building that was partially remote and partially in-person. In addition, one SAI states that it has proactively modified its annual audit plan, and a substantial amount of resources have been diverted to Covid-19 spending assessments. While reporting in annual financial audits normally begins at the end of the third quarter of the year, a significant part of them were launched at the beginning of the second and third quarters, and the results of the assessments were published as interim reports.

D. The ways that your SAI provided support to auditors' technical information needs?

The technical information needs of the personnel were generally supported by online technical support and online trainings. Call centres, training videos, and short helpful guides on common technical issues are methods used by only a few SAIs, but are good examples.

E. Main challenges faced while conducting remote audits (multiple choice)

In relation to the previous question, the most significant challenge faced by the SAIs while conducting remote audits was the difficulty in obtaining data. Communication problems within the team and with the auditees, and documentation difficulties were other prominent issues. Although it is not common, some SAIs report issues related to critical matters for auditing, such as data privacy and secure sharing, lack of adequate infrastructure, skilled staff, and methodology.

F. Opportunities remote audits provided (multiple choice)

Remote auditing practices had both advantages and disadvantages. Increased operational efficiency, flexibility in planning, maintaining continuity under restrictions, reduced time and other resource requirements, and increased productivity are the most visible benefits of remote audits.

QUESTION

Regarding the pandemic conditions and restrictions, which of the following do you think was the most important impact of digitalization of audit?

Effects of digitalization of audit in Covid-19 era	Percentage of agreement
Providing remote access to audit data	68%
Reducing the need for on-site inspections	63%
Automation and standardization of the audit procedures	47%
Ensuring data security	42%
Increasing efficiency and effectiveness	42%
Facilitating communication	37%
Reducing resource usage	32%
Reducing the time allocated to the planning and implementation phases	26%
Enabling real-time reviewing and reporting	16%
Providing high quality and reliable audit trails	16%
Fast and flexible reporting	11%
Enabling continuous monitoring and continuous auditing	0%
Enriching insights	0%

In relation to pandemic conditions and restrictions, we asked SAIs about the most significant impact of the digitalization of audits.

At the audit level, the most important effects of digitalization as a result of the pandemic conditions and following restrictions, were identified as the possibility of remote access to audit data and the reduction in the need for on-site audits.

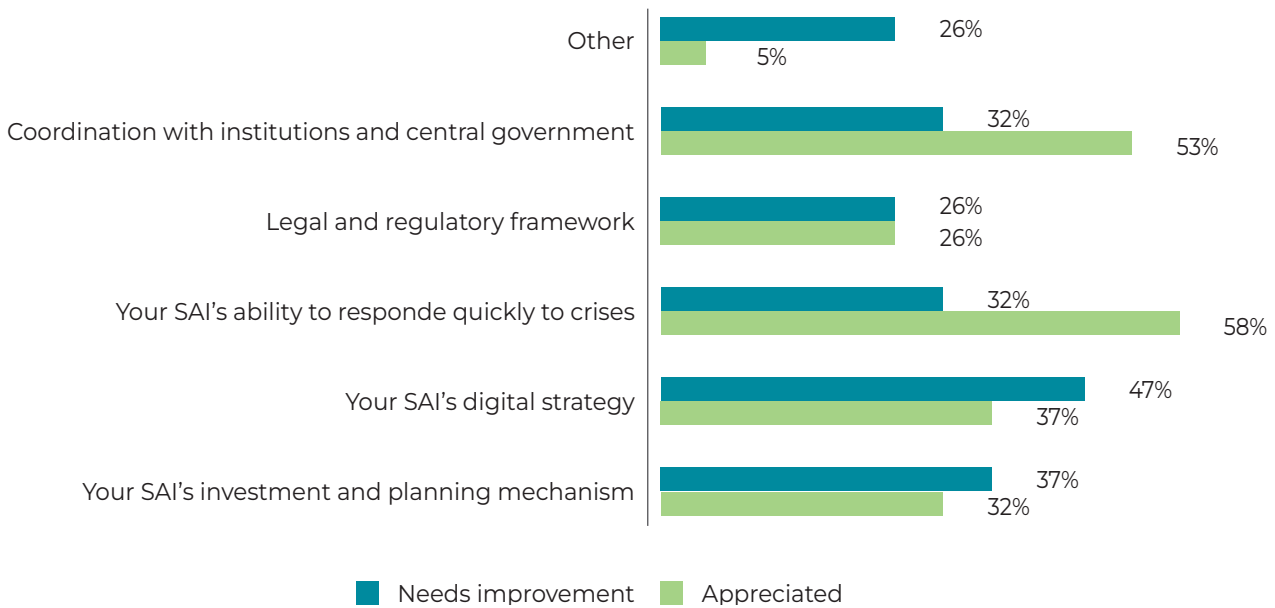
Other highlights, as approved by at least 40% of respondents, include automation and standardization of audit procedures, increased efficiency and effectiveness of audits, and improved data security. None of the respondents believes that enabling continuous monitoring and continuous auditing, or enriching insights, are among the most important outcomes of digitalization in the Covid-19 era.

QUESTION

Which of the following aspects;

A. Did you appreciate most regarding your SAI's digital auditing experience during the pandemic?

B. Do you think can be improved regarding your SAI's digital auditing experience during the pandemic?



We asked the SAIs about the factors they were most satisfied with in relation to their digital auditing experience during the pandemic, as well as the factors they thought could be improved.

When digital audit experiences, including but not limited to remote auditing, were evaluated as a whole, the ability to respond quickly to crises and the capability to provide high-level coordination with institutions and the central government were the elements most appreciated at the SAI level. However, assessments concerning the improvement needs of SAIs revealed that existing digital strategies and investment and planning mechanisms were found to be weak. As a good example, one SAI mentioned the confirmation of a new digital strategy after the pandemic, which allocates more resources and places greater emphasis on attracting, recruiting, and retaining competent staff.

QUESTION

Regarding the pandemic conditions and restrictions, in your opinion, which of the following areas are most open to improvement through the use of digital technologies in audits? (Multiple choice)



According to the majority of respondents, given the pandemic conditions and restrictions, the top three audit topics open to improvement through the use of digital technologies are identification of risks, analysis activities, and reliable use of data and technology. In addition, more than half of respondents think that data-related issues such as data collection, processing and storage activities, and other issues like communication with auditees, automating repetitive work, and detection of errors and fraud remain open to progress.

QUESTION

Which of the following do you think are the most important steps to be taken in order to face the challenges, especially in collection & analysis of data, during the Covid-19 era?



Strengthening data management capacity and adopting new tools and techniques stand out as the most important steps to cope with the difficulties of the period, especially in relation to data collection and analysis. In addition, most SAIs consider investing in new and emerging technologies as a necessary step. As for the other measures that can be taken; about half of the participants support the employment of technically skilled and experienced personnel, increasing training opportunities, establishing cooperation with other SAIs, universities or research institutions, strengthening the legal structure, and providing methodological support.

QUESTION

Please indicate your additional suggestions for improving the use of new and/or existing digital technologies in audits.

Additional recommendations made by SAIs are generally focused on increasing investments. SAIs suggest that professionally trained human resources should support investments, and financial resources should be strengthened. SAIs also draw attention to the issue of human resources by stating that people with key roles should have an open mind-set in data analytics, and recommend getting external support/expert opinion.

The results show that SAIs are determined to fully integrate digitalization into their audit processes without losing their momentum. Regardless of their current situation in the digitalization process, they work to meet the needs brought by the ever-evolving technology in the industrial age and to be prepared for potential future crises.

QUESTION

What kind of support do you think will be effective in development of SAIs analytical capabilities?

The suggestions of the SAIs for possible actions that are thought to be effective in improving their analytical skills are listed below:

- ✓ Online training programs on data analysis methods
- ✓ Sharing experiences and audit cases that set examples of best practices
- ✓ Developing methodology for conducting audits and interpreting results using data analysis tools
- ✓ Joint audits with other SAIs
- ✓ Cooperation with academia
- ✓ International cooperation
- ✓ Rotation in other public entities
- ✓ Investment in infrastructure
- ✓ Providing easily accessible support for problem-solving
- ✓ Cooperation among SAIs

QUESTION**What are the influences that encourage your digital transformation? What is the share of the covid-19 pandemic in this?**

Some SAIs state that the Covid-19 pandemic is not a major factor in accelerating the digitalization of audits. They claim that the Covid-19 pandemic has only provided them with a use case for analysing large amounts of data and performing an interactive audit for the first time. In addition, the situation brought about by the pandemic has little effect on the changes which were already underway.

On the other hand, the majority of SAIs agree that Covid-19 has accelerated the journey, with regard to certain audit functions, in particular. According to SAIs, the main factors encouraging their digital transformation are as follows:

- ✓ Increasing volumes of data that can no longer be processed with traditional tools and require the use of new technological solutions
- ✓ Emergence of new tools that enable more efficient audits
- ✓ Increased speed of information and data transfer
- ✓ Real-time data exchange possibilities
- ✓ Global recognition of digital evolution
- ✓ Digitalisation of public administration
- ✓ Pandemic restrictions
- ✓ Adoption of remote collaboration tools as a result of the remote working requirements; and increased digital competencies of the employees it provides

CONCLUSION

The changes brought by the Industry 4.0 era have increased the availability of digital data for SAIs by enabling the electronic recording of all the financial and non-financial information of the auditees, facilitating data conversion and transfer processes, and supporting high-quality evidence-gathering techniques.

These developments have triggered the renewal of the audit processes, the creation of an environment for digital auditing of all existing data, the minimization of the error rate, and the transition to a continuous audit model. The technological innovations in audit activities and processes have increased the awareness about the importance of protecting digital information. Digitization has also offered effective solutions in tackling the challenges brought by the pandemic.

The Covid-19 pandemic has created difficulties both in audit methodology and audit processes. As a result of the restrictions, the need for remote access to accounting and data recording systems arose, and it became difficult to obtain the documents needed for auditing. Audit teams experienced coordination problems due to disruptions in communication and remote working conditions. In addition, difficulties were encountered in obtaining sufficient and appropriate audit evidence because of problems in communication with the auditees and related third parties. There were delays in the necessary physical controls due to transportation difficulties or the suspension of the activities of the auditees. As a result of the negative effects of the pandemic on the economy, the need to implement additional controls has emerged, especially to detect possible fraudulent acts. The survey results show that the main issues that stand out among the problems experienced during the pandemic period are related to personnel competence, methodology issues, lack of effective laws and regulations, and the availability and governance of quality data.

Given the difficulties encountered, each SAI should determine their needs and gaps and develop a road map in order to reap all of the benefits of digitalization in the post Covid-19 era and be prepared for the next possible crisis. Considering the changing societal and institutional needs, it is imperative that SAIs combine human resources, business processes, and technology components in order to provide more efficient and effective audit outputs. In this framework, first of all, the information technology infrastructure should be established in a secure way. Then, since competence, which is one of the fundamental elements of auditing, has a significant impact on the quality of audit outputs, processes and methods should be developed in the digital environment by using the opportunities provided by information and communication technologies. And, the processes such as data collection, data processing, and analytics should be managed in an optimized way. Investments in technologies such as cloud computing, AI, and machine learning should be increased. In addition, digital audit activities should be constantly monitored, and policies that prioritize digital capabilities should be followed. Furthermore, human resources investments should be increased and continuous trainings on topics like data analytics and cyber security should be planned to improve the digital skills of the auditors and other personnel of the SAIs.

After a roadmap is developed, necessary improvements should be implemented rapidly with the support of both internal and external stakeholders. Top management has a major role in the transformation of auditing, but the success of the transformation depends on both the vision of the managers and the established corporate culture. While the management is expected to take effective steps on issues such as investment in new technologies and human resources, strengthening the legal framework, and relations with external stakeholders, the auditors' cooperation and willingness to adopt change also play a key role in the success of the transformation. In this context, auditor adaptation problems, issues related to project management in technological investments, the risks inherent in the digitalization of audit processes, and the steps to be taken to keep up with rapidly developing innovations should be taken into account in future studies.

In conclusion, it is clear that digitalization presents both opportunities and challenges for the audit profession. Since the development of new techniques and technologies is ongoing and digital transformation is a continuous change, the effects on auditing will also be long-lasting. When used as a tool, digitalization will both provide an indisputable force in the audit profession and increase the capacity of SAIs to respond quickly to potential future crises.