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The Impact of the EU AI Act's Transparency Requirements on AI Innovation

Research Paper

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Abstract. The increasing capabilities of Artificial Intelligence (AI) raise concerns about the risks associated with the technology. The European Union, therefore, proposed the Artificial Intelligence Act aiming to mitigate the risks of AI by fostering their safety and transparency. However, there is controversial debate about its impact on AI innovation. While the AI Act aims to provide legal certainty guiding innovation, the criticism refers to exaggerated bureaucratic burden such as transparency requirements impeding innovation. Based on a multivocal literature review, we examine the impact of the AI Act's transparency requirements on patenting as a means for AI innovation. Our results indicate that the transparency requirements do not necessarily hinder the patentability of AI innovations. Instead, existing concerns primarily rely on uncertainties within key terms of the AI Act. Accordingly, we propose an improvement suggestion focusing on resolving existing uncertainties.

Keywords: *AI Act, transparency, patenting, innovation*

1 Introduction

The rapidly advancing AI capabilities and associated risks have fueled the need for regulation and governance of AI systems. As a consequence, the European Union introduced the AI Act inducing pivotal change in the regulatory landscape which significantly influence the AI innovation capabilities of firms. The goal of the AI Act is "to improve the functioning of the internal market and promote the uptake of human-centric and trustworthy [AI], while ensuring a high level of protection of health, safety [and] fundamental rights [...] against the harmful effects of [AI systems] in the Union, and to support innovation" (Art. 1 (1) AI Act as adopted on March 13, 2024). Although experts welcomed the AI Act recognizing it as a significant milestone in regulating AI (Cozzi et al, 2023), the potential benefits of the AI Act for the EU as a "global leader

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in developing secure, trustworthy, and ethical AI" (European Council, 2020, p. 6) are uncertain. While previous research recognizes the transparency as one of the main rationales behind the AI Act (Panigutti et al, 2023; Li, 2023), its impact on the innovation remains unclear. For instance, transparency requirements of the AI Act impede innovation could potentially restrict the firms' ability to protect AI innovation as intellectual property. Thus, we ask: *What is the impact of the AI Act's transparency requirements on patenting as a tool for commercializing AI innovations?*

To answer our research question, we conduct a multivocal literature review examining the impact of the AI Act's transparency requirements on patenting as a means for AI innovation. We rely on both academic and non-academic literature, as the AI Act has just been passed and academic literature rigorously evaluating the effects of the AI Act on innovations is scarce. Thus, a multivocal literature review is suitable, capturing up to date business perspectives (DIHK, 2023), approaches to patent law (Lankinen, 2019) and transparency within AI (Hacker and Passoth, 2022).

Our results indicate that the transparency requirements may affect innovation, yet, they are unlikely to have a significant impact on innovative ability if the legislator clarifies specific requirements and legal definitions of terms used in the AI Act. Our paper addresses the research gap on the link between transparency requirements and innovation, potentially shedding light on improvements to AI regulations to ensure benefitting companies. We conclude that the transparency mandates of the AI Act do not hinder patentability of AI inventions. However, the number of patents may still reduce because of the uncertain level of transparency required under the AI Act resulting from undefined key terms. Finally, we give an improvement suggestion to the legislators on how to clear up this uncertainty to prevent any negative impact caused by the AI Act on the innovative ability of companies. We consider our results, which are grounded in the current body of literature, as a valuable starting point that requires further empirical data from business field studies and expert opinions.

2 Background

2.1 Possibilities of Economic Usability and Requirements for the Patentability of Technical Inventions

Economic usability means the adequate form of monetization or sale of objects or intellectual property (IP), to generate financial proceeds (white ip, 2021). One possibility of monetization of AI innovation is technological leadership, meaning that the innovation is sufficiently advanced so that other companies do not have the means to copy it. Secondly, companies can keep the functioning of their AI innovations a trade secret. As there is few public information available on the number of AI innovations protected through technological leadership and AI trade secrets, these options are unsuitable to be analyzed by our research. A further look is taken at legal instruments allowing protection to the *use* of AI innovation. For simplicity, the legal situation in *most* member states of the EU will be the scale for the following remarks which is possible as IP law

is largely harmonized. Copyrights are initially owned by the creator of a work (Ginsburg, 2017) and can be licensed. While trademark rights and rights of distinguishing marks protect the identification of products as belonging to a company (DPMA a, 2024), registered design focuses on a product's appearance (DPMA b, 2021). Therefore, these options are not suitable as measures for economic usability of AI. Patents and (the unharmonized!) utility models have the same requirements (European Commission, o. D.) and offer their owners the same saleable and licensable rights (DPMA c, 2020). The process of granting a utility model, however, is faster in return its protection expires faster (DPMA d, 2021). The requirements of utility models are not examined in the registration procedure (European Commission, o. D.), which increases the risk of them being challenged or cancelled. Patents on the other side are more commonly registered than utility models (DPMA e, 2023; DPMA f, 2023).

Overall, patents represent a good measure of economic usability to be considered in context of the AI Act as patent law is harmonized across the EU, refers to the product itself and is commonly used for economic usability. In contrast to copyright, it protects the functionality or the idea, procedure, or method of operation itself and not just format and expression of the idea (Art. 9 (2) TRIPS, 1994) which plays a secondary role regarding AI inventions. Moreover, the number of granted patents is established as an indicator of innovation within academic literature (Bahoo et al., 2023; Igna and Venturini, 2023; Van Roy et al., 2020).

The requirements for registering a patent are novelty, inventive step, industrial applicability of the innovation and technical character. According to Art. 54 EPC, novelty is given if the invention "does not form part of the state of the art" with the latter being "everything made available to the public by means of a written or oral description, by use, or in any other way". The invention involves an inventive step if it is not obvious to a skilled practitioner in the relevant field of technology with average knowledge and ability (European Patent Office (EPO), 2024). As indication for industrial applicability (Art. 57 EPC), it could have a "sound and concrete technical basis [so] that the skilled person can recognize that [the invention's] contribution to the art could lead to practical exploitation in industry" (EPO a, 2006). Lastly a technical character of the invention is required (EPO b, 2006).

2.2 The AI Act and its Transparency Requirements

AI systems are assigned to a risk category according to the risk their use poses especially to fundamental rights and Union values (Explanatory Memorandum in Proposal for AI Act, COM/2021/206 final, 2021). The risk categories are minimal or no risk, limited risk, high risk and unacceptable risk. Depending on the risk category of an AI system, it must meet certain requirements, except for AI systems posing an unacceptable risk which will be completely banned. Limited risk AI systems interacting with natural persons and general-purpose AI (GPAI) systems must only meet certain transparency obligations as set out in Art. 52 respectively Art. 52c AI Act. AI systems with minimal risk do not have to follow any obligations.

If we take a closer look at a possible definition of transparency to consider which provisions of the AI Act should be grouped under this term, we find that transparency

is interpreted differently depending on the subject under consideration. Within transparency in the context of regulatory frameworks, a differentiation is made between enabling, technical, and protective transparency (Hacker and Passoth, 2022). Enabling transparency distinguishes between rights-enabling, review-enabling, and decision-enabling transparency (Hacker and Passoth, 2022). The ability of individuals to exercise their rights against the AI system falls under rights-enabling transparency, while the ability to make informed decisions is subsumed under decision-enabling transparency (Hacker and Passoth, 2022). Review-enabling transparency enables to initiate legal reviews of the AI system (Hacker and Passoth, 2022). Technical transparency means informed decision making on the side of technical operators of the system who might improve the functioning of the AI application (Hacker and Passoth, 2022). Lastly, protective transparency describes the opportunity to reduce significant risks being posed from AI systems (Hacker and Passoth, 2022).

Next, we discuss which transparency requirements result from the AI Act (as adopted on March 13, 2024) considering these transparency definitions. The main transparency requirements can be found in Art. 13 AI Act. According to that, high-risk AI systems, including open-source AI systems, "shall be designed and developed in such a way to ensure that their operation is sufficiently transparent to enable deployers to interpret the system's output and use it appropriately". They "shall be accompanied by instructions for use […] that include concise, complete, correct and clear information that is relevant, accessible and comprehensible to deployers", including i.e. characteristics, capabilities, and limitations of performance of the AI system. These requirements contribute to the aim of understandable AI systems, and output being interpretable. The information to be provided will enable providers to assess for themselves the risks of AI decision-making, in particular the risk of biased algorithms and possible gaps in data protection. It also facilitates surveillance by supervisory organizations or other third parties.

According to Art. 50 AI Act, AI systems must be designed and developed in such a way that natural persons are informed interacting with an AI system and, where appropriate, are provided with further information. Natural persons shall also be informed, and their consent be obtained if they are exposed to an emotion recognition system or biometric categorization system and deep fakes must be disclosed as such.

Disclosing certain information to register a high-risk AI system in a public EU database according to Art. 49, 71 AI Act is a decision- and review-enabling transparency measure. The additional disclosure of contact details of the provider may be important as it gives a user the option to exercise rights against him regarding the infringement of his personal rights. Lastly, affected parties have the right to explanation of individual decision-making taken by the deployer regarding the role of the AI system in the decision-making procedure, main parameters of the decision and related input data under some conditions (Art. 68c). In summary, the AI Act contains rules fulfilling all definitions of transparency. However, as the AI Act only uses the term "transparency" within 13 and 50 AI Act, the focus will be on these articles.

3 Research Method

Although an academic literature review that solely includes peer-reviewed papers is the optimum to ensure the quality of the research under consideration, it would be insufficient and not expedient to gain a comprehensive insight because of the small number of papers on such an emerging topic being published yet. Therefore, we believe that a multivocal literature review is an appropriate method to obtain a broader range of assessments of the research question. That means that apart from academic literature, we consider "grey literature", meaning literature which is produced at all levels of government, academia, business, industry in print and electronic form, but is not controlled by commercial publishers (Farace and Schöpfel, 2010). To identify relevant academic literature, we first defined a suitable search string. To this end, we included the three major components of the research question, being "AI" "Act" and "transparency" or "patent". To avoid the possibility of exclusion of relevant literature, we added synonyms or generic terms, leading to the final search string:

(Act OR Legislation OR Law OR Regulation) AND (Transparency OR Innovation OR Patent OR "Intellectual Property" OR IP) AND (AI OR "Artificial Intelligence" OR "Machine Learning")

We applied this search string to two reputable databases for academic literature, Web of Science and Beck-online, to cover both general scientific and legal literature. As Beck-online is a German database, we translated the search string. Considering all papers and essays on the databases published before January 1, 2024, we identified 855 academic papers. Then, we set criteria to exclude items that (1) were published before January 1, 2017, and (2) were not available in English or German. Content-related, we excluded papers that discussed AI-generated innovations instead of the innovations being AI systems, and papers that set a non-European or too specific focus like AI innovations in healthcare etc. We applied these criteria in title, abstract, and full-text screening leading to 17 papers being left. Through backward and forward search, in which we used the reference list of found papers or citations to them to identify additional items, we did not add any papers to the final set as the cited literature usually was too specific to answer another question but this papers' question.

For identifying grey literature, using the search string in search engines would have led to a variety of results lacking qualitative discussions as blog entries, newspaper articles and so on often only represent the views of a single person without underlying in-depth analysis of the topic. This is a risk to be considered regarding grey literature as it does not follow a peer-reviewed publishing process. Therefore, and despite the risk of a too narrow research, we focused the grey literature research specifically on the most important players with expertise in the legal and / or AI sector including business consulting companies like McKinsey & Company, major law firms like Taylor Wessing and industry associations like the Chamber of Commerce and Industry. To this end, we filtered their websites through a website-intern search function for results referring to the "AI Act". We only included position papers, expert statements etc. in the research. We excluded literature that is not available in full or in English, search results that did not contribute to the state of knowledge, and results that did not include well-founded critical appraisal as the result of an investigation. Additionally, we used material from

the website of the EPO regarding "Artificial Intelligence" as the aspect of patentability of AI was not made a main topic in the found literature but is essential to properly answer the research question. As found literature did mostly not cite other sources, we found only one paper in the backward and forward search.

Following Gramlich et. al (2023), to ensure a qualitative selection of literature, we evaluated our literature sample according to certain criteria categories: authority of the producer, objectivity of the source, methodology, date, related sources, novelty, and impact. If we rated the item as negative in most of the categories, meaning in at least four of the named categories, we excluded it from further consideration. Ultimately, we obtained 12 grey literature sources for the final set. Thereby, we finally maintained a set of 29 literature sources for a multivocal analysis.

4 Results

We categorized the grey and academic literature sources as follows: First, we analyzed the focus of the item analyzed and second, we determined whether the item provided an improvement concept (see Table 1).

Table 1. Focus of the items and existence of concepts

Focus of the items	
AI Act's transparency requirements (17)	Bell et al. (2023), Bomhard and Merkle (2021), Buiten (2019), Ebers et al. (2021), Gacutan and Selvadurai (2020), German AI Association (2023), Hacker and Berz (2023), Hacker and Passoth (2022), Hupont et al. (2023), Nannini et al. (2023), Nastasa et al. (2023), Panigutti et al. (2023), PwC (2023), Raposo (2022), Reed (2018), VDA (2023), Wojtzak (2021)
Connection between AI Act requirements without a focus on transparency or innovative ability (6)	Applied AI Initiative (2022), Block (2023), Block et al. (2023), Bomhard and Merkle (2021), DIHK (2023), Meyer (2018), Mylly (2023), Verdi (2022)
Connection between transparency requirements and innovative ability or trade secrets (7)	Bitkom (2023), Buiten (2019), DIHK (2023), DIHK (2021), Nastasa et al. (2023), Raposo (2022), Wojtzak (2021)
Patentability of AI (5)	Bailas and Thums (2018), EPO (2023), EPO (2019), Lankinen (2019), Méniere and Pihlajamaa (2019)
Existence of concept	
Items including improvement concepts (6)	Bell et al. (2023), Buiten (2019), Gacutan and Selvadurai (2020), German AI Association (2023), Hacker and Berz (2023), Reed (2018)
Items not including improvement concepts (17)	appliedAI Initiative (2023), Bitkom (2023), Bomhard and Merkle (2021), DIHK (2023), DIHK (2021), Ebers et al. (2021), Hacker and Passoth (2022), Meyer (2018),

	Mylly (2023), Nannini et al. (2023), Nastasa et al. (2023), Panigutti et al. (2023), PwC (2023), Raposo (2022), VDA (2023), Verdi (2022), Wojtzak (2021)

Items published before the AI Act's proposal gave us important implications to evaluate improvement concepts although they could not refer to the Act itself.

4.1 Patentability of AI

While three of the four prerequisites of patentability (novelty, inventive step, and industrial applicability) do not show any special features in the patentability of AI systems, the technical character of AI inventions is discussed more strongly. Inventions involving computer programs that solely implement mathematical methods are not patentable according to Art. 52 (2) and (3) EPC. The mathematical method or algorithm of the AI needs to be used in a technical process carried out on a physical entity by technical means resulting in a change of the physical entity to be patentable (Lankinen, 2019). Besides technical character, the invention must describe a not purely abstract or intellectual concept and be implemented by using a computer, computer network or other programmable apparatus with technical effect (Bailas and Thums, 2018). Thereto, the invention has to be described "sufficiently clear[ly] and complete[ly] to be carried out by persons skilled in the art" (EPO, 2024, p. 401). It was mentioned that in the drafting of claims, "black boxes" shall be avoided (Bailas and Thums, 2018). Additionally, the EPO approved that, when AI relies on mathematical methods, they must be disclosed in sufficient detail so that the invention can be reproduced (European Patent Office, 2023). Disclosing the source code is not per se necessary (EPO, 2009) although algorithm and training data are often needed to reproduce the AI invention in practice (Méniere and Pihlajamaa, 2019). However, unveiling the mathematical methods and algorithms might not be clear enough to fulfil the patent requirements because of the lack of understanding of machine learning and possibilities to track the steps of the AI system in its output generation. Lankinen proposes that the definition of input and output of an AI system might be sufficient for a skilled practitioner in the relevant field of technology – here being AI - to understand the innovation's extent of protection and crucial features but questions whether the process leading to the output must be explained as well (2019).

In summary, the patentability of AI does not overly differ from the patentability of other products. The issue would lie on the obligation to disclose further information about the AI system in the patent application to properly explain the functioning of the system to the person skilled in the art. This is significant for "black box" AI systems in which even the developer of the system may not understand the decision-making process. Apart from that, the requirements for the patentability of AI systems were not evaluated as innovation-inhibiting indicated by the tripling of the number of AI inventions registered by the EPO between 2010 and 2017 (Méniere and Pihlajamaa, 2019).

4.2 AI Act Transparency Requirements and Innovative Ability

After we determined the specialties in the patentability of AI systems, we evaluated the influence of transparency requirements in this regard. First, we analyzed what kind of challenges to the transparency requirements are addressed in the literature.

A non-scientific survey conducted by the appliedAI initiative (2022) found that at least a third of the startups would classify themselves as high-risk AI systems whereas the assumption of the EU Commission was at most 15 %. This is important as the transparency obligations of Art. 13 would under this assumption be applicable for way more startups than estimated. The survey found that more than 50 % of the startups see the obligation to transparency and provision of information to users at least as "somewhat difficult". This concern is shared especially regarding missing technical abilities of AI systems to justify their decisions comprehensibly (Bomhard and Merkle, 2021; Buiten, 2019; PwC, 2023; Raposo, 2022. Existing explainability methods are often not practical as they are imprecise, vulnerable for attacks, inconsistent and many AI designers are unaware of these methods (Nannini et al, 2023; Panigutti et al, 2023). In addition, a relatively complex AI system might even be harder to explain in a way that is understood by individuals (Gacutan and Selvadurai, 2020; PwC, 2023). Raposo (2022), however, counters this by stating that not a precise understanding of the AI System but rather the main limitations of the system and its shortcomings are subject to transparency requirements of the AI Act. Panigutti et al. (2023) suggest that the transparency requirements of the AI Act can be met by describing the action, including the intended use, and by explaining how the system can be used, with detailed instructions for use and outputs, and by creating an ideally simple and consistent human-AI interface design alongside human oversight measures. This course could signal when the AI system is uncertain or unable to provide an answer, the system could provide a range of outputs rather than a single word answer or encourage user evaluation before generating an output (Panigutti et al, 2023). Moreover, Bomhard and Merkle comment that notices to be given to users according to Art. 52 AI Act-E (now Art. 50 AI Act) must be discreet and sufficiently transparent at the same time (2021), in any case, risk adequate (VDA, 2023). The VDA criticizes in this matter the vague wording "obvious from the circumstances and the context of use" in Art. 52 (1) AI Act-E (now Art. 50 AI Act) (2023).

Although the risk-based approach in transparency is appreciated (Buiten, 2019; DIHK, 2021; Ebers et al, 2021), a discussion about the inclusion of stricter transparency requirements particularly for GPAI systems has come up. The European Digital SME Alliance (2022) encouraged stricter rules on AI systems for the benefit of smaller players, while the German AI Association (2023) noted that transparency requirements were unproportionate to the level of risk and specific use cases. This is supported by the assumption that GPAI systems could be particularly challenged by the obligation of transparency, as they tend to be extremely complex due to their development through the accumulation of multiple AI systems (Nannini et al, 2023). In addition, Bitkom noted that transparency obligations would go far beyond the purpose of product safety and market regulation (2023).

A key point of criticism is that the way in which transparency and interpretability are to be implemented remains unclear, making it impossible to define them and thus

to ensure legal certainty. (Bell et al, 2023 ; Ebers et al, 2021 ; Gacutan, Selvadurai, 2020 ; Nannini et al, 2023 ; Nastasa et al, 2023). The term of "sufficient transparency" in Art. 13 AI Act adds to the uncertainty but gives the provider leeway in the interpretation (Nannini et al., 2023). However, some state-of-the-art AI and dataset transparency approaches have been found to be "highly suitable to provide concise and accessible technical information for users of high-risk AI systems" (Hupont et al., 2023, p. 26), which implies that an overall standard for Art. 13 might become subject to a standard already being used currently. Only little extensions must be made to guarantee that users understand and use high-risk AI systems properly (Hupont et al., 2023). However, it is questionable whether the information to be disclosed is useful at all as the information provided would rarely be understandable for users without AI development or practice (Hacker and Passoth, 2022). It remains problematic that providers can generally self-certify that they meet the transparency requirements, which makes enforcement of this provision difficult, and leaves open the possibility of ethical whitewashing. (Hacker and Passoth, 2022; Nannini et al, 2023). Nevertheless, the AI Act's transparency obligations around use, documentation and data quality are assessed as an overall successful part of the AI Act (Hacker and Berz, 2023; Reed, 2018).

Two-thirds of startups surveyed by the appliedAI initiative (2022) expect the AI Act to have a negative impact on AI innovation in their own startups, and almost 80% of venture capitalists see a decline in the competitiveness of EU-based AI startups. These findings should, however, be treated with caution as they solely result from named non-scientific study. According to the European Digital SME Association (2022), the requirements of the AI Act will overburden small and medium-sized enterprises (SMEs) with high compliance costs. This is of specific importance as SMEs are on top of innovation in the EU (DIHK, 2023). It also notes that unclear and unspecific rules that do not provide the necessary legal certainty in the use of AI systems could risk hampering innovation. (Bomhard and Merkle, 2021; DIHK, 2023, Verdi, 2022).

It is mentioned that the transparency obligations of the AI Act carry the risk of disclosing trade secrets and proprietary information (Bitkom, 2023; DIHK, 2021; Nastasa et al, 2023; VDA, 2023; Wojtczak, 2021). Specifically, the underlying algorithms of an AI system are complex, difficult to develop and create the unique selling point of a business model, and therefore must not be disclosed (DIHK, 2021). In this regard, Mylly (2023) clarified that the requirements under the AI Act rarely contain information categorized as trade secrets, especially a disclosure to legislative instruments does not qualify as the disclosure of a trade secret. Additionally, it must be noted that the information to be disclosed is usually excluded from trade secret protection (Mylly, 2023) or loses its status as a trade secret with its availability for public. Nevertheless, public availability of information comes with the liberty of use by the public without infringing IP rights (Mylly, 2023), which might not lie in the interest of AI inventors (PwC, 2023). In general, there are fears that disproportional obligations will create a competitive risk and inhibit for startups and investors (Bitkom, 2023; Buiten, 2019). However, the DIHK (2023) points out that the reliability and transparency of foundation models will play a crucial role for the successful use of an AI system in the market, especially regarding a value chain between deployers and users. Nastasa et al. (2023) see the transparency requirements as crucial to build citizen trust.

4.3 Improvement Concepts for the Transparency Requirements of the AI Act

The appliedAI initiative (2022) proposes reducing high-risk cases of AI systems so that no more than 15 % of such systems are affected. It emphasizes the importance of considering the needs of AI startups. Similarly, Bell et al. (2023) suggest a stakeholder-first approach, which involves establishing stakeholders, goals, and purposes for transparency requirements that meet the needs of the system's users. This should be done under a transparency method chosen by a technologist. In relation to the issue of transparency in black box AI systems, Buiten (2019) proposed an approach suggesting that disclosing potential flaws and risks of the AI system in a way that is both understandable and technically feasible could be sufficient to support the informed decision-making by users. This approach prioritizes problem-solving and risk management in technology by identifying biases through learning from existing data and testing. This is considered a feasible method for achieving transparency in algorithms, while also considering the associated costs and benefits for the specific requirements. The focus is on transparency of the technology rather than subjective evaluations (Buiten, 2019). The German AI Association (2023) proposes an approach for regulating foundation models, in the latest draft GPAI systems. According to this approach, developers of foundation models are only required to make documentation available to authorities upon request, as a transparency requirement. Commercial providers that use foundation models must inform end users understandably about "[…] the model's power and limitations […]" (German AI Association, 2023, p. 11) instead of requiring higher levels of traceability and explainability. Finally, it is proposed that Art. 52 of the AI Act should include an obligation to label works generated by AI systems using cryptography or watermarks. This will enable third parties to verify whether a post is a generated work (Hacker and Berz, 2023). In summary, while transparency requirements are seen as a positive step, there is strong debate about the specifics of their implementation. A uniform suggestion for improvement is barely discernible.

5 Discussion

Overall, it appears that transparency requirements have little impact on the patentability of AI. The AI Act's criticism did not mention patentability, suggesting its limited significance in this regard. The disclosure of how AI systems function could result in a quicker advancement in the state of the art, as required by Art. 54 EPC. This could make it more challenging to obtain a patent for AI systems that only show minor progress compared to similar-functioning AI systems. However, if the AI system serves a different purpose that is reflected in technical terms, novelty could still be fulfilled. Since transparency mandates do not affect the economic usability or technical character of the invention, they only play a limited role in the patent application of AI systems.

It is uncertain whether transparency obligations have a negative impact on innovative ability. One concern raised is the level of transparency required for certain AI systems under Art. 13 AI Act. The complexity of GPAI systems has raised concerns about the transparency of their operations. The issue, however, is not an explainable design of an AI system but the uncertainty of the terms the AI Act used. For example, the terms

“transparency” and “interpretability” are not defined. The assumption that definitions are the crucial issue is supported by the statement of several interest groups that unclear regulations could hinder innovation (Bomhard and Merkle, 2021; DIHK, 2023; Verdi, 2022). Inventors could under this assumption be deterred by the uncertainty and refrain from inventing AI systems, leading to a decline in patenting. There is also a widespread concern that transparency obligations may inhibit innovation, particularly in the startup sector (appliedAI initiative, 2022; DIHK, 2023; Verdi, 2022). It is unclear whether all AI Act regulations can be evaluated solely based on transparency regulations. When concerns were raised about overregulation, they were often overlooked and instead portrayed as just one piece of a larger bureaucratic burden. Next, even though the fear of disclosing trade secrets through the requirement of Art. 13 AI Act was dispelled by Mylly (2023), inventors fear that their business model could be revealed under the amount of information to be publicly disclosed. This statement appears to be unfounded. To obtain a patent, an invention must be described in sufficient detail to enable a person skilled in the relevant field to carry it out. This requirement is equivalent to a certain level of transparency, which is not affected by the transparency obligations of the AI Act. This can be countered by the fact that the disclosure in patent application is only made to authorities and not users. Nevertheless, as stated by the DIHK (2023), transparency obligations are crucial for the successful use of an AI system on the market and therefore increase innovative ability.

However, it is uncertain whether addressing the issues is adequate. As two third of startup owners anticipate a negative impact from the AI Act and AI innovation on their own startups, providers are already biased towards the development of AI systems. Therefore, we recommend policymakers to clarify the practical implications of the AI Act obligations, including transparency requirements, to eliminate this bias.

Improvement proposals in the literature aim to balance user information, limit risks from AI systems, and consider the interests of system deployers. This forms the basis for the following improvement suggestion. Firstly, the AI Act should legally define the term ‘interpretability’ to allow for the development of black box AI systems on the EU market without violating transparency requirements. Secondly, it is encouraged to implement the approach of Hacker and Berz (2023) to label works created by generative AI through cryptography or watermarks as a transparency requirement. This will strengthen public trust in AI systems.

Further consideration of European competitiveness and stakeholder needs is necessary. The burden of compliance costs on SMEs should be compensated to encourage informed decisions. Transparency requirements regarding SMEs should not be reduced as users cannot differentiate between the types of companies behind AI systems. Reducing high-risk cases is also not expedient. Restricting the application of AI systems could result in significant loss of trust and potentially undermine the EU’s unique selling proposition of providing trustworthy AI systems to support businesses. Standardized templates could be provided as a guide for fulfilling transparency obligations and understanding the transparency requirements. The named improvement suggestions aim to clarify uncertainties and dispel bias towards an overburden of compliance requirements for deployers of AI systems. This should encourage innovation in the AI sector, leading to an increase in patents and innovation in the EU.

The research on the AI Act is expected to expand radically as the AI Act was just passed in March 2024, which is why this paper is based on just a minute part of criticism of the AI Act. Additionally, research was conducted using two databases covering legal and general scientific literature, including a backward and forward search, as well as carefully selected position papers and statements by 'big players' in the legal, AI, and economic sectors. The text could benefit from the inclusion of sociological aspects to better understand the effects of transparency on user behavior. The research was mainly limited to a search string, which posed a risk of missing relevant items, despite the inclusion of synonyms to avoid excluding too many papers. Most gray literature items are views by interest groups representing potential providers of AI systems. They could possibly describe the situation one-sidedly focusing on burdens for providers without acknowledging benefits for deployers. Lastly, it must be noted that the base of this paper relies on an interplay of predictions and does not display empirical research.

Based on our results that are grounded on the current state of literature on the transparency requirements of the AI Act, future research could focus on empirical findings. Future research should examine options to support SMEs in coping with the compliance requirements under the AI Act to further support innovation. Furthermore, it is important to explore options for meeting the transparency requirements outlined in the AI Act when deploying a black box AI system. This investigation may result in the development of a standardized template that the European Parliament can propose to guide deployers of AI systems.

This paper contributes to academic research on transparency requirements of the AI Act and provides legal insight into the practical reality of deploying AI systems. It aims to clarify the uncertainty surrounding transparency obligations and address current concerns. Although no severe obstacles were found that could decrease the EU's innovative ability through transparency requirements, this paper appeals to European legislators to address the gaps found within these requirements, particularly the lack of legal definitions, and to provide a concept for how they can be fulfilled to achieve legal certainty.

6 Conclusion

This paper examines the transparency requirements proposed in the AI Act in relation to the patentability of AI within the EU. While some expressed concerns that these requirements may hinder innovation, most of the criticism has been directed towards the rules for high-risk and GPAI systems, and specifically towards the possible interpretations of terms in the AI Act that are not yet legally defined. The need for transparency in patent applications does not necessarily preclude the patentability of black box AI systems. We assume that the same applies to transparency regulations under the AI Act, but legal definitions of key terms related to transparency within the AI Act are still needed. Improvement suggestions in the literature were only partially helpful in maintaining a balance between protecting the rights of users of AI systems and complying with the associated costs of deployment. This often depends on the respective interest group represented in position papers. Our research identified weaknesses in regulations from an economic perspective opening the door for further improvement.

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