AI governance and ethics in public procurement: Bridging the gap between theory and practice

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Abstract—As Artificial Intelligence (AI) systems have become increasingly widespread, research in AI ethics has sparked. When developing the systems, many tools and methods are available for implementing AI ethics in practice. In addition, the research in AI governance is starting to activate, and some models for AI governance have already been introduced. Simultaneously, the role of the information systems (IS) procurement function has developed from its traditional operative role to a more strategic position, as the investments in IT have been on a constant rise. Success in procurement is found to be critical regarding the success of the development and implementation of information systems. But how are the existing tools and methods in AI ethics related to procurement practices? And how is procurement positioned in the proposed AI governance frameworks? This study answers these questions by setting up a research framework based on AI governance models and analyzing existing tools and methods in AI ethics.

Keywords— AI ethics, AI governance, IS procurement, method, tool

I. INTRODUCTION

Artificial Intelligence as a technology and a phenomenon has become increasingly common in our everyday life. As the technological capabilities of AI evolve, various operators seek to seize the opportunity, and AI's practical applications keep expanding.

In this emerging context, the ethics of AI has become a hot topic in multidisciplinary research. In the last three years, the research has developed from outlining common ethical principles of AI to developing practical methods and tools for implementing ethics in AI systems development [1]. In addition to the academic domain, many industrial, government, and non-profit organizations have created their own ethical guidelines to control the development of AI systems [2].

However, as current research has pointed out, there is, in reality, only a quantum of control on the practical use of the new technology in terms of ethics [3], [4]. Even if various guidelines and practical tools have been introduced [3], [5], [6], it is far from evident that these are utilized and have the intended impact on the development of AI systems.

In the public sector, the development of information systems is dependent on the procurement process that inevitably precedes the development process. The procurement process is highly regulated, and the public sector organizations must follow this regulation in practically all information systems procurements. [7], [8]

The notion that AI ethics research has not proven its capabilities in influencing AI development in practice [3], [4] turns the attention to the procurement practices. To make the AI systems ethically sustainable by default, supporting the procurement practices with AI ethics tools and methods could be one solution to control the development of the procured systems. When the requirements (both functional and non-functional) for the AI systems are set during the procurement process, there is no option but to follow these when designing and developing the system [9]. Regarding AI ethics, the procurement process could serve as a natural platform for practical methods and tools to be implemented to ensure the ethical sustainability of the procured systems, thus solving the problem of dismissing the guidelines in the development phase.

The rapidly expanding AI research has only recently reached the stage where theoretical observations are combined with actual practices [1]. Public procurements as a practical context have not been among the first domains of pragmatic approach in researching this emerging technology. However, considering both the importance of the public sector as an IS procurer [10] (e.g., in Finland, the public sector IT software and service procurements in 2021 were valued at almost 1100 M€ in total [11]) and the potential relevance of the procurement process as an existing platform for tangible tools for implementing AI ethics, this is an important area of research.

This study aims to understand how the IS procurement practices are positioned in current AI ethics governance models and how the existing tools and methods for implementing ethics in AI systems are linked to procurement practices. In this article, we have positioned the IS procurement practices on current AI governance structures. Using this as a theoretical framework, we have analyzed existing tools and methods for implementing AI ethics using the content analysis method.

The rest of the paper is organized as follows: existing theories and previous work are introduced in chapter 2. The research questions and methods of this study are presented in chapter 3. The findings of this study are presented in chapter 4, and the research is concluded in chapter 5. Suggestions and guidance for future research are given in chapter 6.

II. EXISTING THEORIES AND PREVIOUS WORK

The research on AI ethics has been rapidly growing. Its focus has recently advanced from defining common ethical principles to developing methods and tools for practical adoption of these principles [1]. No matter the advancement, the research in AI ethics has also been criticized for being too focused on the principles rather than trying comprehensively to understand the phenomena. For example, Waelen [12] has suggested that AI ethics should be seen as a critical theory, broadening the scope to a more philosophical context and explaining the background of current principles.

However, the principle-based view has its advantages and is considered a critical phase of the evolution of AI governance [13]. It helps the various stakeholders to seek a common understanding of the basic principles of this emergent theme and develop standard methods and tools to consider when designing and developing concrete AI systems in practice. Since AI ethics has got into the stage of current popularity, many principles have been proposed and discussed, and many of these have also become widely agreed-upon [2], [14], [15].

For example, in 2019, Jobin et al. have listed a set of five key principles in ethical AI: 1) transparency, 2) justice and fairness, 3) non-maleficence, 4) responsibility, and 5) privacy [15]. These principles have been recognized in current research and guide the study of practical tools and methods considering the development [16] and governance [17] of AI systems.

These principles have been derived from analyzing publicly available guidelines created by various organizations in various industries. However, the principles and guidelines are not sufficient in a way that these could be used as off-the-shelf instruments to develop ethical AI systems. As Vakkuri et al. [3] have pointed out, organizations need to make these guidelines more practical for concrete use. And even if there would be more tangible methods and tools promoted, it is not apparent that these would be used in practice [18], [19].

The finding that the existing guidelines and tools seem to provide only a quantum of control to the development of AI systems in terms of ethics forces us to focus on the IS procurement process that could help us ensure the implementation of ethical AI. In this paper, the term procurement is used to refer to *a process of acquiring goods or services for government or public organization*, derived from the definitions commonly used in research [8], [20]. According to the definition, the term refers to a public domain exclusively.

Currently, it is more common in both the public and private sectors to acquire information systems instead of developing information systems internally [7], [21]. Compared to the private sector, the public sector procurement practices regarding information systems are highly regulated [7], [20], [22], [23]. In EU (European Union) and EEA (European Economic Area) countries, the public sector organizations need to play by the rules of not only the acts and directives on the EU level but also the national level legislation. According to Tadelis [24], similar legislations apply also in other continents.

Based on the anticipated value of the procurement, there are both national and EU level thresholds that need to be followed. For example, in Finland, the national value threshold for information system procurements is 60 000 € [25], and the EU level value threshold is 140 000 € for government organizations and 215 000 € for other organizations in the public sector [26].

If the anticipated value of the procurement exceeds the EU level value threshold, the procuring organization must follow the standard procurement procedures set by EU [27]. If the value is anticipated to be under these limits, the organization can choose a proper procedure from the EU guidelines or develop an appropriate method of its own. However, there is expected to be national-level guidance on those procurements that exceed the national value thresholds [9].

These thresholds around anticipated value determine that practically all information system procurements based on AI technologies are under the influence of regulation. Imposed by the regulation, all the requirements set in the procurement process are binding when developing or implementing the procured system. The regulation sets procurement practices in a position where these can either solve or cause issues for the development phase of the procured systems. As Guarneri and Gomes [23] put it, "problems related to poorly managed purchasing process contributes to the non-delivery of value in public services."

The role of procurement has been changing. Regarding IS procurement, Ylinen and Pekkola [7] conclude that in addition to acquiring and implementing the system, procurement is also about considering various stakeholders and different process changes during the lifecycle of an information system. In their literature review related to the strategic role of public procurement, Guarneri and Gomes [23] state that in times of high outsourcing rates and sourcing volumes, the procurement function has gained an increasingly strategic role in organizations.

Regarding AI governance, the research is in a nascent stage. Some models and structures for AI governance have been proposed [5], [28], [29], but none of these are empirically tested. While all of these can be considered potential, we have selected Shneiderman's governance structure for human-centered AI [5] as the research framework of this study. We have presented this structure in relation to other suggested AI governance models more specifically in chapter *III. B. Research Model*.

III. METHODS

A. Presented study, Research question and Hypothesis

The following research question will guide this study: *How are existing methods and tools for implementing ethical AI positioned considering IS procurement practices?*

We hypothesize that the existing methods and tools for implementing ethical AI linked to procurement are scarce, and the theme is undermined in current research. The research hypothesis is based on the notion that the research in public IS procurements generally is limited [21], and the current state of AI ethics research has not until recently been focused on practical applications [1].

This theme of AI ethics in IS procurement is considered necessary since the previous research has noted that high-level guidelines are not commonly used in the development of information systems [18], [19] and the practical implementation of ethically aligned AI systems needs tangible tools and methods to follow [15]. In this context, the IS procurement practices can be considered a potential platform for the methods and tools to be applied to ensure the development of ethically aligned AI systems with the support of the regulative environment that binds the development practices to the requirements set in the procurement phase [7].

B. Research Model

Shneiderman has introduced a three-level governance structure for human-centered AI [5], which is used as a theoretical framework for this study. The framework is presented in Fig. 1.
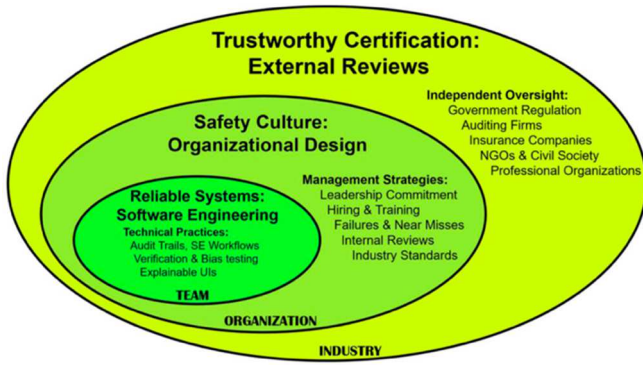
Fig. 1. Three-level governance structure presented by Shneiderman [5]

As described in Fig. 1, the model is constructed on three levels: i) team-level technical practices, ii) organizational level strategies, and iii) industry-level oversight. By the term "human-centered AI," Shneiderman refers to research practices that focus "on amplifying, augmenting, and enhancing human performance in ways that make systems reliable, safe, and trustworthy." According to this definition, the governance model can be considered applicable also in the general use of governance of AI ethics.

Also, Gasser et al. [28] have presented a "layered model for AI governance," which similarly has three layers: i) technical layer, ii) ethical layer, and iii) social and legal layer [28]. However, instead of the organizational approach used in Shneiderman's model, the layers in this model are conceptual and more theoretical.

In their study on the governance of AI, Seppälä et al. [17] have identified four dimensions of ethical AI practices in organizations: i) governance, ii) AI design and development, iii) competence and knowledge development, and iv) stakeholder communication. By the governance practices, they refer to "the set of administrative decisions and practices organizations use to address ethical concerns regarding the deployment, development, and use of AI systems" [17].

It is noteworthy that there is no mention of the procurement practices in any of the AI governance models or research reviewed for this study [5], [17], [28]–[30]. However, from Shneiderman's organizational approach, it is justified to place procurement practices in the framework's middle layer (organizational level), seeing the function as strategical in accordance with the current research [23]. This is supported by the categorization of dimensions of ethical AI practices by Seppälä et al. [17], as the governance level definition fits both the nature of procurement practices and the description of the organizational level in the governance structure.

As the introduced governance structure is built from an organizational perspective, the existing theories and previous work indicate a need for tangible methods and tools [3] at every level of this structure. For example, the industry needs to apply specific tools to enable auditing against the AI ethics guidelines, software teams need concrete methods to implement ethics into the AI system, and organizations need methods and tools to ensure AI system procurements are followed through with an adequate focus on AI ethics.

C. Collected Data and Applied Research Methods

In this study, we conducted a secondary data analysis of data collected by Morley et al. [15]. For their research, they have completed a thorough search of publicly available tools, methods, and principles in AI ethics. They have used both scientific databases (Scopus, arXiv, and PhilPapers) and a general internet search engine (Google Search) for the search conducted in 2019. From more than 1000 initial results, they have filtered 106 sources for the final analysis of their study [15]. For clarity, we name this data set "Morley data."

Using secondary data analysis is considered a practical method when building an initial understanding of the phenomenon under the study [31], as is the case in this study combining AI ethics, AI governance, and IS procurement practices. We approached the Morley data using content analysis as a research method [32].

Analyzing the Morley data, we classified the 106 sources into six categories by document type and defined the categories as presented in Table 1. This categorization revealed that of the 106 sources of the Morley data, there were only 18 documents that could be classified as a "tool" or "method," which are in the interest of this study. The rest of the documents were classified into other defined categories, which were "technical implementation model," "framework," "principle," and "not valid." A single document could be listed in multiple categories (e.g., both framework and principle) if it fulfilled the definitions accordingly.

Since both the research and practicalities in AI ethics have developed further and there presumably are new sources available from recent years, we decided to conduct a supplementary data search. The supplementary search was conducted in Google Scholar and Google Search using a search string *"ai ethics" AND tool OR method*. In accordance with the interest of this study, the objective of the supplementary data search was to focus primarily on methods and tools, supplementing the filtered Morley data.

The results were sorted by relevance, and in both cases, 100 first results were similarly analyzed with the content analysis method [32]. Only the sources that met the definition of a tool or method were included in the supplementary data. The search was conducted to include only records from 2019 to the date, thus governing the considered deprivation of the Morley data.

After the supplementary data search, we formed the final data set from both the filtered Morley data (18 sources) and the supplementary data (14 sources). All these data sources were classified either as tools or methods according to the category definitions presented in Table 1. For clarity, we call these 32 documents "Final data."

IV. FINDINGS

A. Analysis of collected data

Using secondary data can be considered inexpensive and faster than an independent data collection process, but there are also issues related to the data quality and control [31]. Indeed, these issues were realized in this study at the first steps of analyzing the Morley data.

Regarding the Morley data, the focus of the study of Morley et al. was on "publicly available AI ethics tools, methods and research" [15]. Our first step in the data analysis was to classify the sources according to their type. Still, during the process, we noticed that the use of terms like "model," "method," "tool," "framework," and "principle"

was not established, and the terms were used across each other. Thus, it became current to define the critical terminology for further analysis.

We recognized and defined six types of documents that became the main categories for further analysis. The categorization is based on a content analysis [32] that we conducted for the original Morley data. The categories, their definitions, and the number of sources included in each category are presented in Table 1.

TABLE I. MORLEY DATA: CATEGORIES, DEFINITIONS, AND NUMBER OF INDEPENDENT DOCUMENTS

Document type	Definition	Number of sources
Technical implementation model	Technical model (e.g., algorithms) for implementing specific ethical principles (e.g., fairness) into an AI system.	36
Tool	Tangible instrument (e.g., cards) for ensuring the implementation of ethical principles into an AI system.	12
Method	Particular set of actions (e.g., double diamond) for ensuring a common approach to a challenge.	18
Framework	Comprehensive model for ensuring a common approach for governance of a certain subject (e.g., implementing AI ethics).	5
Principle	Guiding "rule" (e.g., fairness) that implicates the ultimate intent and guides all the actions in the subject area (e.g., AI ethics).	2
Not valid	General research papers and websites that could not be classified to the other five categories. Data sources that were not considered to be on the scope of the study or were not found.	50

The document categorization is hierarchical by nature on a scale from detailed to more general. This type of hierarchical document categorization is similar to many others in the field [33].

If the document met the definition, it was added to multiple categories. For example, it was common that the documents classified as tools were also classified as methods. When a document was classified in multiple categories, the categories were usually hierarchically adjacent.

The number of technical implementation models in the Morley data was unexpectedly high. All the documents included in this category were algorithmic models typically designed to solve one particular ethical issue on the technical level. Comparing this to higher-level categories, it appears that the technical-level dilemmas have ignited the ethical considerations of AI systems.

However, since the interest of this study is primarily on the tools and methods, we continued the further analysis with only the documents identified in these two categories. Regarding the Morley data, there were only 18 documents identified as tools or methods. This filtered Morley data was enriched with 14 additional documents retrieved via supplementary data search.

The Final data was formed from 32 sources, all classified as either tools or methods by their document type, in accordance with the interest of this study. However, many of these documents in the Final data were classified into multiple categories, and we decided to include this view in the analysis of the data. Of the total 32 documents of the Final data, 31 were classified as methods and 21 as tools. In addition, 13 of the documents were categorized as frameworks and two as principles. The Final data sources by categories are presented in Table 2.

TABLE II. FINAL DATA: INDIVIDUAL DATA SOURCES BY CATEGORIES

	Tool	Method	Framework	Principle
Individual sources (ID 1–32)	1–4, 8–11, 14–17, 19, 22, 24, 25, 28–32	1, 2, 4–32	2, 13, 16, 17, 21, 22, 24–30	5, 24
Number of sources (sum)	21	31	13	2

In Table 3, we have further analyzed the documents by document types in their relation to the governance model presented in Fig. 1. As a single document might include multiple document types, it might also have various potential user groups and thus be positioned at various levels (team, organization, or industry) of the governance structure.

Both the governance model and the categories of document types are hierarchical by nature, and these hierarchies seem to have a connection. While the tools and methods are produced mainly for the use of teams and organizations, the frameworks and principles are mostly intended for the benefit of organizations and industries. The higher level in the governance structure the document is intended for, the more abstract it is.

TABLE III. FINAL DATA: DOCUMENT TYPES, POSITION IN GOVERNANCE STRUCTURE, AND LINKS TO PROCUREMENT

Type	Number of sources	Position in the governance structure			Link to procurement by source ID
		Team	Organization	Industry	
Tool	21	17	7	–	1, 2, 22
Method	31	24	19	–	1, 2, 13, 22
Framework	13	–	12	5	2, 13, 22
Principles	2	–	1	1	–

There were only four individual documents that had a direct link to procurement practices. As seen in Table 3, all these documents were classified into more than just one category, bringing out the comprehensive nature of these documents. However, as hypothesized, the number of sources linked to procurement practices is remarkably low.

Analyzing the producers of the documents in the Final data by document types, we found that researchers and other academic organizations have produced most of the documents, especially methods and tools. Non-profit organizations have the same kind of producer profile that focuses on tools and methods, but with a smaller number of documents produced. Both private and public sectors are not as active producers as academics and non-profits. These organizations also have a different producer profile focusing more on higher abstraction-level documents.

The finding of only a few procurement-related methods and tools combined with the acknowledgment that researchers produce most of the tangible methods and tools in the focal context highlights the research hypothesis that procurement has gone under the radar of current research in AI ethics. Only one of the four procurement-related documents is produced by the academic field.
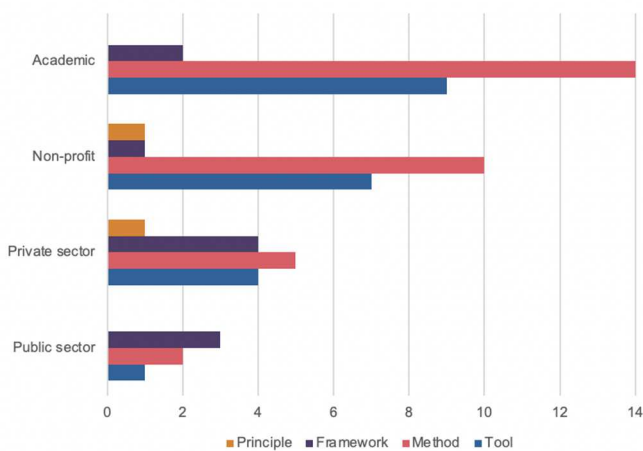

Fig. 2. Final data: Number of document types by producer

However, as visualizing the potential user group for each document type in Fig. 3 points out, 39 document types (22 individual data sources) are potentially designed for use at the organizational level of the governance structure. As we have positioned procurement practices at the organizational level of the structure, we consider it highly potential that the principles, frameworks, methods, and tools positioned at the same level could be further developed to include the needs of procurement practices.
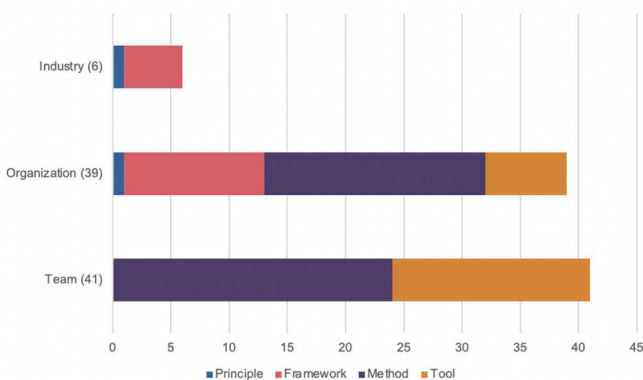

Fig. 3. Final data: Position in the governance structure by document type

B. Discussion

In the first steps of our content analysis, we defined the document types, using these as categories when classifying the data. According to our research, the use of these terms has not been established in the field of AI ethics research. This hierarchical categorization as a contribution can further help make the use of these critical terms more established in the field.

The findings support the research hypothesis that the tangible tools and methods designed for IS procurement are scarce. Looking at the Morley data, we see that most of the sources were either general research documents without tangible contributions or technical implementation models with an algorithm-based view to solve a specific issue on a technical level (Table 1). Of the Morley data, only 18 documents were categorized either as methods or tools. This finding of a low number of tangible tools and methods for implementing AI ethics supports the findings in the current research [16].

When analyzing the Final data, we found that only four documents categorized as tools or methods were related to IS procurement. This makes 12,5 % of the documents included in the Final data. The finding provides new information to the research since this is a new theme that has not been under the interest of the current research. Considering the critical role of IS procurement in the success of IS development and implementation [7], we consider this an alarming sign that needs to be acted upon.

The Final data indicates that even if the academic field is the leading producer of methods and tools in AI ethics, it has practically dismissed the procurement context with only one independent document linked to procurement practices. This new information highlights the issue of dismissing IS procurement in research on AI ethics even more.

As a theoretical background, we have used Shneiderman's governance structure for human-centered AI [5]. We positioned the IS procurement practices in the middle layer of the structure, seeing these as part of organizational management strategies in accordance with procurement's strategic role stated in the recent studies [23], [24]. Analyzing the final data based on the governance structure (Table 3), we found a solid hierarchical connection. The higher level in the organizational structure a document is intended for, the more abstract the document is. As both the categorization of document types and the governance structure are hierarchical by nature, it can be seen that most of the tools and methods are intended for the team level, which can be considered an operational level in organizations. The higher level we are on the governance structure, the less tangible the documents are. As the current research has pointed out the need for practical tools and methods for the development of AI systems [16], the findings of this study suggest a need for tangible practices also in other levels of the governance of AI systems.

However, we argue that the hierarchical approach also conceals a positive message. Based on the found hierarchical connection, we can state that the documents positioned at each level of the governance structure have a similar intended target group, at least to some extent. Indeed, we might not need entirely new methods and tools targeted strictly for IS procurement practitioners' use. Instead, we suggest further analyzing the methods and tools targeted on the

organizational level of the governance structure to consider if these could be developed further to include the needs of IS procurement practices.

V. Conclusions

A. Limitations

We recognize limitations in the collected data since the main data source of the study was secondary data. The Morley data was collected in 2019 when the research of AI ethics was only igniting compared to the current state, and this is recognized as the main limitation of the data. We also encountered issues in data quality and control since the secondary data included many documents that were not in the focus of our study. However, by conducting a supplementary data search we were able to mitigate the encountered data limitations reasonably.

There are also limitations in the AI governance structures used as a theoretical background for this study. Since the research in AI governance is in a nascent state, the models have not been empirically tested. As procurement as an organizational practice was not included in the research, we suggest there is a need for further development and empirical research of the suggested models.

B. Concluding remarks

IS acquiring and procurement practices are critical to the success of the development and implementation of an information system [7]. Because of the legislation, the importance of these practices in the public sector is especially highlighted [7], [22]. With the support of the legislation, procurement practices should be considered a potential key to the dilemmas encountered in developing these systems.

One of these dilemmas is the current state of implementing AI ethics in AI systems development. There is a need for tangible methods and tools for implementing AI ethics in IS development [16]. Despite the available tools, there is no guarantee that these would be used in practice [18], [19]. Because of its legislative nature, the procurement process could be considered a potential key to this challenge since the requirements set in the procurement process are binding when developing or implementing the procured system.

In this study, we have created an understanding of how the organizational procurement practices are positioned in current AI governance models and how the existing tools and methods for implementing ethical AI systems are linked to IS procurement practices. The findings create ground for future research on the subject.

In current research in AI governance, procurement is widely ignored. In this study, we have positioned IS procurement practices in a selected AI governance structure [5], and used this as a theoretical background. This is one of the important contributions of this study.

Using content analysis to analyze the data, we discovered the unestablished way of using the terms related to document types. We defined the terminology for principles, frameworks, methods, tools, and technical implementation models. This is another contribution to the research field, and we suggest that this could help establish the way to use these terms in the future.

Analyzing the current methods and tools in AI ethics, we discovered that only a tiny number of these currently recognize procurement. Most of the existing tools and methods are developed by the academic field, but we found only one independent data source related to procurement practices produced by academics. This finding supports our research hypothesis and highlights the need for future research to focus more on procurement practices.

When positioning the document types in the AI governance structure used as a theoretical background for this study, we found that a significant amount of the document types could be positioned at the organizational level of the structure, which is the same level where the procurement practices are set. We suggest that current organizational tools and methods for implementing AI ethics should be analyzed to develop further their potential, including procurement practices' needs.

This research contributes to AI governance, AI ethics, and IS procurement by creating a preliminary understanding of how and to what extent these currently independent fields of research are linked to each other.

VI. Future work

This study recognizes a need for future research in AI systems procurement practices from ethical and governmental points of view. We suggest that future research focus on empirical research to analyze the current state of AI systems procurement practices in the public sector. Also, we prompt future research in AI ethics and AI governance to include the procurement point of view, especially when developing practical solutions for the industries' needs. As stated in this study, the role of the public procurement process is critical when developing or implementing information systems to use in the public sector. Still, we should not forget the private acquiring practices either.

References

[1] D. Peters, K. Vold, D. Robinson, and R. A. Calvo, "Responsible AI—two frameworks for ethical design practice," IEEE Trans. Technol. Soc., vol. 1, no. 1, pp. 34–47, March 2020.

[2] A. Jobin, M. Ienca, and E. Vayena, "The global landscape of AI ethics guidelines," Nat. Mach. Intell., vol. 1, no. 9, pp. 389–399, September 2019.

[3] V. Vakkuri, K.-K. Kemell, J. Kultanen, and P. Abrahamsson, "The current state of industrial practice in artificial intelligence ethics," IEEE Softw., vol. 37, no. 4, pp. 50–57, July 2020.

[4] T. Hagendorff, "The ethics of AI ethics: an evaluation of guidelines," Minds Mach., vol. 30, no. 1, pp. 99–120, March 2020.

[5] B. Shneiderman, "Bridging the gap between ethics and practice: Guidelines for reliable, safe, and trustworthy human-centered AI systems," ACM Trans. Interact. Intell. Syst., vol. 10, no. 4, p. 1–31, October 2020.

[6] K. Sekiguchi and K. Hori, "Organic and dynamic tool for use with knowledge base of AI ethics for promoting engineers' practice of ethical AI design," AI Soc., vol. 35, no. 1, pp. 51–71, March 2020.

[7] M. Ylinen and S. Pekkola, "Searching for success in a successful IS acquisition," in Proceedings of the 51st Hawaii International Conference on System Sciences (HICSS-51), pp. 4793–4802, January 2018.

[8] A. Alanne, P. Hellsten, S. Pekkola, and I. Saarenpää, "Three positives make one negative: Public sector IS procurement," Electronic Government (EGOV 2015), pp. 321–333, August 2015.

[9] C. E. Moe, M. Newman, and M. K. Sein, "The public procurement of information systems: Dialectics in requirements specification," Eur. J. Inf. Syst., vol. 26, no. 2, pp. 143–163, March 2017.

[10] O. Vasilecas, A. Saulis, N. K. Paliulis, and R. S. Vaiciulis, "Managerial Aspects of the Evaluation of Information Systems Procurement," Organ. Vadyba Sist. Tyrim., no. 41, pp. 169–181, 2007.

[11] "Explore public spending - procurement categories." https://tutkihankintoja.fi/procurement-categories?endDate=31.12.2021&startDate=01.01.2021&lang=en (accessed March 07, 2022).

[12] R. Waelen, "Why AI ethics is a critical theory," Philos. Technol., vol. 35, no. 1, p. 9, February 2022.

[13] J. Morley, A. Elhalal, F. Garcia, L. Kinsey, J. Mökander, and L. Floridi, "Ethics as a service: A pragmatic operationalisation of AI ethics," Minds Mach., vol. 31, no. 2, pp. 239–256, June 2021.

[14] V. Vakkuri and K.-K. Kemell, "Implementing AI ethics in practice: An empirical evaluation of the RESOLVEDD strategy," in Software Business (ICSOB 2019), pp. 260–275, October 2019.

[15] J. Morley, L. Floridi, L. Kinsey, and A. Elhalal, "From what to how: An initial review of publicly available AI ethics tools, methods and research to translate principles into practices," Sci. Eng. Ethics, vol. 26, no. 4, pp. 2141–2168, August 2020.

[16] V. Vakkuri, K.-K. Kemell, M. Jantunen, E. Halme, and P. Abrahamsson, "ECCOLA — A method for implementing ethically aligned AI systems," J. Syst. Softw., vol. 182, p. 111067, December 2021.

[17] A. Seppälä, T. Birkstedt, and M. Mäntymäki, "From ethical AI principles to governed AI," ICIS 2021 Proc., pp. 2151, December 2021.

[18] E. Halme et al., "How to write ethical user stories? Impacts of the ECCOLA method," in Agile Processes in Software Engineering and Extreme Programming, pp. 36–52, June 2021.

[19] A. McNamara, J. Smith, and E. Murphy-Hill, "Does ACM's code of ethics change ethical decision making in software development?," Proceedings of the 2018 26th ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering, pp. 729–733, October 2018.

[20] C. E. Moe and T. Päivärinta, "Challenges in information systems procurement in the Norwegian public sector," Electronic Government (EGOV 2011), pp. 404–417, 2011.

[21] C. Moe, "Research on public procurement of information systems: The need for a process approach," Commun. Assoc. Inf. Syst., vol. 34, no. 1, June 2014.

[22] J. Stentoft Arlbjørn and P. Vagn Freytag, "Public procurement vs private purchasing: Is there any foundation for comparing and learning across the sectors?," Int. J. Public Sect. Manag., vol. 25, no. 3, pp. 203–220, January 2012.

[23] P. Guarnieri and R. C. Gomes, "Can public procurement be strategic? a future agenda proposition," J. Public Procure., vol. 19, no. 4, pp. 295–321, January 2019.

[24] S. Tadelis, "Public procurement design: Lessons from the private sector," Int. J. Ind. Organ., vol. 30, no. 3, pp. 297–302, 2012.

[25] "Act on Public Procurement and Concession Contracts 1397/2016." https://www.finlex.fi/en/laki/kaannokset/2016/en20161397?search%5Btype%5D=pika&search%5Bkieli%5D%5B0%5D=en&search%5Bpika%5D=1397%2F2016 (accessed March 07, 2022).

[26] "Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC", vol. 094, 2014.

[27] "Public Procurement - Guidance for practitioners." https://ec.europa.eu/regional_policy/en/information/publications/guidelines/2018/public-procurement-guidance-for-practitioners-2018 (accessed February 19, 2022).

[28] U. Gasser and V. A. F. Almeida, "A layered model for AI governance," IEEE Internet Comput., vol. 21, no. 6, pp. 58–62, November 2017.

[29] M. Mäntymäki, M. Minkkinen, T. Birkstedt, and M. Viljanen, "Defining organizational AI governance," AI Ethics, February 2022.

[30] B. W. Wirtz, J. C. Weyerer, and B. J. Sturm, "The dark sides of artificial intelligence: An integrated AI governance framework for public administration," Int. J. Public Adm., vol. 43, no. 9, pp. 818–829, July 2020.

[31] X. Wang, K. Conboy, and O. Cawley, "'Leagile' software development: An experience report analysis of the application of lean approaches in agile software development," J. Syst. Softw., vol. 85, no. 6, pp. 1287–1299, June 2012.

[32] L. Given, "The SAGE Encyclopedia of Qualitative Research Methods," 2455 Teller Road, Thousand Oaks California 91320 United States: SAGE Publications, Inc., 2008.

[33] "Ethics by Design and Ethics of Use Approaches for Artificial Intelligence." https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ethics-by-design-and-ethics-of-use-approaches-for-artificial-intelligence_he_en.pdf (accessed March 05, 2022).