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Algorithmic ethics and economic regulation: how do antitrust authorities address the risks of AI?

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The integration of Artificial Intelligence (AI) into competition authorities to detect anti-competitive practices entails inherent ethical risks, such as algorithmic bias and excessive dependence on technology providers. To mitigate these risks, this article investigates how thirty-five regulatory authorities, ranked in the 2023 GCR Enforcement Rating, address these challenges. A document analysis, carried out using ATLAS.ti25, compares these organizations based on five ethical principles (transparency, accountability, fairness and equity, robustness and security, and privacy), grounded in consolidated frameworks in AI ethics and protection bioethics. The results reveal a critical disparity in regulatory maturity: greater technical rigor is observed in operational ethics principles (robustness, privacy, and security) than in social ethics principles. Substantial deficiencies persist in transparency, accountability, and fairness/equity. This gap points to a deficit in the core principle of explainability (encompassing both intelligibility and accountability). The main cause lies in the absence of clear procedures and limited disclosure regarding the use of AI in the core activities of these organizations. The study concludes that strengthening ethical leadership and establishing organizational accountability mechanisms are essential to ensure the fair and transparent application of AI in economic regulation.

Keywords: artificial intelligence, economic regulation, algorithmic ethics, explainability, public integrity.

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Ética algorítmica e regulação econômica: como autoridades antitruste enfrentam os riscos da IA?

A integração da Inteligência Artificial (IA) em órgãos de defesa da concorrência para identificar práticas anticompetitivas acarreta riscos éticos inerentes, como o viés algorítmico e a dependência excessiva de fornecedores de tecnologia. Visando mitigar tais riscos, este artigo investiga como 35 autoridades reguladoras, classificadas pelo *Global Competition Review* (GCR) *Enforcement Rating* de 2023, abordam esses desafios. Por meio de uma análise documental realizada com o auxílio do ATLAS.ti25, comparam-se as organizações com base em cinco princípios éticos (Transparência, Responsabilidade/*Accountability*, Justiça e Equidade, Robustez e Segurança, e Privacidade), fundamentados em frameworks consolidados de ética da IA e bioética de proteção. Os resultados demonstram uma disparidade crítica na maturidade regulatória: observa-se maior rigor técnico em princípios de ética operacional (Robustez, Privacidade e Segurança) do que em princípios de ética social. Persistem deficiências substanciais em Transparência, Responsabilidade e Justiça/Equidade. Essa lacuna aponta para um déficit no princípio central da Explicabilidade (que engloba a inteligibilidade e a prestação de contas). A causa principal reside na ausência de procedimentos objetivos e na falta de divulgação sobre o uso da IA para a atividade-fim dessas organizações. O estudo conclui que o aprimoramento da liderança ética e o estabelecimento de mecanismos organizacionais de prestação de contas são fundamentais para garantir uma aplicação justa e transparente da IA na regulação econômica.
Palavras-chave: inteligência artificial, regulação econômica, ética algorítmica, explicabilidade, integridade pública.

Ética algorítmica y regulación económica: cómo las autoridades antimonopolio enfrentan los riesgos de la IA?

La integración de la inteligencia artificial (IA) en las órganos de defensa de la competencia para identificar prácticas anticompetitivas conlleva riesgos éticos inherentes, como el sesgo algorítmico y una dependencia excesiva de proveedores tecnológicos. Para mitigar tales riesgos, este artículo investiga cómo treinta y cinco autoridades reguladoras, clasificadas según el Rating de Cumplimiento de la Global Competition Review (GCR) de 2023, abordan estos desafíos. A través de un análisis documental llevado a cabo mediante ATLAS.ti25, se comparan las organizaciones basándose en cinco principios éticos: Transparencia, Responsabilidad (*Accountability*), Justicia y Equidad, Robustez y Seguridad, y Privacidad, fundamentados en marcos consolidados de ética de la IA y bioética de protección. Los resultados revelan una disparidad crítica en la madurez regulatoria: se observa un mayor rigor técnico en los principios de ética operacional (Robustez, Privacidad y Seguridad) que en los de ética social. Persisten deficiencias sustanciales en Transparencia, Responsabilidad y Justicia/Equidad. Esta brecha apunta a un déficit en el principio central de Explicabilidad (que abarca tanto la inteligibilidad como la rendición de cuentas). La causa principal radica en la ausencia de procedimientos claros y en la falta de divulgación sobre el uso de la IA para el propósito central de estas organizaciones. El estudio concluye que el fortalecimiento del liderazgo ético y el establecimiento de mecanismos organizacionales de rendición de cuentas son esenciales para garantizar una aplicación justa y transparente de la IA en la regulación económica.
Palabras clave: inteligencia artificial, regulación económica, ética algorítmica, explicabilidad, integridad pública.

1. INTRODUCTION

Artificial Intelligence (AI) has emerged as a transformative force in public governance practices, with growing implications for global economic regulation. In the antitrust field, its incorporation into investigative processes and the analysis of business conduct has significantly expanded the capacity to detect cartels, mergers, and anti-competitive practices (Lu et al., 2019; von Ingersleben-Seip, 2023). However, by shifting decision-making toward complex algorithmic systems, this integration of AI raises a set of highly intricate ethical and institutional dilemmas. A critical question therefore arises: how can competition authorities ensure transparency, accountability, and fairness in automated decision-making processes that affect fundamental economic rights?

This question defines the central research problem of this article: to examine how competition authorities incorporate ethical principles into the adoption and use of AI, and whether the institutional maturity of these practices is sufficient to mitigate risks to regulatory integrity and public trust.

The relevance of this problem stems from a global normative movement toward the institutionalization of "algorithmic ethics" (Floridi & Cowls, 2019; Jobin et al., 2019). Since 2018,

several jurisdictions have formulated national strategies and regulatory frameworks — such as the German AI Strategy, Singapore's Model AI Governance Framework (Singapore Government, 2019), and the European Union's AI Act (Veale & Borgesius, 2021) — reflecting efforts to establish digital governance parameters aligned with the principle of human dignity.

Yet despite the proliferation of normative declarations, a critical gap persists in empirical evidence about how regulatory bodies operationalize such principles in concrete AI governance practices. While the literature highlights risks such as algorithmic bias, decision-making opacity, and technological dependency (Raji & Dobbe, 2023; Schmude et al., 2023), little is known about the ethical maturity of AI systems employed by antitrust authorities and, crucially, whether institutional factors (such as budget and staff stability) meaningfully influence this maturity.

This study addresses this gap through a comparative analysis of 35 competition authorities listed in the Global Competition Review (GCR) – Enforcement Rating 2023. The investigation draws on the five principles of Floridi and Cowls (2019) – Transparency, Accountability, Justice and Fairness, Robustness and Security, and Privacy – articulated with Schramm's (2008) bioethical principles of protection, which emphasize harm prevention and the safeguarding of vulnerable groups. Integrating these traditions allows us to assess whether the regulatory frameworks analyzed transcend formalism to promote protective governance.

Methodologically, the research employs documentary analysis supported by ATLAS.ti25, combining qualitative findings with institutional capacity indicators. In addition, we apply multiple regression models to test the hypothesis that institutional profiles influence regulatory ethical maturity, alongside regional correlation analyses. This multidimensional approach enables an original empirical contribution to debates on how antitrust organizations can use AI in a fair and transparent manner consistent with the requirements of democratic and protective governance.

The data reject the premise that ethical maturity is a linear byproduct of available budgetary resources. Instead, we observe an 'ethical maturity saturation' phenomenon, in which incremental financial investment tends to prioritize technical robustness at the expense of transparency. This trajectory fails to pierce system opacity, thereby maintaining a persistent explainability deficit even within high-income jurisdictions.

Beyond this introduction, the article is structured into four sections. The first presents the theoretical framework, linking the meta-principle of explainability to the bioethics of protection within the context of algorithmic governance by economic regulatory bodies. The second details the methodological procedures, emphasizing documentary analysis via ATLAS.ti25 and the applied statistical modeling. The third presents the analysis and discussion of results, contrasting ethical maturity and institutional capacity across regional clusters. Finally, the fourth section synthesizes the findings and proposes guidelines for strengthening democratic and protective algorithmic governance.

2. THEORETICAL FRAMEWORK

2.1 Explainability as a Meta-Principle in Ethical AI Governance

The expansion of Artificial Intelligence (AI) serves as a sociotechnical transformation vector that restructures labor and public management (Hoch & Engelmann, 2023; Roberts et al., 2021); however,

it introduces systemic risks that demand a sophisticated regulatory response. The central problem lies in power asymmetries and the concentration of AI development within a limited number of organizations (Agar, 2020; Crawford, 2021). This concentration challenges the capacity of existing regulatory structures, which are often considered structurally ill-equipped to handle such technological dynamism (Bélisle-Pipon et al., 2021; Häußler, 2021).

This landscape of concentrated risk and incipient governance has driven a consensus that ethics must be central to AI (Bostrom & Yudkowsky, 2011; Etzioni & Etzioni, 2017; Coeckelbergh, 2020). The global response has manifested as a "proliferation of principles"—an extensive production of guidelines by governments, industry, and academia (Fjeld et al., 2020; Jobin et al., 2019; Ryan & Stahl, 2020) aimed at guiding stakeholder conduct and mitigating misuse (Floridi et al., 2018; Greene et al., 2019).

To transcend this normative dispersion, the present study adopts the unified framework proposed by Floridi and Cowls (2019), which consolidates AI ethics into five principles anchored in the principalist bioethical tradition (Beauchamp & Childress, 2001):

1. Beneficence: A focus on well-being and the public interest.
2. Non-maleficence: The duty to prevent harm and ensure the Robustness and Security of systems.
3. Autonomy: Ensuring that AI remains under human control and decision-making capacity.
4. Justice: A commitment to Fairness and the mitigation of discriminatory biases.

The fundamental contribution of Floridi and Cowls (2019) lies in elevating Explainability to the status of a meta-principle. In opaque algorithmic systems, classical ethical principles become unenforceable without a mechanism to enable their verification. Explainability bridges this gap, materializing in two complementary dimensions: (1) epistemological intelligibility, which underpins transparency regarding the system's internal workings; and (2) ethical accountability, which institutionalizes the traceability of decisions.

In the antitrust context, this requirement takes on critical dimensions. The absence of explainability in automated decisions shifts the problem from a 'universal vulnerability' to a 'concrete harm manifestation' (vulneração) (Schramm, 2008). When a regulated agent is deprived of understanding the criteria behind a sanction, the transparency deficit ceases to be merely a technical flaw and becomes a barrier to the exercise of the right to an adversarial process and a legal defense.

Therefore, the challenge of AI governance in competition authorities—reflected in high-risk examples (Biondi & Cernev, 2023)—transcends mere staffing or budgetary increases. It demands a paradigmatic shift that prioritizes Transparency and Accountability over pure technical excellence, ensuring that the development and application of AI are conducted in a democratic and protective manner (Stahl, 2021). Ultimately, the insufficiency of institutional maturity in implementing Explainability represents the most significant risk to the integrity of regulatory decisions.

1.2 The Use of AI by Economic Regulation Boards

Interest in integrating Artificial Intelligence into competition regulatory bodies is growing (Smuha, 2021), driven by the technology's ability to process vast data volumes and identify complex patterns of

anti-competitive practices, such as price-fixing and collusion (OECD, 2021). Advanced AI techniques, such as e-commerce data analysis and predictive modeling, have proven effective in anticipating and investigating anti-competitive behavior (Bodrick et al., 2024), thereby enhancing regulatory effectiveness and efficiency (Arner et al., 2021; Schrepel, 2021).

However, this accelerated adoption is intrinsically linked to ethical risks: massive data collection and analysis raise Privacy and Security concerns (Biondi & Cernev, 2023), while dependence on third-party providers and algorithmic opacity compromise the Autonomy and Accountability of regulatory bodies (Raji & Dobbe, 2023). The literature indicates that a lack of algorithmic transparency and the use of biased datasets can result in unfair or discriminatory decisions (Ezrachi & Stucke, 2019).

Ethical risks associated with AI use in any domain, including antitrust, were categorized by Cave and ÓhÉigeartaigh (2018) into (1) autonomy risks, (2) justice risks, (3) explainability risks, and (4) collaboration risks. These risks align directly with the principles of the Floridi and Cowls (2019) unified framework—Non-maleficence, Autonomy, Justice, Beneficence, and, notably, Explainability—which serve as the core structure for regulatory analysis.

While the Floridi and Cowls (2019) framework provides a universal foundation for AI ethics, the integration of Schramm's (2008) Bioethics of Protection (BP) fulfills a crucial purpose for the originality of this study: shifting the focus from vulnerability (a universal condition and potential for harm) to harm manifestation (the concrete and actualized manifestation of harm).

Schramm (2008) establishes a fundamental distinction of Latin American origin, which is essential for evaluating regulatory efficacy:

1. Vulnerability (Potential): The universal human condition, inherent to finitude. All regulated agents are universally vulnerable.
2. Harm manifestation (Act/Fact): The state of being effectively impacted, affected, or wounded by a concrete and demonstrable harm or deprivation.

In the antitrust context, a failure to uphold the ethical principles of Explainability (encompassing Transparency and Accountability) and Justice culminates in the actualized algorithmic harm of economic agents. When a regulatory body's automated decisions are opaque or biased, the ethical deficit transitions from a state of latent vulnerability to one of concrete harm manifestation. This transition necessitates the adoption of protective governance frameworks to safeguard integrity and ensure distributive justice within the market.

3. METHODOLOGICAL PROCEDURES

This study adopts a mixed-methods research design, predominantly qualitative, exploratory, and comparative, complemented by statistical analyses to test hypotheses regarding institutional capacity. The qualitative approach is grounded in a content analysis of official documents of 35 competition authorities identified in the GCR – Enforcement Rating 2023. The documentary corpus was constructed from annual reports, governance policies, and ethical/technical AI guidelines available

on their respective official websites, categorized using the qualitative analysis software ATLAS.ti25 (Babbie, 2016).

The use of ATLAS.ti25 allowed for the systematization of large volumes of normative data, optimizing the identification of semantic patterns through computer-assisted coding techniques. This approach aligns with the current trend of employing advanced computational models for the efficient processing of information and the prediction of priorities in highly complex technical environments (Bani-Salameh et al., 2021).

The theoretical framework for coding and categorization consists of a two-level system, ensuring the originality and depth of the analysis. In this regard, the primary analytical categories were operationalized according to the universal ethical principles of Floridi and Cowls (2019). Within this framework, Explainability is treated as a cross-cutting principle that underpins Transparency (technical intelligibility) and Responsibility (institutional accountability), forming the social ethics pillar of this study, as shown in Table 1:

TABLE 1 CORRESPONDENCE BETWEEN FLORIDI AND COWLS' PRINCIPLES AND THE STUDY'S ANALYTICAL CATEGORIES

Ethical Principle (Floridi & Cowls, 2019)	Analytical Category (Present Study)	Strategic Ethical Function
Explicability	Transparency and Accountability	Enables understanding and the assignment of responsibility to algorithmic decisions.
Justice	Fairness and Equity	Ensures non-discriminatory decisions and equitable distribution of benefits.
Non-maleficence	Robustness, Safety, and Privacy	Prevents harm and ensures data protection and operational security.
Beneficence	Regulatory Purpose	Directs AI toward the public good and institutional strengthening.
Autonomy	Human Decisional Control	Maintains decision-making power and reversibility over automated systems.

Source: Adapted from Floridi and Cowls (2019).

The framework proposed by Floridi and Cowls is supplemented by Schramm's (2008) Bioethics of Protection (BP). This integration deepens the evaluative scope by shifting the focus from mere vulnerability to the institutional duty to protect against infringement (actual harm). Such an approach enables an assessment of whether the ethical maturity of agencies transcends mere formalism (Table 2).

TABLE 2 PROTECTION PRINCIPLES APPLIED TO AI ETHICS

Bioethical Principle (Schramm, 2008)	Application to AI Ethics	Object of Protection
Non-maleficence	Ensures technical robustness, safety, and the ethical use of data.	Protects against risks, failures, and privacy violations.
Autonomy	Ensures human control and reversible decision-making over algorithms.	Protects freedom of choice and user self-determination.
Justice	Monitors and mitigate algorithmic biases.	Protects equity and prevents discrimination.
Beneficence	Directs AI toward the common good and the public interest.	Promotes collective well-being and market integrity.

Source: Adapted from Schramm (2008).

In this framework, Explicability emerges as a precondition for protection: only systems that are intelligible and auditable allow for the identification of harms, the assurance of autonomy, and the assignment of accountability to agents. The analytical procedure was conducted in three primary stages, aiming for methodological triangulation between qualitative data (ethical codes) and quantitative data (institutional indicators):

(1) Coding of AI-relevant excerpts using ATLAS.ti25 and organizing these codes into five analytical categories (Table 1).

(2) Conducting multiple regressions to formally test the hypothesis that institutional profiles (resources, stability) influence ethical regulatory maturity, as summarized in Table 3.

(3) Cross-referencing ethical maturity (qualitative scores) with institutional indicators, followed by data clustering by global regions. The association between regional means was observed using Pearson's correlation coefficient to provide robustness to the exploratory inferences.

To facilitate the transition from qualitative to quantitative analysis, ethical maturity was operationalized through an ordinal scale from 0 to 4, applied to each analytical category within ATLAS.ti25. Scoring followed criteria for normative density and institutionalization: (0) no mention; (1) generic mention; (2) declaratory guidelines without enforcement mechanisms; (3) specific technical procedures and conduct guides; and (4) evidence of institutionalized audit or accountability mechanisms. This rigor in scoring aims to ensure the replicability of the study and the consistency of the data used in subsequent statistical models.

TABLE 3 SUMMARY OF REGRESSION MODELS: INSTITUTIONAL VARIABLES VS. ALGORITHMIC ETHICAL MATURITY

Analysis	Dependent Variable (Y)	Independent Variables (X)	Objective
Regression 1	Overall Ethical Maturity Score	Budgetary Resources	To determine whether financial resources are correlated with general ethical maturity.
Regression 2	Transparency Score	President of the Board Salary + Total Staff Size	To explore whether investment in human capital and institutional scale affect Transparency scores (linked to Explicability).
Regression 3	Robustness and Safety Score	Average Tenure (years) + % of Senior Staff (5+ years of experience)	To verify whether the stability of the technical body (institutional memory) influences rigor regarding technical and operational principles.

Source: Research Data.

Finally, it is essential to highlight the limitations inherent in this research design. First, the documentary corpus is restricted to public documents, which may overlook undisclosed internal governance practices or, conversely, overestimate purely formal commitments (ethics washing). Additionally, the small sample size in specific regional analyses requires that regression results be interpreted as indicative correlation trends rather than definitive universal generalizations. These limitations, however, do not invalidate the originality of the diagnosis; rather, they serve as a foundation for future investigations that may incorporate primary data or interviews with regulators.

4. DATA ANALYSIS AND DISCUSSION: THE DISSONANCE BETWEEN TECHNICAL MATURITY AND SOCIAL ETHICS

The comparative analysis of the 35 competition authorities, articulating the qualitative assessment of ethical principles with institutional indicators, reveals a critical dissonance: maturity is high regarding technical aspects (operational ethics), yet persistently low in social dimensions (social ethics). The findings demonstrate that institutional maturity is insufficient to mitigate the ethical risks to justice and transparency posed by AI. This conclusion is supported by the triangulation of regional analysis (Table 4) and regression tests (Tables 5 and 6), which decouple ethical advancement from mere financial resource allocation.

TABLE 4 REGIONAL CONTEXTUALIZATION: ETHICAL MATURITY VS. INSTITUTIONAL CAPACITY (AVERAGE)

Region	Average Budget (€ millions)	Average No. of Employees	Average Tenure (Years)	Average Total Ethical Score	Average Robustness/ Privacy (Operational)	Average Transparency/ Justice (Social)
Latin America (LATAM)	8.86	123.6	6.18	6.2	3.6	2.6
Europe (EU/ EEA)	16.29	188.8	6.67	6.75	4.0	2.75
North America (USA)	162.70	1,083	N/A	7	4.0	3.0
Asia-Pacific & Africa (APAC)	22.84	193.8	7.55	6.8	4.0	2.8

Source: Research Data.

The segmentation of jurisdictions into four regional clusters—North America (USA), Europe (European Union/European Economic Area), Asia-Pacific and Africa (APAC), and Latin America (LATAM) was instrumental in contextualizing the heterogeneity of algorithmic ethical maturity. This analysis sought to transcend mere description by establishing links with the theoretical framework encompassing Floridi and Cowls' (2019) ethical principles and the bioethics of protection (Schramm, 2008, 2017). This approach facilitated an identification of how institutional capacity and accumulated human capital (tenure) influence the transition from formal compliance to substantive ethical robustness.

3.1 North America (USA): Massive Resources and the Transparency Challenge

The profile of the U.S. Federal Trade Commission (FTC) serves as a benchmark of scale, operating with a budget of approximately €162.70 million and a staff of 1,083 employees. Although its total score of 7 is the highest, this performance reinforces the primary conclusion of Regression 1 (see Table 5): financial resources are a necessary, yet insufficient, condition for ethical excellence. The resource disparity relative to Latin America (18 times greater) is disproportionate to the marginal gain in scoring (only 0.8 points). This suggests a saturation point in ethical maturity, where additional investment does not translate into improvements in more complex principles.

A perfect score in operational ethics (Robustness/Privacy) (4) aligns with the FTC's regulatory focus on protecting consumers against direct technical harms. However, the persistent challenge in social ethics (3)—specifically regarding Transparency—suggests a difficulty in implementing Floridi and Cowls' (2019) principle of Explicability across the entire decision-making cycle.

3.2 Europe (EU/EEA): Technical Stability and Normative Leadership

Europe exhibits a profile of moderate resources (€16.29 million and 188.8 employees) coupled with high institutional stability, reflected in an average tenure of 6.67 years—the highest among groups with complete data. This stability is pivotal: consistent excellence in operational ethics (4), which matches U.S. performance despite budgetary disparities, suggests that workforce stability and accumulated institutional knowledge (as indicated by Regression 3) are the primary drivers of excellence in Robustness and Security.

Furthermore, the high level of ethical maturity (6.75) reflects a culture of compliance consolidated by regulatory frameworks such as the General Data Protection Regulation (GDPR) and the AI Act (Veale & Borgesius, 2021)—the latter being the first global regulation to categorize AI systems by risk levels. However, Europe shares the common challenge in social ethics (2.75). This gap points to a structural bottleneck in transposing abstract principles of Justice and Transparency into operational mechanisms that ensure autonomy and mitigate human vulnerability, as postulated by the Bioethics of Protection (Schramm, 2008, 2017).

3.3 Asia-Pacific and Africa (APAC): Experience and Technical Rigor

Jurisdictions in this cluster demonstrate a pragmatic approach, supported by frameworks such as the Model AI Governance Framework (Singapore Government, 2019), where social ethics (2.8) is considered, but the primary focus remains on security and technological stability. This group presents a competitive resource profile (€22.84 million) and the highest stability (7.55 years) in the sample. This exceptionally high tenure reinforces the hypothesis of Regression 3: the greater longevity and experience of the technical staff likely enable these jurisdictions to achieve the top score in operational ethics (4) and a total score of 6.8. This slightly surpasses Europe, demonstrating that institutional knowledge is a powerful ethical asset. The high scores in Robustness and Privacy reflect global alignment with technical rigor; however, these jurisdictions maintain a pragmatic stance where social ethics (2.8) is addressed but not prioritized over security and technological stability.

3.4 Latin America (LATAM): Structural Challenges and Ethical Vulnerability

Latin America faces the most significant challenges, operating with the most limited resources (€8.86 million) and the lowest stability (6.18 years). The lower score in operational ethics (3.6) and reduced stability confirm the impact of institutional tenure (Regression 3): high institutional turnover in the region may be undermining the capacity to build and maintain complex Robustness and Security policies, which require the retention of technological talent. The lowest score in social ethics (2.6) represents the most pronounced gap. In a context of limited resources and lower technical capacity, the difficulty in implementing Explicability (Transparency/Accountability) heightens the risk of human vulnerability (Schramm, 2017).

In this scenario, algorithmic opacity is not merely a technical failure but a concrete moral issue, as it prevents regulated individuals and companies from exercising their autonomy and understanding the reasons for the harm or deprivation imposed upon them by AI systems. Although ethical performance is the lowest, a score of 6.2/10 — even with a limited budget — suggests that Latin

American jurisdictions have sought to adopt AI policies efficiently. Nevertheless, structural challenges and instability impede progress toward the more complex governance required for social ethics.

The results of the initial multiple regressions (Table 5) indicated a statistical dissonance. Regressions 1 and 2 (Budget vs. Total Ethics; Personnel vs. Transparency) found no statistical significance, suggesting that ethical advancement is not a linear function of resource quantity.

TABLE 5 SUMMARY OF INITIAL REGRESSION MODELS

Regression Model	Dependent Variable (Y)	Independent Variables (X)	Adjusted R2	p-value (F-stat)	Most Relevant Coefficient (Sign)	Key Conclusion
Regression 1	Total Ethical Maturity Score	Institutional Budget	0.098	0.198	Budget (+0.0076)	Insignificant. Financial resources are not a statistically robust predictor of overall ethical maturity.
Regression 2	Transparency Score	President of the Board's Salary and Number of Employees	-0.084	0.59	None	Insignificant. Quantitative human capital (staff size and compensation) does not explain rigor in Transparency/ Explicability.
Regression 3	Robustness and Security Score	Average Tenure and % of Experience > 5 years	0.347	0.187	Average Tenure (+0.076)	Strong Trend. Technical staff stability (tenure) shows the strongest positive correlation (R2 = 0,347) with technical/operational rigor, though the small sample size (n = 7) precludes formal significance.

Source: Research Data.

The initial statistical analysis (Regressions 1 and 2), which indicated a lack of significance for financial resources (budget) and human capital (staff size) regarding the individual ethical maturity of jurisdictions, does not imply that these factors are irrelevant. On the contrary, this dissonance suggests that ethical effectiveness is a qualitative and cultural challenge rather than a merely quantitative one.

Regional correlations transformed relationships that were statistically insignificant at the individual level (Regressions 1 and 2) into strongly positive associations at the aggregate level. This suggests that institutional factors — specifically budget, personnel, and stability — do influence ethical maturity; however, this effect only becomes clearly manifested when cross-regional resource and cultural differences are contrasted, rather than when testing the internal variance of individual jurisdictions.

Regional correlation should be employed to contextualize and validate the qualitative analysis, rather than to replace the original regression analysis, which remains the formal statistical baseline despite its limitations. Consequently, the strong correlations observed in regional means ($r > 0.78$ across all models) indicate that budget and staffing are indeed factors influencing the regional institutional capacity to internalize ethical requirements. Nevertheless, this effect only surfaced distinctly when contrasting vast differences in scale, as demonstrated in Table 6.

TABLE 6 CROSS-REGIONAL CORRELATION (AGGREGATE LEVEL)

Central Hypothesis	Original Regression (R^2)	Regional Correlation Coeff. (r, N=4)	Correlated Variables	Key Finding & Theoretical Implication
1. Budget vs. Total Ethics	$R^2 \approx 0.098$ (Insignificant)	$r \approx 0.835$ (Strong Positive)	Institutional Budget (X) vs. Total Ethical Score (Y)	Statistical Decoupling: Budget is not a robust predictor at the individual level. The strong regional correlation suggests financial resources are a *necessary* regional condition, but their efficacy is limited by a saturation of ethical maturity (funding alone does not resolve the Explicability deficit).
2. Personnel vs. Social Ethics	$R^2 < 0$ (Insignificant)	$r \approx 0.781$ (Strong Positive)	Number of Employees (X) vs. Social Ethics (Transparency/Justice) (Y)	Qualitative Challenge: Statistical insignificance confirms that Transparency/Explicability cannot be resolved by merely increasing headcounts. The solution is qualitative and cultural, requiring legal mandates and an alignment of accountability cultures to mitigate vulnerability (Schramm, 2008).

Central Hypothesis	Original Regression (R^2)	Regional Correlation Coeff. (r, N=4)	Correlated Variables	Key Finding & Theoretical Implication
3. Stability vs. Operational Ethics	$R^2 \approx 0.347$ (Strong Trend)	$r \approx 0.871$ (Very Strong Positive)	Average Tenure (X) vs. Operational Ethics (Robustness/Security) (Y)	Key Finding: Technical staff stability is the primary predictor of compliance with Non-maleficence and Robustness (Floridi & Cowls). Technical excellence is a direct function of accumulated institutional knowledge, outweighing the importance of budget for this specific ethical pillar.

Source: Research Data.

As demonstrated in Table 6, the correlation between budget and ethical maturity did not prove to be statistically significant. In this sense, empirical evidence points to Technical Staff Stability as the most reliable predictor of algorithmic Non-maleficence. Unlike isolated financial inputs, 'accumulated experience capital' (staff tenure) is what allows agencies to transition from purely declaratory guidelines to institutionalized mechanisms of technical robustness and security. The most expressive finding is the strong positive correlation between institutional stability and operational ethics scores (Robustness and Security), corroborating the trend observed in Regression 3. Jurisdictions with high tenure (such as Europe and Asia-Pacific/Africa) achieve high levels of Robustness, while Latin America, marked by the lowest average tenure, presents the weakest performance.

This result indicates that mastering technical principles — Robustness and Security — is fundamentally a matter of accumulated institutional knowledge. According to Floridi and Cowls (2019), Robustness is a technical principle of non-maleficence; its implementation requires the retention of talent in data science and machine learning over long periods. Therefore, technical staff stability is the primary predictor of compliance with the obligation of technical Non-maleficence in the use of AI.

The primary deficit in the sample is global and lies within the social ethics principles (Transparency, Accountability, and Justice/Fairness), in which no region achieves a maximum score. Even the North American group (USA), despite its massive budget, scores only 3 out of 5 in this regard.

This critical gap points to a failure in implementing the core principle of Explainability (Floridi & Cowls, 2019), which encompasses Intelligibility and Accountability. The challenge is not technological but epistemic and governance-related: algorithmic opacity (transparency deficit) prevents the regulated agent — whether a consumer or a company — from understanding why they were the target of an investigation or sanction. In the context of economic regulation, such opacity transforms universal vulnerability into a concrete harm manifestation (Schramm, 2008). The lack of Justice and Fairness (the lowest score at 3) hinders the exercise of the right to a defense and the adversarial process, constituting a real and demonstrable harm that BP (Bioethics of Protection) requires the regulatory authority to actively mitigate (Schramm, 2017).

The statistical insignificance of Regression 2 (Staff vs. Transparency) confirms that resolving this "explainability crisis" requires more than simply hiring more employees; it demands a cultural shift and the implementation of legal mandates that enforce Human-in-the-Loop and Accountability (principles required by Floridi & Cowls, 2019) at critical points of the decision-making process, regardless of resource volume.

Analyzing the rating data used to characterize the organizations, this finding reveals an intersection between the concerns raised in the literature and the aspects observed within the Brazilian regulatory body (CADE). For instance, the disparities in resource allocation at the Administrative Council for Economic Defense (CADE) —which possesses a considerable budget contrasted with relatively low compensation for its Chairperson — echoes the arguments of Crawford (2021) and Agar (2020) regarding the dominance exercised by a restricted number of organizations in AI development and application. Such imbalances may suggest a possible power asymmetry within the Brazilian regulator, potentially affecting its capacity to effectively handle AI-related issues and the management of human behavior (Hoch & Engelmann, 2023; Roberts et al., 2021).

Furthermore, the complex organizational framework of the Brazilian regulator—evidenced by its substantial workforce and the extensive use of discretionary posts—aligns with the concerns raised by Bélisle-Pipon et al. (2021) regarding the dynamism of AI technology and the inadequate preparation of existing regulatory structures. Such administrative complexity may demand more robust internal oversight and coordination (Häußler, 2021).

Finally, the lack of transparency regarding female representation within the Brazilian regulator echoes the concerns of Floridi et al. (2018) about the importance of diverse perspectives in ethical AI regulation. The absence of such information may indicate a gap in institutional transparency and accountability, as discussed by Jobin et al. (2019) and Ryan and Stahl (2020), weakening Brazil's capacity to effectively regulate AI use, especially concerning the manipulation of human behavior.

This regional disparity reinforces that the gap identified in social ethics principles represents not just an administrative delay, but a concrete algorithmic harm manifestation. By operating with 'black-box' systems, antitrust authorities shift the regulated agent from a condition of universal vulnerability to a state of injury regarding the right to a defense and intelligibility. This makes the explainability deficit a matter of public integrity, rather than merely one of technological efficiency (Schramm, 2017). Thus, under the lens of the Bioethics of Protection, economic regulation ceases to be a purely technical instrument and becomes a necessary safeguard against the inevitable algorithmic harm found in scenarios of information asymmetry.

5. FINAL REMARKS

This study investigated the ethical challenges and risks arising from the application of AI systems within 35 competition authorities, utilizing the ethical framework of Floridi and Cowls (2019). The analysis demonstrates that ethical advancement in economic regulation is driven more by qualitative and structural factors than by isolated financial resources. The most robust finding is the correlation between institutional stability and rigor in operational ethics, suggesting that the prevention of algorithmic failures is a knowledge asset accumulated through talent retention.

However, the universal gap in social ethics principles (Transparency and Accountability) reveals a critical explainability deficit. Through the lens of Schramm's (2008) bioethics of protection, this opacity

transcends being a mere technical challenge to become a risk of algorithmic harm manifestation, ultimately compromising the right to an adversarial defense and the overall integrity of the market.

5.1 Implications for Public Administration and Regulation

The implications of this study for public administration are direct: AI governance in the public sector should not be treated as a matter of technology procurement, but rather as one of institutional development. The strong correlation between staff tenure and technological security indicates that retention policies for technical civil servants are essential guarantors of more robust and secure AI. This finding assists management sectors within public organizations in adopting best practices for talent retention and the preservation of specialized knowledge.

Furthermore, to prevent the harm manifestation of the governed, public bodies must transition from "black-box AI" toward auditable systems. The practical implication is the necessity of creating accountability mechanisms that enable effective human oversight and the intelligibility of automated decision-making processes.

5. 2 Limitations and Recommendations

Despite the originality of the diagnostic presented, this research design has limitations that must be considered when interpreting the results. First, the documentary corpus was restricted to public records, which may reflect the normative intentions of the agencies rather than their actual day-to-day practices. This carries the risk of masking operational gaps under a veneer of compliance, often referred to as "ethics washing." Second, the use of cross-sectional data and the limited sample size in certain regional clusters preclude assertions of absolute causality, allowing only for the identification of statistical trends and exploratory correlations.

To ensure that the integration of AI into economic regulation advances ethically and mitigates the risk of algorithmic harm manifestation, the following institutional actions are recommended:

1. Establish algorithmic intelligibility as a mandatory governance requirement, thereby safeguarding the right to an adversarial defense for the governed;
2. Prioritize retention policies for technical teams to ensure the stability of the expertise required for operational ethics;
3. Integrate specialists in ethics, law, and social sciences into the system development lifecycle to balance technical rigor with social responsibility.

Regarding the future research agenda, we suggest longitudinal monitoring of the GCR Enforcement Rating over a three-to-five-year horizon to measure the actual impact of frameworks such as the EU AI Act on the maturity of competition authorities. Additionally, qualitative studies based on interviews with managers are recommended to uncover cultural barriers to transparency. Finally, we propose the development of indices to quantify the legal and social costs of algorithmic harm manifestation, shifting the debate from theoretical ethics toward a solid evidence-based regulatory intervention.

REFERENCES

Agar, N. (2020). *The sceptic and the AI society.* Palgrave Macmillan.

Arner, D. W., Buckley, R. P., & Zetzsche, D. A. (2021). Finance, technology, and regulation: From hedgehogs to foxes. *European Business Organization Law Review*, *22*(1), 11-40. https://doi.org/10.1007/s40804-020-00201-9

Babbie, E. (2016). *The Practice of Social Research* (14th ed.). Cengage Learning. https://doi.org/10.4324/9781315518014

Bani-Salameh, H., Sallam, M., & Al Shboul, B. (2021). A deep-learning-based bug priority prediction using RNN-LSTM neural networks. *e-Informatica Software Engineering Journal*, *15*(1), 29-45. https://doi.org/10.37190/e-Inf210102

Beauchamp, T. L., & Childress, J. F. (2001). *Principles of biomedical ethics* (5th ed.). Oxford University.

Bélisle-Pipon, J. C., Couture, V., Roy, M. C., Ganache, I., Goetghebeur, M., & Cohen, I. G. (2021). What makes artificial intelligence exceptional in health technology assessment? *Frontiers in Artificial Intelligence*, *4*, 736697. https://doi.org/10.3389/frai.2021.736697

Biondi, G. M. C. B., & Cernev, A. K. (2023). Nuveo: ética digital e inteligência artificial para desafios do mundo real. *Revista de Administração Contemporânea*, *27*(3), e220063. https://doi.org/10.1590/1982-7849rac2023220063

Bodrick, M., Alqarni, H., Alsuhaim, M., & Almuways, Y. S. (2024). *Critical appraisal of definitions on intelligence within the organizational context. Journal of Learning and Development Studies*, *4*(2), 12-20. https://doi.org/10.32996/jlds.2024.4.2.2

Bostrom, N., & Yudkowsky, E. (2011). The ethics of artificial intelligence. In K. Frankish & W. M. Ramsey (Eds.), *The Cambridge handbook of artificial intelligence* (pp. 316-334). Cambridge University.

Cave, S., Heigeartaigh, S. O. (2019) An AI Race for Strategic Advantage: Rhetoric and Risks. In *Proceedings of the 2019 AAAI/ACM Conference on AI, Ethics, and Society* (AIES '19). Association for Computing Machinery. https://doi.org/10.1145/3278721.3278780

Coeckelbergh, M. (2020). *AI ethics*. MIT Press. https://doi.org/10.7551/mitpress/12549.001.0001

Crawford, K. (2021). *Atlas of AI: power, politics, and the planetary costs of artificial intelligence*. Yale University.

Etzioni, A., & Etzioni, O. (2017). *Incorporating ethics into artificial intelligence. The Journal of Ethics*, *21*(4), 403-418. https://doi.org/10.1007/s10892-017-9252-2

Ezrachi, A., & Stucke, M. E. (2019). *Virtual Competition: The Promise and Perils of the AlgorithmDriven Economy*. Harvard University Press. https://doi.org/10.4159/9780674241596

Fjeld, J., Achten, N., Hilligoss, H., Nagy, A., & Srikumar, M. (2020). *Principled artificial intelligence: Mapping consensus in ethical and rights-based approaches to principles for AI*. Berkman Klein Center for Internet & Society. https://doi.org/10.2139/ssrn.3518482

Floridi, L., & Cowls, J. (2019). A unified framework of five principles for AI in society. *Harvard Data Science Review*, *1*(1). https://doi.org/10.1162/99608f92.8cd550d1

Floridi, L., Cowls, J., Beltrametti, M., Chatila, R., Chazerand, P., Dignum, V., Luetge, C., Madelin, R., Pagallo, U., Rossi, F., Schafer, B., Valcke, P., & Vayena, E. (2018). AI4People – An ethical framework for a good AI society: opportunities, risks, principles, and recommendations. *Minds and Machines*, *28*, 689-707. https://doi.org/10.1007/s11023-018-9482-5

Greene, D., Hoffmann, A. L., & Stark, L. (2019). Better, nicer, clearer, fairer: A critical assessment of the movement for ethical artificial intelligence and machine learning. In *Proceedings of the 52nd Hawaii International Conference on System Sciences*. https://doi.org/10.24251/hicss.2019.258

Hagendorff, T. (2020). *The ethics of AI ethics: An evaluation of guidelines*. *Minds and Machines*, *30*(1), 99-120. https://doi.org/10.1007/s11023-020-09517-8

Häußler, H. (2021). The underlying values of data ethics frameworks: A critical analysis of discourses and power structures. *Libri*, *71*(4), 307-319. https://doi.org/10.1515/libri-2021-0095

Hoch, P. A., & Engelmann, W. (2023). Regulação da inteligência artificial no Judiciário brasileiro e

europeu. *Pensar – Revista de Ciências Jurídicas*, *28*(4), 1-18. https://doi.org/10.5020/2317-2150.2023.14263

Jobin, A., Ienca, M., & Vayena, E. (2019). The global landscape of AI ethics guidelines. *Nature Machine Intelligence*, *1*, 389-399. https://doi.org/10.1038/s42256-019-0088-2

Mayson, S. G. (2020). The limits of machine learning in adjudicating employment discrimination claims. *California Law Review*, *108*(2), 387-442.

Motta, M. (2020). Competition policy in the digital era. *Economic Journal*, *130*(629), 1999-2023.

Organization for Economic Co-operation and Development. (2021). *Unlocking the potential of artificial intelligence in competition policy* [OECD Digital Economy Papers, No. 306]. https://doi.org/10.1787/000306-en

Raji, I. D., & Dobbe, R. (2023). Concrete problems in AI safety, revisited. *arXiv preprint arXiv:2401.10899*. https://arxiv.org/abs/2401.10899

Roberts, H., Cowls, J., Morley, J., Taddeo, M., Wang, V., & Floridi, L. (2021). The chinese approach to artificial intelligence: an analysis of policy, ethics, and regulation. *AI & Society, 36*, 59-77. https://doi.org/10.1007/s00146-020-00992-2

Ryan, M., & Stahl, B. C. (2020). Artificial intelligence ethics guidelines for developers and users: Clarifying their content and normative implications. *Journal of Information, Communication and Ethics in Society*, *19*(1), 61-86. https://doi.org/10.1108/JICES-12-2019-0138

Schmude, T., Koesten, L., Möller, T., & Tschiatschek, S. (2023, June). On the impact of explanations on understanding of algorithmic decision-making. In *Proceedings of the 2023 ACM Conference on Fairness, Accountability, and Transparency*, Nova York, NY, EUA. https://doi.org/10.1145/3593013.3594054

Schramm, F. R. (2008). Bioética da proteção: ferramenta válida para enfrentar problemas morais na era da globalização. *Revista Bioética*, *16*(1), 11-23. https://revistabioetica.cfm.org.br/revista_bioetica/article/view/52

Schramm, F. R. (2017). A bioética de proteção: uma ferramenta para a avaliação das práticas sanitárias? *Ciência & Saúde Coletiva*, *22*, 1531-1538. https://doi.org/10.1590/1413-81232017225.04532017

Schrepel, T. (2021). *Computational antitrust: An introduction and research agenda*. Stanford University CodeX Blockchain Group Research Paper. http://dx.doi.org/10.2139/ssrn.3766960

Singapore Government. (2019). *Model AI governance framework*. https://www.pdpc.gov.sg/Help-and-Resources/2020/01/Model-AI-Gov-Framework

Smuha, N. A. (2021). From a 'race to AI' to a 'race to AI regulation': regulatory competition for artificial intelligence. *Law, Innovation and Technology*, *13*(1), 57-84. https://doi.org/10.1080/17579961.2021.1898300

Stahl, B. C. (2021). *Artificial Intelligence for a Better Future: An Ecosystem Perspective on the Ethics of AI and Emerging Digital Technologies.* Springer.

Veale, M., & Borgesius, F.Z (2021). Demystifying the draft EU Artificial Intelligence Act – analysing the good, the bad, and the unclear elements of the proposed approach. *Computer Law Review International*, *22*(4), 97-112. https://doi.org/10.9785/cri-2021-220402

von Ingersleben-Seip, N. (2023). Competition and cooperation in artificial intelligence standard setting: explaining emergent patterns. *Review of Policy Research*, *40*(5), 781-810. https://doi.org/10.1111/ropr.12538

Zekos, G. I. (2024). Digital economy and competition. In *Artificial intelligence and competition: economic and legal perspectives in the digital age* (pp. 293-359). Springer.

Zeng, Y., Lu, E., & Huangfu, C. (2018). *Linking artificial intelligence principles*. arXiv. https://doi.org/10.48550/arXiv.1812.04814

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RESEARCH DATA AVAILABILITY

The data are not publicly available due to institutional and ethical restrictions. However, they may be made available by the authors upon formal request.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

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