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Towards AI Governance in DAX40: A Typology of Organizational Guidelines for Self-Regulation

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Abstract: In this article, we combine the discourse on the ethical challenges of using Artificial Intelligence (AI) with research perspectives on overarching AI governance. Although AI govenance is not yet institutionalized, an increasing number of organizations are formulating their own guidelines for the responsible use of AI. These self-regulatory approaches serve as guidance for customers and employees. At the same time, they serve to align organizational processes and control mechanisms. Little is known about the differences between self-regulatory approaches and how organizations anticipate the future direction of AI governance. Using DAX40 companies as an example, we examine how organizations design AI guidelines for self-regulation and which criteria of AI ethics they take into account. Based on a systematic search strategy and qualitative content analysis, we identify three different types of self-regulation: (1) non-codified self-regulation, (2) symbolic-technical self-regulation, and (3) comprehensive socio-technical self-regulation.

Keywords: AI governance, organization, artificial intelligence, responsible AI, guidelines, self-regulation

Auf dem Weg zur KI-Governance im DAX40: Eine Typologie organisatorischer Leitlinien für die Selbstregulierung

Zusammenfassung: In diesem Beitrag verbinden wir den Diskurs zu ethischen Herausforderungen des Einsatzes von Künstlicher Intelligenz (KI) mit Forschungsperspektiven auf eine übergeordnete KI-Governance. Obgleich diese noch nicht institutionalisiert ist, formulieren immer mehr Organisationen eigene Richtlinien für den verantwortungsvollen Einsatz von KI. Diese Selbstregulierungsansätze dienen der Orientierung für Kunden und Beschäftigte. Zugleich dienen sie der Ausrichtung organisatorischer Prozesse und Prüfmechanismen. Wenig bekannt ist, welche Unterschiede es zwischen Selbstregulierungsansätzen gibt und welche zukünftige Ausrichtung einer KI-Governance Organisationen damit antizipieren. Am Beispiel von DAX40-Unternehmen untersuchen wir, wie Organisationen KI-Richtlinien zur Selbstregulierung gestalten und welche Kriterien der KI-Ethik sie dabei berücksichtigen. Auf der Grundlage einer systematischen Suchstrategie und einer qualitativen Inhaltsanalyse identifizieren wir drei verschiedene Typen der Selbstregulierung: (1) nicht kodifizierte Selbstregulierung, (2) symbolisch-technische Selbstregulierung und (3) umfassende sozio-technische Selbstregulierung.

Stichwörter: KI-Governance, Organisation, Künstliche Intelligenz, verantwortungsvolle KI, Leitlinien, Selbstregulierung

1. Introduction

Artificial Intelligence (AI) opens new possibilities for organizations and employees in performing tasks and generating solutions. Authors emphasize positive outcomes in productivity and quality (Brynjolfsson et al., 2025). However, due to its pervasive nature (von Krogh, 2018) and the opacity of data structure and algorithms (Meske et al., 2020), interest in AI governance is growing in organizations (Hickmann & Petrin, 2021; Hickok, 2021; Stahl et al., 2022). The design of organizational AI governance is shaped by a multifaceted regulatory framework. Hard law, such as the European Artificial Intelligence Act (EU AI Act) or industry-specific regulations (e.g., the regulation on digital operational resilience in finance, DORA), defines binding legal requirements. Soft law adds further normative expectations that influence corporate behavior without formal legal force. This includes harmonized standards such as ISO 42001, which translate these requirements into concrete technical and operational guidance as well as ethical principles and guidelines like the OECD AI Principles. Finally, stakeholder pressure from investors, customers, or civil society creates additional expectations for responsible and trustworthy AI. Together, these elements form the comprehensive and increasingly legally binding regulatory environment in which organizations must position their AI governance practices (Hickmann & Petrin, 2021; Mäntymäki et al., 2022a; Agrawal & Nene, 2025; Batool et al., 2025; Maman & Feldmann, 2025).

As a subset of corporate governance, AI governance is defined as a system of rules, practices, processes, and technical measures through which organizations design, deploy, and oversee AI systems to ensure that their use aligns with legal requirements, ethical principles, external expectations, and the organization's own strategies and values. It structures how organizations manage risks, ensure responsible and trustworthy AI and integrate AI in ways that support responsible and goal-oriented organizational action (Mäntymäki et al., 2022b; Wirtz et al., 2022; Schneider et al., 2023; Schneider et al., 2024; Papagiannidis et al., 2025). The main challenge for AI governance is to translate the regulatory requirements into practical organizational processes (Mäntymäki et al., 2022a; Birkstedt et al., 2023; Agrawal & Nene, 2025; Batool et al., 2025; Papagiannidis et al., 2025).

While scholars outline conceptual frameworks for a future AI governance that address the interplay between external regulatory requirements, organizational governance measures, and internal and external effects (e.g., Mäntymäki et al., 2022a; Papagiannidis et al., 2025), there is little empirical evidence to date on how organizations actually address this topic. Distinctions about coping patterns in face of rising AI governance demands are missing. As formalized AI governance systems are not established, initial indications can be found in the increasing number of organizational AI guidelines, which are formulated as a self-regulatory mechanism to create a preliminary approach for coping with ethical challenges of AI usage while translating external requirements into internal practices (Corrêa et al., 2023; Schneider et al., 2024). A number of studies have already examined AI guidelines issued by governments, industry bodies, and non-governmental organizations (e.g., Jobin et al., 2019; Hagendorff, 2020; Corrêa et al., 2023), specifying ethical principles such as transparency, justice and fairness, non-maleficence, responsibili-

ty, privacy, beneficence, freedom and autonomy, trust, sustainability, dignity, and solidarity (Jobin et al., 2019). So far, this discourse on AI ethics remains rather detached from a governance perspective that searches for concrete corporate measures to demonstrate corporate responsibility in AI usage (Batool et al., 2025). In line with Hickman and Petrin (2021) we understand AI guidelines for self-regulation as pre-stage of an AI governance worth looking into to explore how companies prepare for future formal regulation.

The aim of this study is to examine how organizations interpret corporate responsibility for ethical challenges of AI in their self-regulation, particularly which criteria of AI ethics they address in these guidelines. We focus our analysis on the forty largest listed organizations in Germany (DAX40) since these corporations have to cope with the same governance requirements and are challenged to document their responsibility. Methodologically, the study builds on a systematic document collection in which publicly available AI-related corporate documents are identified and classified as part of the data-gathering and search strategy. Based on this classified corpus, a typology of corporate self-regulation is developed through sequential pre-analysis and qualitative content analysis and is subsequently substantiated by a contextual analysis that embeds the identified guideline types within their broader organizational and governance contexts. As a result, we explore three types: (1) non-codified self-regulation, (2) symbolic-technical self-regulation, and (3) comprehensive socio-technical self-regulation.

2. Theoretical foundations

2.1 AI guidelines as a practice of corporate self-regulation

The strategy-as-practice research community (e.g., Whittington, 2006; Jarzabkowski & Paul Spee, 2009; Seidl et al., 2024) shows that future-oriented preparation for corporate challenges is less of a formalized process and more based on forward-going and feedback processes in interaction with relevant stakeholders. This also matters for future challenges in corporate governance such as AI implementation, where organizational guidelines can be understood as a relevant practice to initiate self-regulatory mechanisms for demonstrating responsibility in implementation and usage (Camilleri, 2024; Papagiannidis et al., 2025). With their AI guidelines organizations communicate which principles they consider particularly important for the development and use of this technology. These guidelines can take various forms, such as ethical declarations, codes of conduct, white papers, or statements. These documents specify the organization's key criteria of AI ethics, but also the overall objectives, roles, authorities, and further responsibilities for the deployment and use of AI. AI guidelines can range from internal guidance to public commitments (Jobin et al., 2019; Hickok, 2021; Attard-Frost & Walters, 2022; Corrêa et al., 2023; Schneider et al., 2024; Prem, 2024; Cabiddu et al., 2025). As such, guidelines indicate how organizations interpret regulatory requirements and stakeholder demands while transferring them into concrete, organization-specific principles with impact on internal practices and stakeholder communication (Mäntymäki et al., 2022a; Schneider et al., 2024; Maman & Feldmann, 2025). AI guidelines are shaped under the influence of external requirements as well as organizational strategies and values (Papagiannidis et al., 2025).

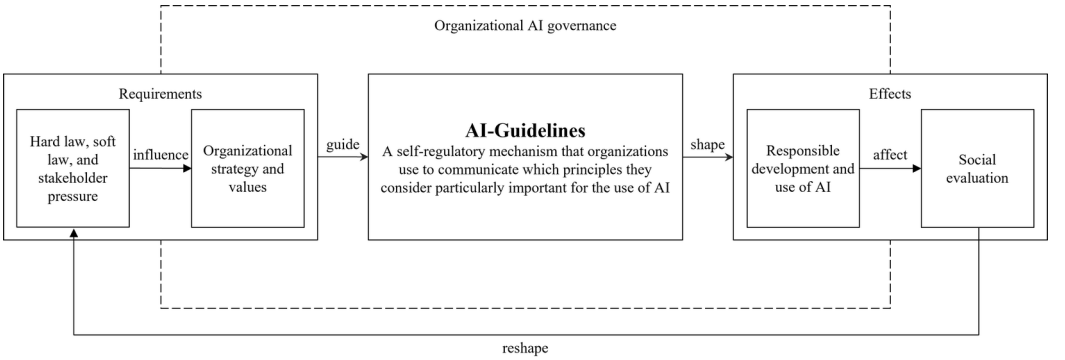

Figure 1: Requirements and effects of AI guidelines as a governance mechanism - Adapted model according to Papagiannidis et al., 2025 and Mäntymäki et al., 2022a

Following Papagiannidis et al. (2025) and Mäntymäki et al. (2022a) AI guidelines initiate an exchange basis for coping with ethical challenges of AI. It is in particular the external requirements of hard and soft law, and stakeholder pressure that form the framework for the design of AI guidelines (see Figure 1). While soft law initiatives such as the OECD AI Principles or the UNESCO Recommendations on the Ethics of AI initially dominated the regulatory discourse, the emergence of generative AI has led to the creation of legally binding regulations around the world (Alanoca et al., 2025). In Europe, the EU AI Act has developed a representative legal framework that regulates the use and development of AI in EU countries (European Parliament, 2024). In addition to this overarching legal framework, there are a number of applicable regulations that are not explicitly designed for AI systems but, for example, represent data rules such as the GDPR and therefore also apply to these systems (Viljanen & Parviainen, 2022). Taken together, these regulations provide the normative reference for organizational self-regulation that organizations in Europe have to cope with.

While AI guidelines currently remain a voluntary instrument of corporate self-regulation rather than a mandatory reporting requirement, they nevertheless represent a documented commitment to these internal and external requirements surrounding the use of AI. However, the effective translation of this commitment into organizational practice depends on complementary governance mechanisms. These include structural mechanisms that aim to define responsibilities within the organization, e.g., via an AI committee, and assign decision-making authorities. Other procedural mechanisms such as process design, performance management, and compliance monitoring serve to align decisions and actions with the organization's strategic and value-based objectives. Finally, relational mechanisms support communication and equip employees with the skills they need to use AI responsibly. This includes not only ongoing communication about AI, but also raising employee awareness of the technology, its potential and challenges, as well as the associated organizational and structural changes, and promoting their AI literacy (Schneider et al., 2023, 2024; Cabiddu et al., 2025).

2.2 Criteria of AI ethics from a socio-technical perspective

Ethical discourses specify ethical challenges and point out criteria of responsible AI implementation in organizations. Often emphasized challenges are hidden beneficence, non-maleficence, autonomy, justice, and explicability (e.g., Floridi et al., 2018; Prem 2023; Herrmann & Pfeiffer, 2023).

At the same time scholars go beyond a list of criteria and elaborate on context-specific consideration of responsible AI application (Widder & Nafus, 2023; Herrmann & Pfeiffer, 2023). This is routed in socio-technical systems thinking (Nitsch et al., 2024) reflecting the different ways of enacting a technology under organization-specific conditions (Orlikowski & Scott, 2008; Leonardi & Treem, 2020). Defining responsible AI may thus include technological characteristics as an input factor for a corporate service, job design as a throughput factor of what happens to employees interacting with the technology or effected by the AI system, and consequences for customers or clients as a typical outcome factor (Parker & Grote, 2022; Bankins & Formosa, 2023; Berretta et al., 2023). As different discourses and disciplines highlight distinct criteria of responsible AI, Wilkens et al. (2023) provide a comprehensive overview describing which criteria are associated by which target group. Trustworthiness, privacy and ethics as well as explainability are criteria facing challenges in technology development. These challenges are frequently discussed in computer and information science for AI developers. The criteria of job loss prevention, physical and mental health as well as human agency and augmentation are related to the challenges AI enhances in employee development and job crafting. They are

Technology development	**Explainability**	Transparent data usage and interpretation to improve technology adoption and to provide helpful information to users (e.g., remaining error probabilities)
	Trustworthiness, privacy & ethics	Unbiased data structure and ethical concerns in data collection and usage, with the aim of operating AI reliably and ethically without discrimination
Organizational development	**Accountability & safety culture**	Establishment of systems and organizational routines (e.g., process descriptions or checklists) to ensure reliability and to promote responsibility at system level
	Compensation of weaknesses in the system	Deficit-oriented view to compensate for human fatigue, unstable concentration or cognitive limitations in sensory discrimination
	Knowledge utilization from the user domain	Close integration of the user domain in software development
Employee development	**Augmentation & human agency**	Technology design for an enhanced use by employees who experience empowerment and professionalization through the human-AI interaction
	Physical & mental health	Protecting employees from negative influences such as heavy loads, chemical substances, or stressful interactions
	Job loss prevention	Prevention from negative consequences of new technologies on employment

Table 1: Criteria of responsible AI explored from a transdisciplinary literature review (Wilkens et al., 2023)

often discussed in psychology, sociology and HRM facing the responsibility of supervisors and employee representatives. In addition to that, the criteria accountability and safety culture, compensation of weaknesses in the system, and knowledge utilization from the user domain face challenges of AI concerning organizational design as discussed in engineering studies and organizational science (see Table 1).

In summary, an evaluation of AI guidelines for self-regulation as elaborated in this paper should consider what hard and soft law factors are taken into consideration, what mechanisms of self-regulation in terms of authorities and procedures are implemented, and what concrete (context-specific) criteria of AI ethics are specified.

3. Methodology

3.1 Sampling approach, research design, and data collection

To examine how organizations practice self-regulation through AI guidelines, we systematically evaluated publicly available AI guidelines from the 40 organizations listed on the German share index (DAX40). These organizations have the highest standards in terms of reporting and general corporate governance. Therefore, they should also be the first to report according to a defined AI governance standard. With this selection approach, we were able to ensure a uniform legal framework for all companies (e.g., EU AI Act and General Data Protection Regulation, GDPR), while also including different industries, comparable company sizes, and a common country culture.

We conducted a systematic search strategy (Snyder, 2019) and followed common standards for the structured selection of written material (Page et al., 2021). We searched for information on corporate websites, public archives, PDF documents, financial and annual reports, ethical guidelines, as well as external reports or articles, as AI guidelines are not necessarily explicitly labeled as such. In addition to this manual search, we use Boolean operators to combine the keywords *artificial intelligence, AI, machine learning, ML*, or *intelligent technology* with the keywords *guideline, declaration, standards, digital strategy, framework, whitepaper,* or *regulation* in Google's search engine and in the search functions of the corporate websites. We excluded documents that did not specifically relate to the use of AI within the organization or that merely provided general examples of AI use without addressing the underlying intentions or governance practices for its use within the organization, as well as documents written in languages other than English or German. The systematic data collection took place from October to November in 2023, followed by further refinement from October to November in 2024 to include potential reactions of the entry into force of the EU AI Act in August 2024. Since the database for the two collection dates did not differ significantly, no differentiation is made between the collection dates in the analysis.

Following the systematic data collection, 95 documents were identified for in-depth analysis and then classified according to document type and thematic focus. Documents that explicitly deal with ethical principles for the development and use of AI and are presented as stand-alone or clearly defined policy documents were categorized as AI guidelines. These primarily include dedicated AI codes, codes of conduct, and white papers. In addition, other corporate publications such as annual reports or sustainability reports, as well as information on the company website, were classified as supplementary contextual documents if they contained references to AI-related activities, structures, or responsibili-

ties. This classification served to structure the heterogeneous document corpus and create a transparent database for subsequent analysis procedures. All analyzed information and documents are stored as PDF-files in a digital repository and are available on request from the authors (see Figure 2).

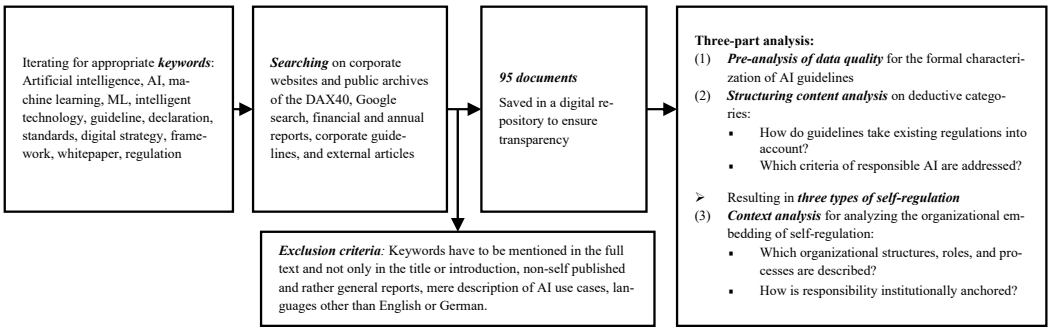

Figure 2: Flow chart of the search strategy and the evaluation process - Flow chart according to Page et al. (2021)

3.2 Data coding and data analysis

The data analysis followed a semi-systematic three-part process combining qualitative and quantitative indicators (Snyder, 2019). As a pre-analysis, we distinguished the quality of the data source, as it is not identical for all DAX40 companies, but indirectly indicates to what extent and in what depth companies show awareness and give attention to ethical challenges of AI. The varying quality of the available data is therefore provided as supplementary information and is based exclusively on documents classified as dedicated AI guidelines. Based on this, we assessed in the main evaluation the extent to which AI guidelines take existing regulations into account. We coded what regulations are explicitly mentioned in the guidelines, specifically referring to the EU AI Act, national laws, and industry-specific regulations that are referenced in the context of AI use, such as DORA. Moreover, we examined which criteria of responsible AI are addressed in the guidelines. We referred to the catalogue of criteria and their underlying definitions as outlined in Table 1. The coding refers to the meaning in corporate documents more than to explicit wording as this is not always identical to the scientific outlines. Building on this analytical procedure, the variations in how organizations address the criteria reveal distinct patterns of self-regulation. These patterns consolidate into three overarching types of self-regulatory approaches, which differ in external explicitness of their guidelines and considered criteria of AI ethics.

In the third part of the data analysis, we drew on supplementary documents to contextualize how self-regulatory efforts are implemented beyond formalized guideline mechanisms. We focused on the organizational structures, roles, and processes described, and on how responsibility is institutionally anchored. (Schneider et al., 2023, 2024). Based on a structuring content analysis (Mayring & Fenzl, 2014; Mayring, 2019), the coding scheme is used independently by two coders in a deductive manner, considering an intercoder-reliability (Lombard et al., 2022).

4. Findings

The following subsections outline the three identified types of AI self-regulation in sequential order (see Table 2). *Type 1 – Non-codified self-regulation* comprises approaches without publicly accessible AI guidelines, but which do provide information on governance measures. *Type 2 – Symbolic technical self-regulation* includes guidelines that translate selected principles into technical artifacts or processes, but are often only partial or illustrative in nature. *Type 3 – Comprehensive socio-technical self-regulation* encompasses guidelines that pursue a distinct socio-technical perspective by linking ethical principles with concrete organizational and technical measures, thereby demonstrating how these principles are implemented in daily operations. These characterizations provide an initial overview, which will be further detailed and empirically substantiated in the course of this paper.

			Pre-analysis of data quality		Content Analysis								
	DAX40 Organizations	Segment	Formal Preparation	Scope & Depth	Reference of existing regulations relating to the use of AI	Explain-ability*td	Trustworthiness, privacy & ethics*td	Accountability & safety culture*od	Compensation of weaknesses in the system*od	Knowledge utilization from the user domain*od	Augmentation & human agency*ed	Physical & mental health*ed	Job loss prevention*ed
Type 3- Comprehensive socio-technical self-regulation	Allianz	Finance	Guidelines on homepage	Compre-hensive	Orientation toward existing regulations	x	x	x		x	x		
	Bayer	Chemicals, Pharmaceuti-cals, Medical Technology	Code of Conduct		Orientation toward existing regulations	x	x	x		x	x	x	
	BMW	Mechanical engineering, transportation, logistics	AI Ethics Code		Orientation toward existing regulations, explicit reference to EU AI Act	x	x	x			x	x	
	Commerzbank	Finance	AI Principles		Orientation toward existing regulations, explicit reference to EU AI Act	x	x	x			x	x	x
	Continental	Mechanical engineering, transportation, logistics	Guidelines on homepage		Orientation toward existing regulations, explicit reference to *Ethics Guidelines for Trustworthy AI* (AI HLEG) and *Ethically Aligned Design* (IEEE)	x	x	x			x	x	
	Deutsche Telekom	Electronics, hardware, software	Digital Ethics Guidelines on AI		Orientation toward existing regulations, explicit reference to EU AI Act	x	x	x	x	x	x	x	x
	Infineon	Electronics, hardware, software	AI Manifest		Orientation toward existing regulations	x	x	x	x		x	x	
	Mercedes-Benz Group	Mechanical engineering, transportation, logistics	Guidelines on homepage		Orientation toward existing regulations	x	x	x			x		x
	Merck	Chemicals, Pharmaceuti-cals, Medical Technology	Code of Digital Ethics		Orientation toward existing regulations	x	x	x		x	x	x	
	SAP	Electronics, hardware, software	Global AI Ethics Policy		Orientation toward existing regulations	x	x	x			x		
	Volkswagen	Mechanical engineering, transportation, logistics	Ethical Principles for AI		Orientation toward existing regulations	x	x	x			x		x

			Pre-analysis of data quality		Content Analysis								
	DAX40 Organizations	Segment	Formal Preparation	Scope & Depth	Reference of existing regulations relating to the use of AI	Explain-ability*td	Trustworthiness, privacy & ethics*td	Accountability & safety culture*od	Compensation of weaknesses in the system*od	Knowledge utilization from the user domain*od	Augmentation & human agency*ed	Physical & mental health*ed	Job loss prevention*ed
Type 2 – Symbolic-technical self-regulation	Airbus	Mechanical engineering, transportation, logistics	Guidelines on homepage	Super-ficial	Orientation toward existing regulations, explicit reference to *Ethics Guidelines for Trustworthy AI* (AI HLEG) and *Trustworty AI building blocks* (EASA)	(x)	(x)	(x)			(x)	(x)	(x)
	BASF	Chemicals, Pharmaceuti-cals, Medical Technology	Code of Conduct		Orientation toward existing regulations	(x)	(x)					(x)	
	Daimler Truck	Mechanical engineering, transportation, logistics	Code of Conduct		Orientation toward existing regulations	(x)	(x)	(x)					(x)
	Deutsche Bank	Finance	Guidelines on homepage		Orientation toward existing regulations, explicit reference to *Ethics Guidelines for Trustworthy AI* (AI HLEG)	(x)	(x)	(x)			(x)		
	E.ON	Energy and raw materials	White Paper		Orientation toward existing regulations, explicit reference to *GDPR*	(x)	(x)		(x)				
	Henkel	Chemicals, Pharmaceuti-cals, Medical Technology	Code of Conduct		Orientation toward existing regulations, explicit reference to *GDPR*	(x)	(x)	(x)					
	Siemens	Electronics, hardware, software	Sustainability Re-port		Orientation toward existing regulations, explicit reference to *EU AI Act* and *GDPR*	(x)	(x)	(x)			(x)		
	Siemens Health-ineers	Chemicals, Pharmaceuti-cals, Medical Technology	Sustainability Re-port		Orientation toward existing regulations, explicitly refer-ence to *EU AI Act* and *GDPR*	(x)	(x)	(x)			(x)		

			Pre-analysis of data quality		Content Analysis									
	DAX40 Organizations	Segment	Formal Preparation	Scope & Depth	Reference of existing regulations relating to the use of AI	Explain-ability*td	Trustworthiness, privacy & ethics*td	Accountability & safety culture*od	Compensation of weaknesses in the system*od	Knowledge utilization from the user domain*od	Augmentation & human agency*ed	Physical & mental health*ed	Job loss prevention*ed
Type 1 – Non-codified self-regulation	Beiersdorf	Chemicals, Pharmaceuticals, Medical Technology	no formal preparation	no formal preparation	Orientation toward existing regulations								
	Covestro	Chemicals, Pharmaceuticals, Medical Technology			Orientation toward existing regulations								
	MTU Aero Engines	Mechanical engineering, transportation, logistics			Orientation toward existing regulations								
	Münchner Rück	Finance			Orientation toward existing regulations, explicitly reference to *Ethics Guidelines for Trustworthy AI* (AI HLEG)								
	Porsche	Mechanical engineering, transportation, logistics			Orientation toward existing regulations								
	RWE	Energy and raw materials			Orientation toward existing regulations								
	adidas	Retail and Consumer Goods			No explicit reference to AI related regulation								
	Brenntag	Chemicals, Pharmaceuticals, Medical Technology			No explicit reference to AI related regulation								
	Deutsche Börse	Finance			Orientation toward existing regulations and positioning to the European Comission's *White Paper on AI – A European Approach*								
	Deutsche Post	Mechanical engineering, transportation, logistics			Orientation toward existing regulations								
	Fresenius	Chemicals, Pharmaceuticals, Medical Technology			No explicit reference to AI related regulation								
	Hannover Rück	Finance			Orientation toward existing regulations, explicitly reference to *EU AI Act*								

			Pre-analysis of data quality		Content Analysis								
	DAX40 Organizations	Segment	Formal Preparation	Scope & Depth	Reference of existing regulations relating to the use of AI	Explain-ability*td	Trustworthiness, privacy & ethics*td	Accountability & safety culture*od	Compensation of weaknesses in the system*od	Knowledge utilization from the user domain*od	Augmentation & human agency*ed	Physical & mental health*ed	Job loss prevention*ed
Type 1 – Non-codified self-regulation	Heidelberg Materials	Others			Orientation toward existing regulations								
	Porsche Automobil Holding	Mechanical engineering, transportation, logistics			No explicit reference to AI related regulation								
	Qiagen	Chemicals, Pharmaceuticals, Medical Technology			No explicit reference to AI related regulation								
	Rheinmetall	Mechanical engineering, transportation, logistics			No explicit reference to AI related regulation								
	Sartorius	Chemicals, Pharmaceuticals, Medical Technology			No explicit reference to AI related regulation								
	Siemens Energy	Energy and raw materials			No explicit reference to AI related regulation								
	Symrise	Chemicals, Pharmaceuticals, Medical Technology			No explicit reference to AI related regulation								
	Vonovia	Real estate			No explicit reference to AI related regulation								
	Zalando	Retail and Consumer Goods			No explicit reference to AI related regulation								

Table 2: Content-related emphasis of self-regulation according to the types of AI guidelines of the DAX40 – Criteria of Wilkens et al. (2023): *td = technology development; *od = organizational development; *ed = employee development. Fulfilment of criteria: empty cell = no explicit reference; (x) = superficially addressed; x = comprehensively addressed

Type 1 – Non-codified self-regulation

Pre-analysis of data quality and content analysis: No formal preparation of defined guidelines or criteria for AI use could be identified from the data material for companies of this type (n = 21). For this reason, the database does not allow for a more in-depth content analysis. It is noteworthy that in individual cases (n = 6), organizations indicate that internal guidelines for the use of AI have been developed. For example, Beiersdorf writes in its 2023 annual report that the company "has published binding legal guidelines within a short period of time that all Beiersdorf employees must observe when using [generative AI] applications" (Beiersdorf, Annual Report 2023, p. 172).

Contextual analysis: Apart from the lack of specific guidelines, there are references in individual cases to existing AI-related regulations and governance measures. Ten of the 21 companies indicate that they take existing regulations into account, with three cases explicitly referring to specific regulations. For example, Hannover Rück emphasizes in its annual report that the company intends to adapt its existing guidelines on the use of AI to the legal requirements of the EU AI Act and is preparing for possible guidelines on AI governance and risk management. Similarly, Münchener Rück refers to efforts at the European level and states in its 2023 annual report that it has developed its own strategy in line with the European Commission's guidelines. In a position paper, Deutsche Börse Group states: "[Most] activities/services provided by AI applications in the financial sector would be regulated by existing rules and laws" (Deutsche Börse Group, Comments on EC's communication, p. 2), which include, among others, the Markets in Financial Instruments Directive II (MiFID II) and the Markets in Financial Instruments Regulation (MiFIR) framework.

In addition, several measures for governing AI are mentioned ranging from individual measures to comprehensive control mechanisms. These include cooperation and strategic partnerships with external partners such as IBM (Deutsche Post) or DFKI (Sartorius) or references to formal governance structures, such as the establishment of a research lab at Sartorius. In the spirit of participation and co-determination, the Heidelberg Materials works council has also taken a position on the use of AI and its possible consequences within the company. Covestro, on the other hand, refers to employee training on the opportunities, risks, and reflective use of AI. In two selected cases, a combination of several measures became apparent, such as MTU Aero Engines, which refers to its collaboration with applied AI to develop not only an AI strategy, but also a competence center that promotes implementation guidelines, training concepts, and measures to raise awareness of AI within the company. RWE's measures are similarly comprehensive and comprise an AI research laboratory, an AI control framework to guide and support future AI projects, and the involvement of all necessary stakeholders and employee representatives. This reflects the efforts of organizations to address the internal use of AI.

Due to the lack of dedicated guidelines and isolated references to governance measures, we refer to this type as *non-codified self-regulation*. The crucial point is that self-regulation mechanisms evolve, while the content of what is regulated in particular remains unspecified for externals.

Type 2 - Symbolic-technical self-regulation

Pre-analysis of data quality: Organizations of this type (n = 8) report in greater detail on their use of AI and provide specific examples of its application. They choose different ways of presenting this information, ranging from general references to guidelines on their homepages to official documents such as codes of conduct or annual reports, in which they address the use of AI in the company in specific paragraphs and refer to superficial criteria.

Content analysis: With regard to the consideration of existing legal and regulatory frameworks in relation to AI, all organizations refer either implicitly to alignment with existing regulations or explicitly to regulatory efforts at the European level, such as the Ethics Guidelines for Trustworthy AI from the High-Level Expert Group on AI (AI HLEG) or the EU AI Act. This is illustrated by the example of Siemens, which applies "generally accepted and trustworthy AI frameworks to AI tools [in anticipation of the] upcoming AI regulation in the EU" (Siemens, Sustainability Report 2023, p. 35). Airbus stands out in particular by referring to the industry-specific regulations of the European Aviation Safety Agency (EASA), which has developed trustworthy AI building blocks for the aviation industry based on the Ethics Guidelines for Trustworthy AI, which are relevant for the development of aircraft.

With regard to the anchoring of ethical principles, the data reveals loosely listed criteria for the use of AI, as well as descriptions formulated by organizations for dealing with ethical challenges. The data shows that all organizations refer to the criteria of technology development in terms of *explainability* and *trustworthiness, privacy & ethics*, followed by the criteria of *accountability & safety culture*, and *augmentation & human agency*, in their statements. Other criteria are given less consideration, and the criterion of *knowledge utilization from the user domain* is not considered at all. In the case of Airbus, for example, it was possible to assign criteria using defined principles such as "accountability and transparency" and "safety first," which refer to the criteria of *accountability & safety culture*. In cases where there were no explicit criteria, but only descriptions, it was possible to classify them based on the indirect meaning of the statement. This becomes clear in the case of BASF, where the statements in the code of conduct to the effect that the company uses technologies inclusively as part of its digital responsibility and seeks to avoid reinforcement effects and unfair distortions could be linked to the criterion of *trustworthy AI*.

Contextual analysis: Apart from ethical considerations, the documents also refer to measures like cooperation and strategic partnerships (e.g., BASF) and include participation and co-determination initiatives like the involvement of employee representatives and the development of a group agreement to address AI-induced changes (e.g., Daimler Truck). In addition, measures to prepare and train employees are mentioned, as well as formal governance structures and oversight initiatives, through Deutsche Bank's Artificial Intelligence Oversight Forum (AIOF), to "ensure appropriate monitoring and risk assessment of AI solutions and their alignment with the bank's strategic goals" (Deutsche Bank, non-financial report 2023, p. 141).

Since the individual criteria are not explained in detail and mainly refer to technological aspects, with only partial reference to supplementary governance measures, we refer to this type as *symbolic-technical self-regulation*.

Type 3 - Comprehensive socio-technical self-regulation

Pre-analysis: Organizations of this type (n = 11) publish comprehensive guidelines on their websites, in documents such as a code of conduct or in explicit AI documents (e.g., AI manifesto, AI code, or similar), in which they define principles for the responsible use of AI and supplement these with further explanations on how to translate them into operational practice.

Content analysis: With regard to the consideration of existing legal and regulatory frameworks in relation to AI, companies are adopting approaches that vary in scope. Bayer, for example, points out that AI is used within the applicable legal and ethical framework. Continental devotes a separate section to this topic in its Code of Ethics for AI and addresses laws, regulations, as well as Continental's own rules, standards, and instructions. Deutsche Telekom, in turn, mentions in its annual report that it is preparing for the implementation of the EU AI Act, and Commerzbank is aligning its efforts with the EU AI Act and comments on regulatory developments at the European level in a separate paper.

Concerning the anchoring of ethical principles, all corporations emphasize criteria of technology development, as well as *accountability and safety culture* and *augmentation and human agency* referring to organizational and personnel development. While the criterion *physical and mental health* is still considered comparatively often, the remaining criteria are considered less often. The organizations do not only specify principles, but also explain how they are implemented in practice and, in some cases, who is responsible for their further development and compliance within the company. The Mercedes-Benz Group, for example, addresses the criterion of explainability by emphasizing its commitment to maintaining a high level of transparency in the use of AI in order to promote trust in AI systems and gives further explanations of how this is achieved.

Contextual analysis: With regard to governance initiatives, type 3 companies include more references and are increasingly focusing on establishing formal accountability structures and oversight, as well as organizational and normative anchoring, which aim to implement the defined guidelines and embedded principles for the use of AI in the culture of the organization. These include dedicated organizational units such as a data advisory board (Allianz), various working groups and expert groups (Deutsche Telekom), and committees, panels and offices with different areas of responsibility (SAP). In addition to this, references can be found to the founding of competence centers (e.g. BMW). Particularly noteworthy are the approaches taken by Continental, Deutsche Telekom, and SAP. Continental defines so-called “AI owners”, who are responsible for implementing the guidelines and ensuring compliance withing the company. Deutsche Telekom and SAP complement their guidelines with comprehensive measures, such as interdisciplinary working groups, expert panels on specific topics such as ChatGPT, prompt-a-thons to promote a culture of enablement within the company, assessments to ensure the implementation of AI requirements, and many more.

Since these companies take all socio-technical dimensions into account in their guidelines and supplement them with organizational initiatives for the responsible use of AI, we refer to them as c*omprehensive socio-technical self-regulation*.

5. Discussion and limitations

The debate on AI ethics is not uniformly aligned with corporate governance. In our analysis, we evaluate the self-regulation documents of DAX40 companies to gain deeper insight into how these companies are preparing for future governance requirements and to what extent they refer to criteria that are considered in the debate on AI ethics.

The analysis shows that DAX40 companies have a common ground for designing and applying AI guidelines in terms of compliance with existing regulations, the establishment of predominantly technical ethical principles, and supplementary governance initiatives. Differences primarily exist in the formal preparation of the guidelines and the criteria that go beyond technical aspects, from which three types of self-regulation could be derived. Type 1 is characterized by the absence of a dedicated and publicly available AI guideline, with ethical challenges related to AI addressed only indirectly or in a fragmented manner across other corporate documents. Type 2 companies articulate explicit ethical principles within standalone AI guidelines, yet limit their scope to a selective set of ethical challenges. In contrast, type 3 reflects a comprehensive socio-technical approach to AI self-regulation, engaging with a broad range of ethical considerations discussed in the AI ethics literature and systematically linking them to organizational practices and governance structures. This suggests that type 3 companies are highly aware of AI challenges in their operational business.

The differences identified between the types cannot be attributed entirely to industry affiliation or other similarities in contextual factors. However, it is interesting to note that companies in the electronics, hardware, and software sectors are particularly strongly represented in type 3. The core business of these companies revolves around data, which means that AI is more than just a tool for a support process. It is often part of the solution offered. Other companies represented in type 3 have a long tradition of co-determination by works councils, as it is known from the automotive industry. Further interpretation of the antecedents of different types requires further future research with more in-depth analysis of the corporations.

While companies are currently fundamentally free to design their own AI self-regulation, DAX40 companies are used to foster transparency for governance reasons due to their size, regulatory interdependence, and economic and social significance in other governance fields. Thus, they are expected to go beyond minimum standards of co-determination and prepare for future governance requirements. As long as there is no overarching legally obliged standard in reporting, self-regulation might even help to differentiate while demonstrating early adoption and high responsibility for AI usage as a strategic factor.

Against the backdrop of corporate governance research in general (Di Vito & Trottier, 2022; Mueller, 2022) and AI governance research in particular (Birkstedt et al., 2023; Batool et al, 2025), our findings underscore that the self-regulatory mechanisms of checks and balances for addressing ethical challenges are at the heart of new governance issues. It is AI governance as an incremental feed-forward practice that sets in motion a gradual process of further development. Even if companies remain rather vague about the importance of AI ethics, they are developing control bodies and reporting mechanisms to demonstrate their responsibility. In line with Hickman and Petrin (2021), we therefore conclude that self-regulatory mechanisms should be considered and recognized as a starting point for AI governance, even if they cannot replace a comprehensive AI governance structure.

By analyzing AI guidelines for self-regulation among DAX40 companies and developing a typology, we build on former scholars' work on AI governance (e.g., Mäntymäki et al., 2022a; Schneider et al., 2024; Papagiannidis et al., 2025) by making previously undefined forms of corporate self-regulation visible with the help of a comparative content analysis. Our typology not only reflects differences identified in earlier work (e.g., Jobin et al., 2019; Hagendorff, 2020), but also clarifies their origin. Differences result from a varying scope of ethical criteria addressed and the already implemented governance mechanisms to monitor effects and operate control. In doing so, we also build an empirical bridge between established governance models and corporate self-regulation activities indicating contextualized measures that can be considered as pre-stage practices towards an AI governance.

The analysis can be considered as a starting point for further research. We would first like to encourage empirical validation to investigate whether advancements in self-regulation or exceeding minimum standards offer advantages either in organizational internal technology acceptance or as external competitive advantages in the different markets of the DAX40. We assume that there are differences between markets, whether high standards in AI ethics matter or not. Thus, it will be interesting to find out for which industries and under what conditions high AI governance standards may have competitive impact. The contribution of this paper is to make empirically validated distinctions of the independent variable while specifying different types of coping with challenges of AI ethics.

With respect to regulatory research, it remains an open and important question to what extent socio-technical criteria will be considered for future legal frameworks, and which initiatives may foster a more nuanced socio-technical understanding of AI ethics in regulatory communities.

The typology developed in this paper helps politicians, companies, and scientists alike. For politicians, the different types indicate whether and to what degree companies cope with ethical challenges in a manner that demonstrates high self-obligation. Only about a quarter of DAX40 corporations anticipate risks of broader scope, while most corporations neglect in particular social challenges when implementing AI. This is an important insight for the development of legal obligations. In addition, the typology provides information for managers responsible for corporate decision-making on which criteria of AI ethics and mechanisms for checks and balances can be activated to demonstrate a high level of risk awareness. The study reveals that AI self-regulation can be considered strategically when going beyond minimum requirements, especially as long as general standards for all corporations are not legally binding. Moreover, the typology can serve as a guide for step-by-step implementation of an AI governance structure and highlight, which measures (e.g., ethics council, risk management, etc.) are crucial for documenting advancements. At the same time, the study underscores the importance of actively anticipating regulatory developments, choosing a clear governance logic, operationalizing guidelines, and aligning the intent of AI use with the guidelines and governance measures.

Like any other study, this study is not without limitations. First, the generalizability of the results is limited. The analysis of DAX40 corporations was a conscious sampling decision to focus on those corporations where one can expect the most advanced preparations for AI governance, in order to analyze not the mean but the leading edge of corporations. Since only a minority of DAX40 corporations have developed advanced self-regulatory

approaches, it can be assumed that such standards are even less established among other companies. Second, the focus on publicly available information and documents carries the risk of incompleteness. We have taken this risk into account by also highlighting in type 1 that individual companies have guidelines that are not directly accessible, but whose existence can be verified through references and accompanying governance measures. Third, the time perspective is a crucial variable, especially in this dynamic subject area. Policies are likely to evolve dynamically in line with technical and regulatory developments, meaning that at the time of analysis, we were only able to gain a snapshot insight into the state of self-regulation. However, we have attempted to counteract this by translating the individual results of the companies into an overarching typology that represents a more time-independent systematization and sharpens the theoretical understanding of the design and use of AI policies in organizations.

6. Conclusion and outlook

Organizational AI guidelines for self-regulation are just one component of a complex regulatory approach that includes soft law components, legally binding regulations, and practical implementation to promote the ethical use and development of AI (Batool et al., 2025; Maman & Feldman, 2025). This study shows that AI guidelines and complementary governance measures represent an approach to corporate self-regulation that can both promote the responsible use of AI in organizations and contribute to the overarching social discourse and regulatory developments. It becomes evident that it is not only the mere existence of guidelines that matters, but also their design, referenced ethical principles, and supplementation with additional governance measures.

AI is increasingly finding its way into corporate reporting and is already being treated as a central component of future corporate social responsibility reporting (e.g., Camilleri, 2024). With comprehensive socio-technical approaches to self-regulation, organizations are taking a significant step toward comprehensive AI governance structures.

Ultimately, however, the potential and effectiveness of these approaches can only be verified by looking at internal governance processes. We therefore encourage future research to empirically validate whether advancements in self-regulation provide any organizational internal or market-based advantage.

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