Supreme Audit Institutions and the Strive Towards an Open Data Culture

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Abstract

Open data is the pinnacle of democratic access to public information, enticing public authorities to strive for better governance since operational transparency invites public scrutiny. Our investigative demarche focuses on establishing whether EU's supreme audit institutions provide their stakeholders useful and comparable information within the national Open data portals and whether their communication with stakeholders using their official websites abides by the Open data principles and legal requirements. Information pertaining to the 28 European Open data portals was analyzed by multiple research criteria to establish each SAI's involvement in providing meaningful datasets. Furthermore, each European SAI's Open data conduct using their official website was measured by employing a disclosure index composed of specific criteria. Our research illustrates the current level of SAI Open data literacy and aims to highlight good practices in order to contribute to the dissemination of an Open data culture among European supreme audit institutions.

Key words: open data, external audit, public sector, supreme audit institutions, European Union
J.E.L. classification: H83

1. Introduction

INTOSAI principles on the value and benefits of supreme audit institutions (abbreviated SAIs) state that access to audit reports should be facilitated for all stakeholders, using appropriate communication tools. Furthermore, SAI transparency, effective communication, good governance and service excellence and quality are all principles that form the bedrock of a modern supreme audit institution.

Our research captures the external public audit sector in full reform process, under the impact of digitalization, as a present and future challenge and an imperative trend for the information and knowledge-based society, that affects SAI activities in an increasingly significant manner.

Our investigative demarche focuses on the perspective of external public audit concerning Open data practices and has a bidimensional aim. Firstly, we analyze the generalization degree of Open data practices in EU member states and the SAIs' footprint within the national Open data portals and secondly, we measure the dissemination degree of documents created and managed by the EU SAIs using their official websites (the 27 SAIs of the EU member states and the European Court of Auditors).

Aiming to achieve their main objective, to ensure transparency and accountability for the efficient, efficacious and economic use of public resources, the European Union's supreme audit institutions process vast amounts of data stemming from a variety of domains pertaining to the public and private sectors. Concomitantly, the external audit process creates added value in the form of highly re-usable data, documents and information relevant to its stakeholders.

2. Literature review

There is a general consensus among researchers that Open data will contribute extensively to the creation of value in business, science and government (Inkpen *et al,* 2021), citing policymakers that consider data as „the raw material of the 21st Century" (Calzada, 2018, p.2).

Special consideration was given to researching whether current Open data policies and practices are able to harness its full potential (Concilio *et al*, 2021, p.1), urging the public authorities to further improve and target Open data creation to ensure it reaches the quality threshold needed for added value creation.

Open data's growth gave rise to open science advocates (Ramachandran *et al,* 2021, p.14, Inkpen *et al,* 2021), advancing the agenda for collaborative frameworks and efficient research, promoting cultural change amid the neo-liberalization of universities and academics.

Conversely, the research on public external audit by reference to the valences of digital technology both at the international and the national echelon is limited, generally converging on the conclusion that it will increase efficiency and effectiveness of audit work. (Pedrosa, 2020, p.565).

Sanchez Fernandez de Valderrama *et al* (2014, p.474) have approached computer-assisted audit techniques, concluding that audit activity can be implemented with a higher degree of precision and swiftness when employing audit software. In their view, computer-assisted audit techniques do not pertain only to financial audit, but also to performance audit and conformity audit.

Antipova (2019, p.441) shows that the digital audit extends the possibility of visualizing broader trends, problems and relationships, offering more relevant observations to decision-makers and interested parties in public sector improvements. In her vision, the pillars of public sector audit digitalization are standardization, human resources management and data management. Likewise, SAIs' future perspectives should include, alongside shoring up their investigative abilities, augmenting international transparency, also the increase in digital technology usage.

Conversely, considering that public external audit proves valuable to a variety of users (Hay *et al*, 2020), Torres *et al* (2020) have approached the use of social media by SAIs, as an instrument to communicate with and involve stakeholders. Essentially, the authors researched the presence of supreme and regional audit institutions from the European Union and the United States of America within Web 2.0 and the social media instruments. Their research results indicate that the adoption of these instruments by public external audit bodies is rather incipient, since half of the researched institutions do not employ such instruments and that there are significant approach differences between institutions (social media is best used in the United States of America compared to the European Union; the usage degree is higher among supreme audit institutions compared to their regional counterparts), considering the public administration's typology, the country's population, general social media use and past national transparency scores. Likewise, their results illustrate that the number of social media followers and public awareness regarding SAI's digital presence is generally limited, and the published content rarely engages stakeholders in interaction.

Dascălu (2016, p.123) considers that supreme audit institutions can play a dual role in the context of an open government paradigm. First, by conducting audits on the government's Open data programs to ensure their adequate implementation and proper public accountability and second, by harnessing the power of Open data in their audit activities. To reach this goal, the author envisages substantive modifications to the public external audit activity, starting with SAIs' strategic approach and continuing with constructing the adequate framework needed for the online audit.

The European Union's Charter of Fundamental Rights (2012) establishes the people's right to expression and information, and also to hold opinions and to receive and impart information and ideas free of interference from public authorities and regardless of frontiers. Similarly, the right to access documents of institutional bodies, offices and agencies of the European Union, whatever their medium, is guaranteed to each EU citizen or legal entity having a registered office in a member state, under the reserve of protecting personal data.

Furthermore, the EU recognizes the strong evolution towards the information society and the role of digital content in rapidly creating job opportunities, while the public sector collects, produces and reproduces a multitude of information in diverse activity domains.

In this context, the first European "Open data" regulatory initiative was the landmark EU Directive 2003/98/CE (2003) on the reuse of public sector information, its fundamental principle stating that the reutilization of documents belonging to public sector entities is allowed, for commercial and non-commercial purposes, according to a minimal set of regulations and, if possible, the documents shall be provided in an electronic form. After the Directive entered into effect, the volume of data produced and available globally (including public data) has grown exponentially. Furthermore, new types of data were generated and collected seamlessly, concomitant with the development of new data analysis, processing and marketization technologies, allowing for new economic and social opportunities for the reuse of public sector information.

Building on these premises, the European Directive 2013/37/EU (2013) was implemented, amending the previously introduced legislation 2003/98/CE. It premiered the concept of Open data, as well as definitions for machine-readable formats – "documents structured in such a way that software applications can easily identify, recognize and extract specific data from it" and open format – "a file format that is platform-independent and made available to the public without any restriction that impedes the reuse of documents". Concomitantly, the scope of the initial legislation was broadened, by including documents pertaining to university libraries, as well as those belonging to cultural institutions such as museums, libraries and archives, that were previously expressly exempted from the scope of public sector information reuse norms.

The accelerated progress that marked the recent years in terms of digital technologies, particularly regarding machine learning, artificial intelligence, and the internet of things have determined the European legislator to amend and improve the specific regulations by introducing EU Directive 2019/1024 (2019) on Open data and the reuse of public sector information. It underscores the importance and contribution of public sector information to improving the internal market and developing new applications for consumers, considering that the intelligent use of data, including the use of artificial intelligence applications can have a transformative effect on all economic sectors.

EU Directive 2019/1024 further nuances the reuse of public sector documents, by recognizing that Open data initiatives not only bring added value to its final beneficiaries, to its re-users and the society as a whole but also aides the public entities producing and publishing it, through promoting transparency and accountability and through further improving the quality of information managed and published, using the feedback received from stakeholders.

Recognizing the importance of harnessing the entire potential of public sector data, EU member states are encouraged to promote the creation of databases using the basic principle "open by design and by default" in all areas subject to Open data policies. Furthermore, the Directive compels member states to make all existing documents reusable unless national rules restrict access. Moreover, data stemming from research activities, that was previously exempted from publication becomes subject to Open data regulations for commercial or non-commercial purposes, provided that the research benefited from public funding, under the reserve of protecting intellectual property, confidentiality and personal data. In addition, member states are encouraged to ensure long-term data access by introducing adequate information preservation policies.

Beyond acting as a platform for member states to harmonize their national legislation, the 2019 EU Open data Directive aims to facilitate the creation of informational products based on public sector documents, ensuring their effective and borderless use by private entities, in particular SMEs, in informational products and services, and on the other hand, by EU citizens, promoting communication and free information dissemination. To reach this goal, the Commission must facilitate cooperation between member states and further support the design, testing and implementation of interoperable electronic interfaces to ensure the delivery of efficient and secure public services.

3. Research methodology

The first research dimension, the generalization degree of Open data practices in EU member states and the SAIs' footprint within the national Open data portals, firstly entailed a round-up of EU member states' Open data portals. Subsequently, by recourse to the investigation of these portals, we collected and centralized data referring to the number of public organizations registered as Open data suppliers, the total number of databases published and also the number of economic, financial or

accounting–related databases. Likewise, we conducted searches among the enrolled organizations and, where the supreme audit institution was identified among them, we collected information regarding its Open data practices, respectively SAI's activity intensity (assessed by the number of databases published and the last publication's date), the specific content of published data and the data formats used for this purpose. To mitigate the error risk in identifying SAIs among the enrolled entities in the national Open data portals, we employed corroborative search techniques, respectively searching for SAI's full name in its official language, its roots, the keyword "audit" and where the portal allowed, we conducted exhaustive searches among the enrolled entities.

The second research dimension, respectively analyzing the dissemination degree for documents created and managed by the EU SAIs through their official websites also constitutes a quantitative research. The documents targeted by our investigative approach refer to operational planning, audit reporting, aggregated reporting and follow-up on recommendations. In this regard, we firstly identified 6 specific Open data criteria ("open data" keywords, annual activity program, audit reports, periodic activity reports, follow-up on recommendations, long-term data availability). By analyzing the official websites of the 28 European Union SAIs, for each information category identified, we scored 1. The basis for our research were the English-version websites and, where these did not offer relevant information, we used the native language website versions, by recourse to automatic content translation.

In order to assess the SAIs' dissemination degree for Open data, we employed the disclosure index (information publication index), by comparing information published to the total potential disclosure.

Mathematically, the disclosure index (Matiș *et al*, 2014, p.20) is calculated with the following formula:

$$DI = \frac{\sum_{i=1}^{m} di}{n}$$

where:
DI = disclosure index;
di = 1 if the information exists and is relevant, 0 otherwise;
m = number of disclosed elements;
n = number of potential elements to be disclosed.

As a result, the disclosure index scores between 0 and 1. Practically, as the disclosure index is closer to 1, the respective SAI discloses more relevant information on its official website.

Our investigative approach is focused on two research questions: to what degree do EU SAIs provide useful and comparable information to stakeholders, as a part of the Open data informational network? Are EU SAIs active actors in promoting an "open by design and by default" culture?

4. Findings

Research results indicate a general preoccupation from the part of the EU member states to create the national Open data infrastructure, showing that all 27 member states have developed governmental Open data portals. Out of the 27 national Open data portals, 5 are exclusively available in their national language (Austria, Denmark, Germany, Italy and Hungary), while the rest also employ an English version, although generally limited to the main website sections.

The EU27 national Open data portals host an average of 507 public institutions, most in France (2,860), Estonia (2,200) and Austria (1,290), while the national Open data portals with the least institutional adherence belong to Malta (3), Greece (24), Denmark (35), the Czech Republic (45), Latvia (86) and Slovakia (91). Romania ranks 15th among EU member states, hosting 108 public entities enrolled in its Open data portal. The enrollment degree for EU national Open data portals is mapped in Figure 1.
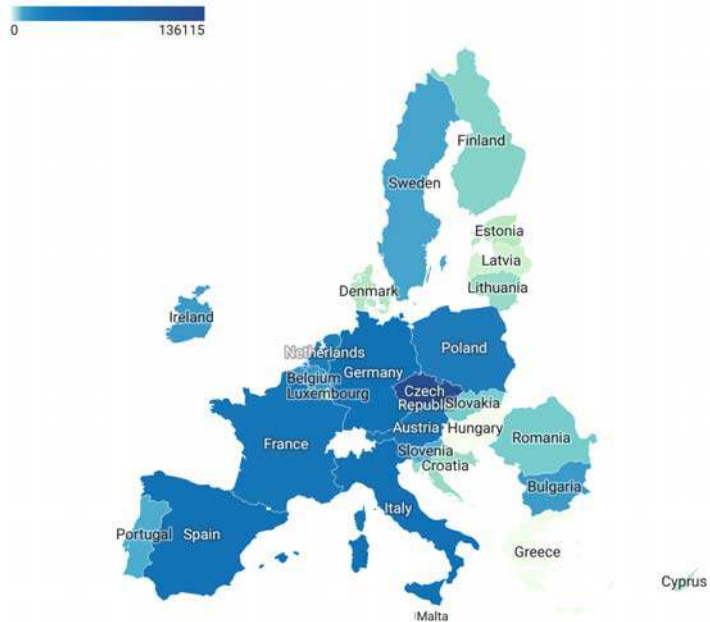
Figure no. 1. Enrollment degree for EU national Open data portals
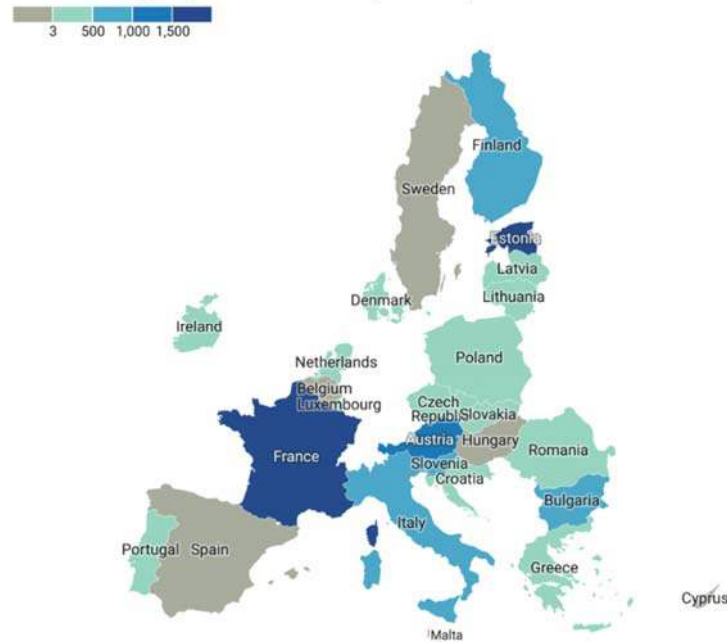
Source: own projection based on data collected from EU national Open data portals

From the perspective of Open data publishing intensity across the national frameworks, the 27 portals researched host an average of 17,617 datasets, the most active countries being the Czech Republic (136,115), Germany (48,353), Spain (47,743), Italy (45,980), France (37,253) and Austria (34,739). From an opposite perspective, the national Open data portals managed by Greece (47), Malta (205), Latvia (487), Estonia (789) and Denmark (846) have the least intense publication intensity. As before, the Romanian Open data portal ranks at the middle of the pack, with a total of 2,346 datasets published. The publishing intensity of public bodies enrolled in the national Open data portals is mapped in Figure 2.

Figure no. 2. Publishing intensity on EU national Open data portals

Source: own projection based on data collected from EU national Open data portals

From the perspective of the enrollment of SAIs in the national Open data portals, our research results indicate that only 10 national supreme audit institutions hailing from EU members states (Austria, Bulgaria, Cyprus, Estonia, Finland, France, Czech Republic, Slovakia, Slovenia and the Netherlands) currently enjoy membership. Out of the 10, the SAIs belonging to Finland and the Netherlands are inactive members of their national Open data portal, without any datasets published.

The main coordinates of SAI activity within the national Open data portals are presented in Table 1.

The results obtained illustrate a reduced SAI interest to provide data in an open manner within the dedicated national infrastructure. Except for the French SAI, which boasts 188 published datasets, the other 9 supreme audit institutions enrolled in the national Open data portals have only published between 0 and 12 datasets since their enrollment.

Furthermore, by analyzing the adoption of the "open by design and by default" philosophy, our research illustrates a reduced SAI preoccupation to provide the public with updated information. Thus, only 2 supreme audit institutions (Austria and France) have published data within the current year, while SAI Estonia published its latest dataset in 2020 and the SAIs belonging to Bulgaria, Cyprus, Slovakia and Slovenia are inactive for the last 2 or 3 years. Conversely, only the Czech supreme audit institution dynamically publishes data, allowing stakeholders to access permanently updated information.

Table no. 1. The main coordinates of SAI activity within the national Open data portals

No.	The supreme audit institution	SAI published datasets	Latest SAI publication	Nature of data published	Data formats
1	SAI Austria	8	11.03.2021	- audited parties - political parties' transactions	csv, pdf, xlsx
2	SAI Bulgaria	5	24.09.2019	- register of public dignitaries - electoral financial data	csv
3	SAI Cyprus	3	21.02.2018	- audit reports/special reports	csv, pdf, html
4	SAI Czech Republic	12	dynamic	- audited parties - petition statistics - public property and public procurement data collected during audits	csv, xlsx
5	SAI Estonia	1	10.12.2020	audit reports starting with 1990 to date	html
6	SAI Finland	0	N/A	N/A	N/A
7	SAI France	188	06.04.2021	- audit reports - audit-related statistical data	csv, xlsx, xml, txt
8	SAI the Netherlands	0	N/A	N/A	N/A
9	SAI Slovakia	10	31.10.2019	- audited parties - audit program - list of identified deficiencies - SAI specific information – contracts, invoices etc.	xlsx, html
10	SAI Slovenia	9	13.12.2018	- audit reports - public auditor lists - lists of identified deficiencies	pdf, html
11	European Court of Auditors	9	01.11.2019	annual reports	xml

Source: own projection based on data collected from EU national Open data portals

The mapping of EU SAIs' enrollment in the national Open data portals, as well as their publishing intensity is presented in Figure 3.

Figure no. 3. SAI portal enrollment and Open data publishing intensity
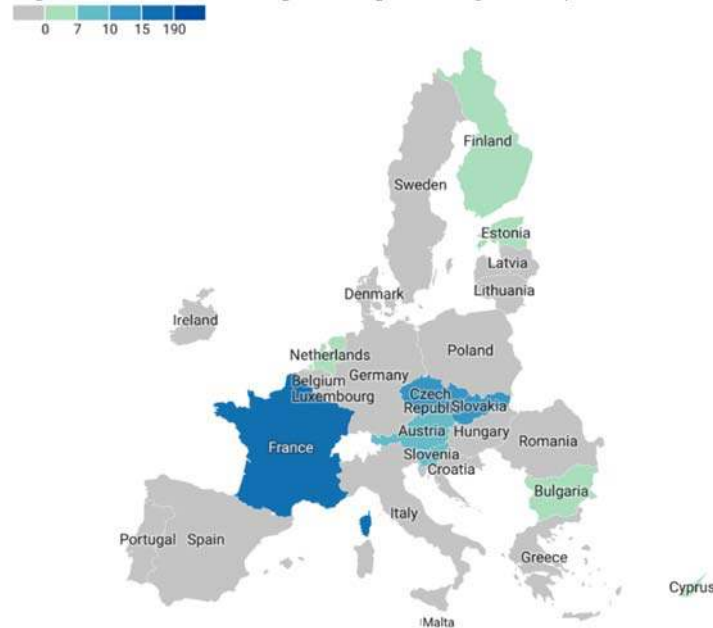
Source: own projection based on data collected from EU national Open data portals

By reference to the types of data published by EU member state's supreme audit institutions, our research emphasizes the fact that the majority of enrolled SAIs publish periodic activity reports. Additionally, SAI Bulgaria publishes information regarding public dignitaries and financial data on the electoral process. The Czech SAI publishes data on the audited entities, internal statistics on petitions and, additionally, is the only SAI to offer data collected from public entities during audits, respectively data on public property and public procurements. SAI Slovakia in turn publishes the list of audited entities, its annual audit program, the list of identified deficiencies, as well as a series of internal administrative information – commercial contracts, invoices etc. Concomitantly, SAI Slovenia publishes the list of public external auditors and the registry of identified deficiencies.

Regarding the data formats used to publish Open data, our research highlights that, in most cases, supreme audit institutions employ several formats for their published data, respectively: csv (comma-separated values) in the case of SAI Austria, Bulgaria, Cyprus, France and the Czech Republic, pdf (portable document format) in the case of SAI Austria, Cyprus and Slovenia, xlsx (Microsoft Excel Open XML), as is the case with SAI Austria, France, the Czech Republic and Slovakia or html (hypertext markup language), employed by SAI Cyprus, Estonia, Slovakia and Slovenia. Correlatively, our research highlights some of the less utilized formats used by SAI to publish Open data, as is the case with xml (extensible markup language) and txt (text file), both used by the French SAI. On average, supreme audit institutions employ 2 data formats when publishing Open data, while SAI Bulgaria only uses csv format and, oppositely, SAI France employs 4 data formats – csv, xlsx, xml and txt.

For our second research dimension, the values for the Open data disclosure index obtained by investigating the content of EU's supreme audit institutions' official websites, are presented in Figure 4.

Research results illustrate significant disparities between the European supreme audit institutions regarding their Open data disclosure practices when using their official websites.

The Open data disclosure index for the researched supreme audit institutions varies between 0.5 and 1. By reference to the results obtained using the selected criteria, SAI Belgium, Bulgaria, Cyprus, France, Germany, Greece, Ireland and Luxembourg disclose the least Open data, while, conversely, the Estonian and Lithuanian supreme audit institutions disclose all the Open data categories envisaged by our research.

Figure no. 4. EU SAIs' Open data disclosure index
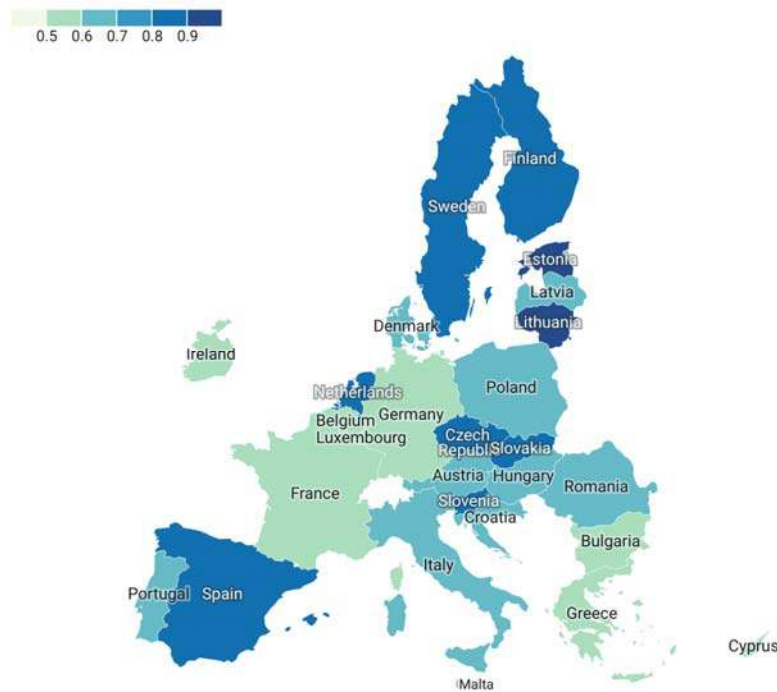
Source: own projection

The average SAI Open data disclosure index for the selected sample is 0.6845, which suggests a relatively high Open data disclosure index for the data managed by EU's supreme audit institutions and published on their official web pages.

However, research results indicate that only 36% of the analyzed supreme audit institutions adequately present relevant information regarding the "Open data" syntagma (SAI Denmark, Estonia, Finland, Italy, Latvia, Lithuania, the Czech Republic, Slovakia, Spain and the Netherlands). For the rest of the analyzed websites, the search results do not offer relevant content or such content is not found at all. By exception, the websites of SAI Belgium, Cyprus, Greece and Romania do not currently employ internal search engines.

From the operational planning standpoint, our research indicates that only 16 EU supreme audit institutions present, through their official websites, the annual audit program/plan or relevant information in this regard (the European Court of Auditors, and SAI Croatia, Estonia, Finland, Greece, Latvia, Lithuania, Poland, Portugal, the Czech Republic, Romania, Slovakia, Slovenia, Spain, Sweden and Hungary).

Furthermore, our research results highlight that the majority of EU supreme audit institutions' websites provide the interested parties information regarding audit reports and periodic activity reports and also offer the possibility of long-term access, some using wider timespans (for example SAI Belgium, Cyprus, Czech Republic and Slovenia) or narrower ones (for example SAI Croatia). Oftentimes, these documents are published on the official SAIs' websites using the pdf format and rarely in Microsoft word or html format.

It is worth mentioning the diversity of SAI practices regarding the disclosure of information regarding SAI audit reports. Most frequently, these reports are available in a chronological order. Additionally, some SAI websites offer their visitors the possibility of conducting more advanced searches based on metadata pertaining to each document, such as the auditee's activity domain or category, the audit type conducted or the SAI branch in charge of the audit process. Furthermore, SAI practices oscillate from the publication of the complete audit report (either individual reports or aggregated based on their audit theme) or of synthetic information or summarized reports, usually presenting the main conclusions and recommendations, written in the official state language and sometimes in other international language.

5. Conclusions

The research conducted highlights different maturity degrees of SAI Open data policies employed through the dedicated national Open data portals, while also illustrating the diversity in the Open data typology, format and content that supreme audit institutions offer to the public using their official websites.

The research results allow us to conclude on the incipient stage of EU's supreme audit institutions' in adopting an "open by design and by default" approach to publishing Open data, since only 10 SAIs are enrolled in the national Open data portals and 2 of them have never published a single dataset.

Concerning the SAIs' footprint within the national Open data portals, we can conclude on their marginal contribution, varying from 0.009% (SAI Czech Republic) to 0.505% (SAI France), with an average of 0.159% of the total Open datasets published. Quantitatively, only SAI France has a significant footprint within the national Open data portal, with 188 published datasets, while the other 9 enrolled SAIs have only published between 0 and 12 datasets across their entire Open data presence. Our conclusion is further supported by the lack of Open data publishing consistency, since only 3 European supreme audit institutions (Austria, France and Estonia) have published data in the last 2 years, which denote a lack of preoccupation for adopting an open conduct towards stakeholders. Our research results underpin previous research (Concilio *et al*, 2021, p.1) concluding that in general, the quality on published datasets sits below the benchmark needed for added value creation, and that further public incentivization and targeted dataset creation will be needed for Open data to reach its enormous potential.

Correlatively, the informational palette that SAIs offer their interested parties is heterogeneous, consisting of synthetic or otherwise already publicly available information, such as annual activity reports, to data regarding the SAIs' administrative activity (contracts, invoices) or, in some cases, data collected in their audit activities.

When referring to the EU's supreme audit institutions' Open data conduct using their official websites, the research allowed us to conclude on a wide range of maturity levels regarding the typology, format and content of published Open data, as well as the ease of access.

Our research highlights a reduced EU SAI interest to disclose Open data regarding the follow-up on the implementation status of their recommendations, with only 7 European supreme audit institutions offering their stakeholders through the official websites, data or documents relevant in this regard (SAI Austria, Estonia, Lithuania, Malta, Slovenia, Sweden and the Netherlands).

Furthermore, our research allowed us to conclude that, in most cases, the English version of the SAIs' websites differs significantly from the national language version. From this perspective, our research results converge with those previously conducted (Trincu-Drăguşin *et al,* 2021, p.14), illustrating that EU supreme audit institutions generally offer synthetic and often outdated information on their English version websites compared to the national language ones, since most SAI stakeholders are residents and the national language website is more relevant to them.

We consider that our investigative demarche on European supreme audit institutions contributes with nuances not found in previous research regarding the public external audit field, while its results are useful and of interest to the professional and the general socio-economic environment, preoccupied with this activity (stakeholders, decision-makers, regulatory bodies).

The main research limitations refer to certain constraints regarding the approach of public external audit and supreme audit institutions in the relevant literature, to the heterogeneity of SAI reports and official websites (presenting different information, on different timespans and in diverse formats), to a series of linguistic constraints given the fact that some SAIs present more detailed and exhaustive information only in their official national language.

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