HOW DIFFERENT ACADEMIC FIELDS PERCEIVE THE PROBLEM OF REGULATING EMERGING TECHNOLOGIES

COMO DIFERENTES ÁREAS ACADÊMICAS PERCEBEM O PROBLEMA DE REGULAÇÃO DE TECNOLOGIAS EMERGENTES

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Abstract. This research explores the experience and perceptions of researchers from Administration, Information Systems (IS), Law, and Sociology academic fields regarding regulating emerging Information and Communication Technologies (ICT) in Brazil. We conducted a discriminant analysis of a survey applied to 139 researchers, assessing their experiences, contributions, and perceptions of challenges and worldview of lawmakers and bureaucrats. The results indicate little difference between the areas. However, despite recognizing the importance of participation, actual involvement and contributions were low. The lack of interest in public consultations and hearings potentially undermines the effectiveness of regulations, highlighting the need for further investigation and alternative solutions to enhance engagement. The absence of the IS area can critically impact the development and enforcement of effective regulations, emphasizing the importance of interdisciplinary collaboration.

Keywords: emerging technologies. ICT regulation. academy participation. discriminant analysis. public consultation

Resumo. Esta pesquisa explora a experiência e percepções de pesquisadores das áreas de Administração, Sistemas de Informação (SI), Direito e Sociologia sobre a regulação das Tecnologias da Informação e Comunicação (TIC) emergentes no Brasil. Realizamos uma análise discriminante de um survey aplicado a 139 pesquisadores, avaliando suas experiências, contribuições e percepções sobre desafios e visão de mundo de legisladores e burocratas. Os resultados indicam pouca diferenciação entre as áreas. Contudo, apesar de reconhecer a importância da participação, o envolvimento e as contribuições efetivas foram baixos. O desinteresse por consultas e audiências públicas pode comprometer a efetividade das regulações, ressaltando a necessidade de mais pesquisas e soluções alternativas para ampliar o engajamento. A ausência da área de SI pode impactar criticamente o desenvolvimento e a aplicação de regulações efetivas, reforçando a importância da colaboração interdisciplinar.

Palavras-chave: tecnologias disruptivas, regulação de ICT, participação da academia, análise discriminante, consulta pública

1. INTRODUCTION

The regulation of emerging Information and Communication Technologies (ICT) is a global challenge that requires a multidisciplinary approach to provide practical guidance to policymakers (e.g. Aanestad et al., 2021a) Gozman et al., 2019).

The multidisciplinary nature of a phenomenon stems from the possibility of studying the research problem from multiple theories and perspectives (Vaidya & Campbell, 2016). This leads to diverse scientific work encompassing technical, operational, practical, and philosophical viewpoints (Zuiderwijk et al., 2021). Understanding and integrating these strands is crucial for achieving a cohesive interdisciplinary comprehension of the issue (Elliot, 2011; Jiang and Cameron, 2020).

Multidisciplinary is a challenge inherent to the political environment in which discussions about regulation occur with the participation of diverse actors. This challenge gains a novel dimension when the subject pertains to emerging ICT and the digital economy (Roca & O'Sullivan, 2022). Four key factors distinguish the current dilemmas and issues related to ICT regulation: the rapid pace of technological evolution, the pervasiveness of digital technologies, the disruption of geographic boundaries in a globally connected world through digital platforms, and the scale of societal impacts (Gozman et al., 2019; High-Level Expert Group on Artificial Intelligence, 2019; World Bank, 2021).

Among the actors, academics and practitioners contribute to the regulatory process in various ways, such as research grants or engaging with Centers of Excellence established by governmental agencies (Goldberg et al., 2018), and participating in debates and public consultations on regulatory proposals. They are often regarded as neutral actors (Roca, 2024). However, would an academic from the Administration field advocate for fewer regulatory barriers to stimulate innovation and entrepreneurship, or prioritize Environmental, Social, and Corporate Governance (ESG) principles? Conversely, might a Sociology scholar endorse greater government intervention to protect marginalized groups and democracy, or argue against restrictions on freedom of expression and privacy? How would a Law academic approach regulation? By championing new legislation or favoring the application of existing laws through analogy, hermeneutics, and jurisprudence? And what can we expect from an Information Systems (IS) scholar? A resistance to constraints that impede the creative development of data-related technologies, or a heightened risk aversion stemming from their advanced technical expertise?

The research problem centers around the multidisciplinary scenario of regulating emerging ICT, particularly the participation of various academic fields in discussing and forming legislative and regulatory proposals. Our question is: What are the differences between academic fields regarding their experiences and perceptions of the ICT regulation issue?

We aim to outline the differences between four Grand Academic Areas (GAA) (Administration, IS, Law, and Sociology) concerning their experiences and perceptions of ICT regulation in Brazil. Specifically, we intend to describe the differences in participation and contribution to discussions, perceptions of the challenges in regulating ICT, and perceptions of values and beliefs regarding ICT regulation.

Drawing on challenges in regulating ICT highlighted in our literature review and insights into values, needs, and concerns from interviews with eleven Brazilian parliamentarians, legislative assistants, and expert bureaucrats who participated in public hearings in 2019, we surveyed professors and researchers from the four GAA. Each one encompassed related fields (e.g., IS - Informatics and Computer Science, Engineering, Mathematics, and Statistics). We utilized Multiple Discriminant Analysis (MDA), with the GAA as the categorical dependent variable, and responses to survey questions based on prior literature and qualitative research (Galhardo & Souza, 2024) as independent variables.

We identified common ground among the areas that could facilitate discussions on regulating emerging ICT. However, overall participation was low, contradicting the perceived importance of participation. This may be due to researchers' past experiences of having their suggestions overlooked in public consultations and hearings, an issue particularly noted in the IS area.

The rest of the article is structured as follows: The next section discusses the challenges in regulation identified in our literature review and the multidisciplinary nature of the discussions, highlighting the role of academia. This is followed by a detailed description of the research method, findings, and a discussion of the results. Finally, we conclude with the theoretical and practical implications of the study and offer suggestions for future research.

2. BACKGROUND

2.1 Challenges in regulating ICT

Policy, legal, and regulatory frameworks governing ICT have garnered significant scholarly attention, particularly following the implementation of the EU General Data Protection Regulation (GDPR) (World Bank, 2019). This heightened focus has fueled research across various themes, including ethical concerns surrounding AI and data analytics in society (Dennehy et al., 2016), calls for responsible research (Davison et al., 2023), the implications of winner-takes-all platform economics, and the social, environmental, and economic impacts of blockchain (Rossi et al., 2019), concerns over internet misinformation and fake news (Dennis et al., 2019), and the governance of emerging disruptive technologies (Taeihagh et al., 2021).

The proliferation of research in these areas has highlighted critical gaps, prompting key questions: "How to bridge the gap between ethics and policy (e.g., for AI)?" (Gozman et al., 2019, p. 3), "How should policymakers develop frameworks, regulations, and laws on ethics and accountability regarding the deployment of digital technologies in society?" (Aanestad et al., 2021, p. 3), "What regulations and guidelines are necessary for the ethically compliant development, implementation, and use of surveillance technologies?" (Čas et al., 2022), "which stakeholders are more relevant for each of the intermediation functions and each link"? (Roca, 2024). These questions span multiple disciplines including anthropology, economics, law, public policy, and sociology, requiring cross-level, multi-referent, and interdisciplinary perspectives (HICSS Conference Office, 2022).

Underlying these issues is the pervasive nature of ICT, which heightens risks to human rights, including data protection, ownership, and privacy (Arner et al., 2021; Souter & Spuy, 2019). Additionally, manipulation via social media — used to disseminate misinformation, misrepresentations, distortions, and propaganda — exacerbates issues such as hate speech, polarization, discrimination, and incitement to violence (Bradshaw & Howard, 2019; Souter & Spuy, 2019; World Bank, 2019). The reliance on corporate self-regulation absent democratic oversight further complicates governance efforts (Floridi, 2021; World Bank, 2019).

Regulators are thus expected to intermediate, ensuring positive market outcomes while addressing citizens' concerns (Roca, 2024; OECD, 2020; Souter & Spuy, 2019). However, the inherent dilemma in technology regulation (Collingridge, 1980) is exacerbated by the rapid pace and disruptive scale of technological advancements (Jensen, 2019). These challenges have led to calls for flexible legislation capable of evolving alongside regulated technologies (UNESCO. Information for All Programme (IFAP), 2007) as well as for responsible research and innovation to ensure proactive regulation despite uncertainties (Palmerini et al., 2014).

Regulatory challenges can be categorized into six groups, as illustrated in Figure 1.

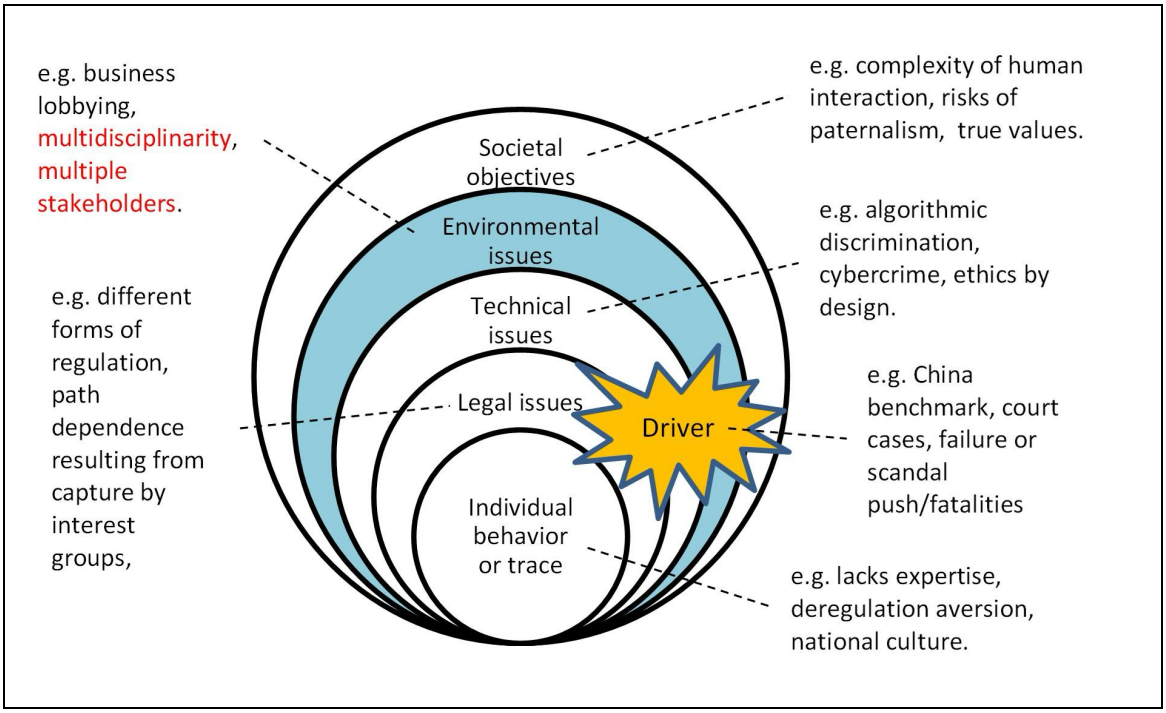

Figure 1. Groups of challenges in ICT regulation, highlighting the focus of the research.
Source: Authors, based on literature review.

At the overarching level, **Societal Objectives** group drives much of the current academic discourse on ethical and sociological issues related to disruptive ICT development and its impact on human relationships, work, business, and politics. This category explores philosophical and sociological aspects of human interaction complexity (Pagallo, 2015) and evaluates the core values shaping diverse stakeholder perspectives (Barclay, 2014; Currie & Seddon, 2022; Melville et al., 2022; Mökander et al., 2022).

The **Environmental Issues** group examines challenges tied to the political landscape of regulation, including asymmetries in bargaining power and lobbying influence over regulators (King & Kraemer, 2019; Lindman et al., 2022). Social media's impact on voter preferences and, consequently, political agendas represents a major development in this space (Benvenisti, 2018). Addressing these issues requires multidisciplinary approaches that bridge conceptual and terminological gaps across fields to facilitate coherent discussions (Mahieu et al., 2018).

While ethical and social concerns persist, the **Technical Issues** group adopts an operational perspective, focusing on computational limitations and decision-making complexities that have garnered attention in the IS field. Areas of investigation include access to corporate data and algorithms, information asymmetries in the digital economy (Eggers & Turley, 2018; Hacker, 2018; OECD, 2020; Trakman et al., 2019; UNESCO, 2023; World Bank, 2019), ethics by design (Nelson et al., 2019; Schuelke-Leech et al. 2019), and pricing models shaped by blurred distinctions between vendors, facilitators, customers, and producers within the sharing economy (OECD, 2019). This research stream is crucial for developing a “regulated self-regulation” digital business ecosystem (Schulz & Held, 2005).

The **Legal Issues** group focuses on challenges involving specific aspects of the law field like liability assignment (Eggers & Turley, 2018; OECD, 2019), regulatory overlap, and jurisdictional conflicts across different legal frameworks (Arner et al., 2021; Baum & Giussi, 2019; Eggers & Turley, 2018; Estache & Serebrisky, 2020; OECD, 2019; Pagallo 2012). Fragmented regulatory environments enable companies to engage in "forum shopping", strategically operating across jurisdictions to evade compliance, thereby hindering efforts to establish "fit-for-purpose" regulatory frameworks and enforcement mechanisms (Eggers &

Turley, 2018; OECD, 2019). While these issues may not be the primary focus of IS researchers, their contributions are essential for designing effective legal enforcement mechanisms that ensure adherence to standards, norms, and best practices (Huang et al., 2021; ILO, 2021; Inter-American Development Bank, 2018; Müller et al., 2022; Nelson et al., 2019; OECD, 2020; Vogelsang, 2017).

The **Individual Behavior or Trace** group examines regulators' characteristics, including risk aversion in adapting regulatory frameworks (Eggers & Turley, 2018; OECD, 2019), reliance on professional and trade organizations for expertise (Lindman et al., 2022; Schuelke-Leech et al., 2019), and national cultural influences on regulatory flexibility and efficiency (Estache & Serebrisky, 2020; Fisher & Harindranath, 2004; Zhang & Bruun, 2017).

Finally, the **Drivers** group encompasses externalities or unforeseen events that trigger regulatory action, such as apocalyptic AI depictions in cinema (Wasilow & Thorpe, 2019), and incidents, accidents, or fatalities linked to autonomous vehicle technologies (Arner et al., 2021; Schuelke-Leech et al., 2019).

2.2 Multidisciplinarity and ICT regulation

The terms multidisciplinarity, interdisciplinarity, and transdisciplinarity are often mistakenly used interchangeably (Choi & Pak, 2006). Although subtle, their distinctions are well-documented in the literature (Klein, 1990). Multidisciplinarity refers to knowledge about a phenomenon produced by different disciplines, which coexist without integration. By contrast, interdisciplinarity involves integration to form a new, harmonized level of analysis (Choi & Pak, 2006). Transdisciplinarity goes beyond academic knowledge, pursuing a holistic view of phenomena that transcends disciplinary boundaries (Choi & Pak, 2006; Klein, 1990; Serna, 2015).

Integrating knowledge from various domains is not a new challenge for IS; rather, it is an inherent characteristic of the field (Webster & Watson, 2002). Since the 1990s, IS research has evolved beyond corporate back-office problems and productivity tools, shifting away from a sole focus on organizational development and IT solution adoption (Beath et al., 2013). This transformation reflects IT ubiquity, which positions ICT as a strategic cornerstone of all organizations (Sawyer & Winter, 2011). Consequently, the IS field faces a dual challenge: expanding its disciplinary boundary to encompass a broader range of IS topics while simultaneously engaging with other disciplines to examine IS-related phenomena (Tarafdar & Davison, 2018). Nevertheless, contributions from the IS scholars remain predominantly intradisciplinary (Tarafdar & Davison, 2018).

Recent efforts to bridge this gap (Beath et al., 2013; Zuiderwijk et al., 2021) promote integration and expansion of the discipline's boundaries, seeking to influence and contribute to various academic domains. Some responses to these calls include new theories, such as Interdisciplinary Structuration Theory (Puron-Cid, 2013), frameworks (e.g., Ciriello, 2021), and research methods like Competitive Benchmarking (Ketter et al., 2016). Scholars conduct interdisciplinary literature reviews to establish a more holistic perspective on complex problems (Elliot, 2011), recognizing the lack of consensus on key findings and implications (Coombs et al., 2020), which undermines cohesive treatment (Smith et al., 2011).

Such contributions are crucial for addressing increasingly complex socio-technical challenges with broad impacts on business, society, and government, which cannot be reduced to mere empirical measurement (Raadschelders, 2011). Emerging ICT topics such as artificial intelligence, facial recognition, cryptocurrencies, autonomous vehicles, and digital platforms are subjects of frequent discussion. Regulatory concerns surrounding their development and application are explored by multilateral organizations (e.g., ILO, 2021), standard-setting bodies (e.g., IEEE, 2019), government agencies (e.g., High-Level Expert Group on Artificial Intelligence, 2019), consulting firms (Eggers & Turley, 2018), and non-government

organizations (Ada Lovelace Institute & AI Now Institute and Open Government, 2021). A paradox emerges as Big Tech CEOs advocate for increased regulation of their own businesses (Bartz & Culliford, 2021), illustrating the evolving intersection between IS and political studies (Pelizza, 2021).

Multidisciplinarity is in the group of challenges inherent to the political environment where regulatory discussions occur, involving multiple actors with diverse academic backgrounds, professional experiences, economic power, communication and persuasion abilities, and worldviews. Among these actors, scholars and practitioners assist regulators by participating in debates as guests, providing criticism and suggestions in public consultations on regulatory proposals, or being funded and hired by government agencies (Goldberg et al., 2018), business sectors, civil society, or multilateral organizations to provide expert opinions.

While multidisciplinary dialogue is central to ICT regulation, two critical questions remain unaddressed: which academic disciplines participate in and most influence the regulatory outcomes, and how do scholars' perceptions of ICT regulation diverge across fields. Answering these questions is key to achieving the necessary holistic approach required to balance the positive and negative outcomes of emerging ICT, what Jeroen van den Hoven calls "Comprehensive Engineering" (Maedche, 2017).

To investigate these gaps, our study employs discriminant analysis, as detailed in the following section.

3. METHOD

This descriptive study examines the differences in attitudes and opinions of researchers from four GAAs - Administration, IS, Law, and Sociology - regarding ICT regulation. These GAAs represent the most common academic backgrounds of experts invited to the public hearings analyzed in this study. Each GAA encompasses related disciplines, as detailed in Table 1.

Table 1. Academic areas included in each Grand Academic Area (GAA) of the study.

GAA	Related areas included
Administration (A)	Administration, Accounting, Economics, and their specialized disciplines (e.g., Marketing, Finance)
IS (C)	Informatics and Computer Science, Engineering, Mathematics, and Statistics
Sociology (S)	Sociology, Anthropology, Political Science, Philosophy
Law (L)	Law

3.1 Survey design and instrument

We conducted a survey with professors and researchers from the four GAAs. The research instrument comprised four sections described in Table 2.

Table 2. Research instrument description

Section	Objective	Questions examples
Demographics	Four questions addressing generational profile, legal system culture (based on country of birth), academic background, and potential professional links to public administration (to assess bias risks).	Identify the area(s) of knowledge of your academic background. Include undergraduate, master, and doctoral areas.
Participation in Public Consultations	Three questions evaluating respondents' participation and contribution experiences in nine ICT regulation public consultations in Brazil (over the past five years), including	If you contributed with criticisms or suggestions in the Public Consultations, please indicate which ones.

Section	Objective	Questions examples
	their perceptions of whether their contributions were useful or ignored.	
Perceived Challenges in ICT Regulation	Question assessing the perceived difficulty of twelve regulatory challenges (two challenges per category identified in the literature review).	In your opinion, how do the elements below impact emerging ICT regulation in terms of difficulty to overcome? Access to company data and algorithms
Alignment with Policymakers' Views	Respondents rated the importance of statements/excerpts drawn from (Galhardo & Souza, 2024) findings from interviews with parliamentarians, their assistants, and technocrats from the executive and prosecutorial branches, representing their worldview classified as values, needs, and concerns. These individuals participated in 2019 public hearings on ICT regulation across federal, state, and municipal science/technology committees.	For each selected interview excerpt, mark the degree of importance for the value associated with the statement or doubt presented.

Supplementary material 1 details the research instrument, including variables, measurement scales, and data handling methods.

3.2 Sample collection

We sent invitations to participate in the study via email between April 4 and April 30, 2022, with responses collected until May 10, 2022. We gathered email addresses from the websites of Brazilian educational institutions offering courses in the fields of research interest. Institutions were selected based on the National Postgraduate System Assessment (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), 2022), prioritizing the highest-ranked courses in each discipline. A total of 2710 emails were dispatched, yielding 170 responses.

3.3 Quantitative analysis technique

To evaluate differences between GAAs (categorical dependent variables), we treated responses to each question as independent variables. This approach identified which variables contributed most to variations in average score profiles across GAAs.

We employed Multiple Discriminant Analysis (MDA), suitable for cases where the dependent variable is non-metric and multichotomous, the independent variables are metrics, and the primary objective is to understand group differences (Hair Jr et al., 2018). Nominal independent variables were converted into dummy variables, and ordinal variables were transformed into a numeric scale. To understand group differences, we analyzed a subset of independent variables representing the discrimination dimensions: participation and contribution in Public Consultations; perceived challenges in ICT regulation; and alignment with policymakers' worldviews (see Supplementary material 1 for details).

We conducted Box's M test in R (Fox et al., 2021) for each dimension to assess the assumption of equal dispersion and covariance matrices among the independent variables. The test rejected the null hypothesis ($p < 0.001$), indicating unequal covariance matrices across groups (see Table S1 in Supplementary material 2). Given this violation, we applied Quadratic Discriminant Analysis (QDA), which relaxes the assumption of equal covariance structures

(Hair Jr et al., 2018). The analysis was performed in R using the MASS package (Venables & Ripley, 2002). Group differences were interpreted by visual inspection of group means for each independent variable.

The following section presents the results for each discrimination analysis dimension.

4. FINDINGS

From the 170 responses received, we excluded ten respondents with academic backgrounds exclusively in fields outside the study's scope (e.g., psychology, biology, medicine, dentistry). Additionally, 21 respondents who answered less than 50% of the questions were excluded. This left us with 139 respondents, of whom 110 completed at least 97% of the questions. The question with the highest non-response rate (11%) concerned the challenge of sharing true values among the various stakeholders. All other questions had an abstention rate of less than 10%.

Thirty-four respondents reported academic backgrounds in more than one area, including at least one within the study's scope. Although these responses do not meet the condition of being mutually exclusive (Hair Jr et al., 2018), we included them as an independent multidisciplinary ("M") group to assess whether their perspectives differ from those of singular academic fields. Table S2 in the supplementary material 2 provides a detailed breakdown of responses by academic area and age.

All academic areas, including the multidisciplinary group, exceeded the recommended minimum of 20 respondents for discriminant analysis (Hair Jr et al., 2018). Individually, 12 of the 41 questions had at least one area with fewer than 20 respondents. The lowest response count was 16 in the Sociology area for a specific question, while the remaining 11 questions had at least 18 respondents per area.

Regarding legal culture, 97% of the respondents were Brazilian, with a few isolated cases of foreigners born in civil law countries (Spain, France, Italy, Portugal, and Russia).

Only seven respondents were employees of executive, legislative, prosecution service, or judiciary entities. These few cases did not introduce bias compared to other respondents from the same academic field. Overall, 30% of participants had no ties to the government institutions, whereas 65% were professors or researchers affiliated with public universities.

4.1 Experience in emerging ICT regulation

Almost half of the respondents reported having some level of experience with ICT regulation. Sociology was the only GAA where the number of participants exceeded the number of non-participants. Most respondents (72%) indicated a single form of contribution, limited to reading the reference document or regulatory proposal in public consultations. Only a small fraction (8%), from the Law and Sociology fields, reported engaging in more than three forms of participation, as detailed in Tables S3, S4 and S5 in the supplementary material 2.

Figure 2 presents the radar chart of QDA group means for the independent variables of participation and contribution. These variables are measured in two ways. First, participation and contribution are counted once, regardless of how many forms the respondents indicated (Any). Secondly (Total), for each respondent, the different forms of participation (e.g., reading a reference document/proposal in a public consultation + providing criticism/suggestions in a public consultation = 2) and contributions (e.g., Brazilian strategy for fifth-generation networks (5G) + Brazilian Strategy for Digital Transformation = 2) are summed up.

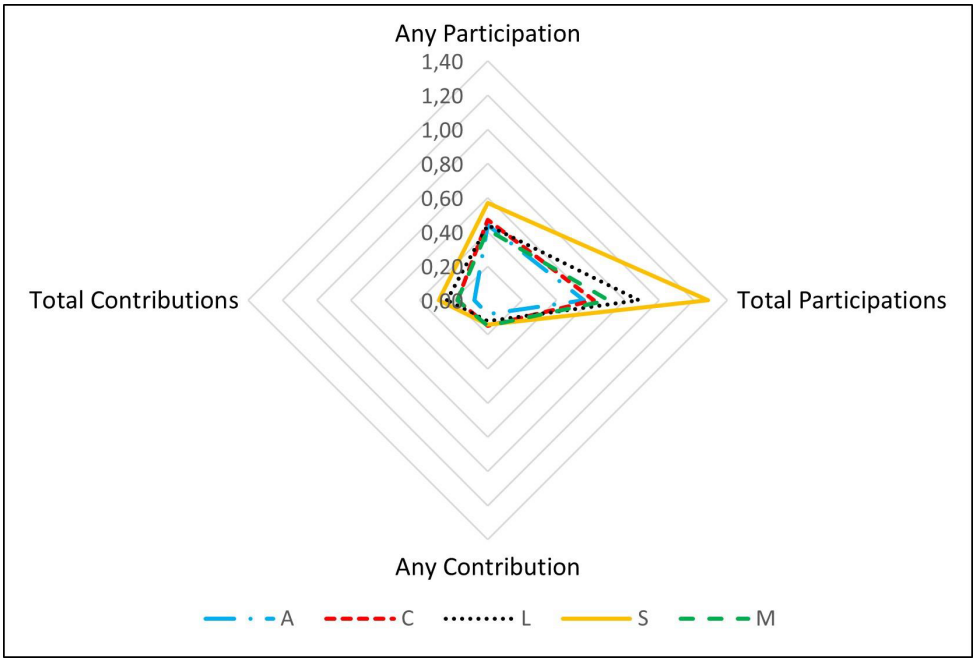

Figure 2. Radar chart of QDA group means of Participation and Contribution independent variables for each academic área

Note. A = Administration, Accounting, and Economics; C = Information Systems, Informatics and Computer Science, Engineering, Mathematics, and Statistics; L = Law; S = Sociology, Anthropology, Political Science, and Philosophy; M = Multidisciplinary, including at least one grand area of interest; Any = Participation and contribution are counted once, regardless of how many forms; Total = The different forms of participation and contributions are summed up.

QDA analysis confirmed that Sociology exhibited slightly higher levels of participation in some options compared to other academic areas, which showed no significant differences. This prominence of Sociology became even more pronounced when participation was weighted by the number of engagement alternatives, followed by the Law field. Meanwhile, respondents from the Administration field contributed the least to regulation proposals, displaying a slight deviation from other fields.

The public consultations that received the most contributions were the Brazilian AI Strategy and the Digital Government Strategy. Conversely, the Brazilian strategy for 5G networks and the Reference Model for the Publication of Open Data did not receive any contributions (see Table S6 in the supplementary material 2).

Among those who actively contributed, responses were relatively evenly distributed among three groups: those who found their criticisms and suggestions helpful, those who deemed them useless, and those who did not verify whether their input was considered. As described in Table S7 of the supplementary material 2, respondents from the IS and Sociology fields were disproportionately represented among those dissatisfied with their contributions being disregarded.

4.2 Differences in the perception of challenges in regulating ICT

Respondents generally rated most regulatory challenges as moderate to high in difficulty. **Access to algorithms** and corporate data and business **lobbying** were the only challenges perceived as extremely difficult. AI apocalyptic cinematographic vision (**AI in cinema**) was the only challenge with an overall trend rating from moderate to low difficulty.

The QDA analysis revealed no significant discrimination between areas in the respondents' assessment of most challenges, as illustrated in Figure 3. However, the Administration field showed the clearest distinction regarding the difficulties in accessing corporate data. The

challenge of **enforcement** of existing legislation was rated more critically by respondents from the IS field and those with a multidisciplinary background compared to other academic areas. Sociology stood out in relation to the challenges of **sharing true values** among the various stakeholders and **national culture** that influences the flexibility, bureaucracy, and efficiency of regulators, especially compared to respondents with a multidisciplinary background.

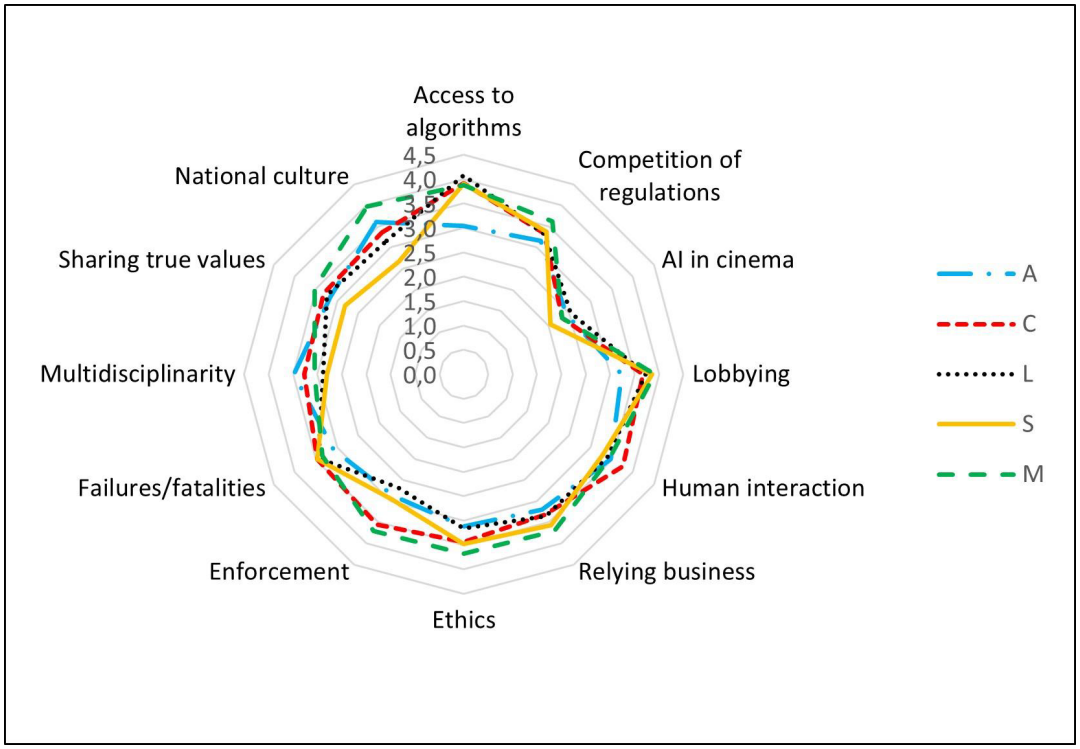

Figure 3. Radar chart of QDA group means for ICT regulation difficulties as independent variables across academic areas

Note. A = Administration, Accounting, and Economics; C = Information Systems, Informatics and Computer Science, Engineering, Mathematics, and Statistics; L = Law; S = Sociology, Anthropology, Political Science, and Philosophy; M = Multidisciplinary, including at least one grand area of interest; Access to algorithms = Access to corporate data and algorithms; Competition of regulation = Competition and conflict between different forms of regulation; AI in cinema = Apocalyptic artificial intelligence vision in cinema; Lobbying = Business lobbying; Human interaction = Complexity of human interaction; Relying business = Relying entirely on information/opinions from professional or business organizations; Ethics = Incorporate ethics in the design, development, and use of technological artifacts; Enforcement = Enforcement of existing regulations; Failures/fatalities = Occurrence of failures/fatalities or unlawful use with mainstream media coverage; Multidisciplinarity = Multidisciplinary requirement; Sharing true values = Sharing true values among the various stakeholders; National culture = National culture that influences the flexibility, bureaucracy, and efficiency of regulators.

4.3 The differences in worldview

The QDA analysis showed that most independent variables – values, needs, and concerns – do not discriminate significantly between academic areas. Most values evaluated by respondents lacked a clear trend, with one notable exception: the belief that it **is possible to regulate** ICT versus its counterpoint, disbelief in regulation. The perception that it **is possible to regulate** was considered highly important, whereas the belief that it **is not possible to regulate** was seen as less significant (see Figure 4). Another subtle yet noticeable trend was the classification of **disbelief** in discussions as unimportant.

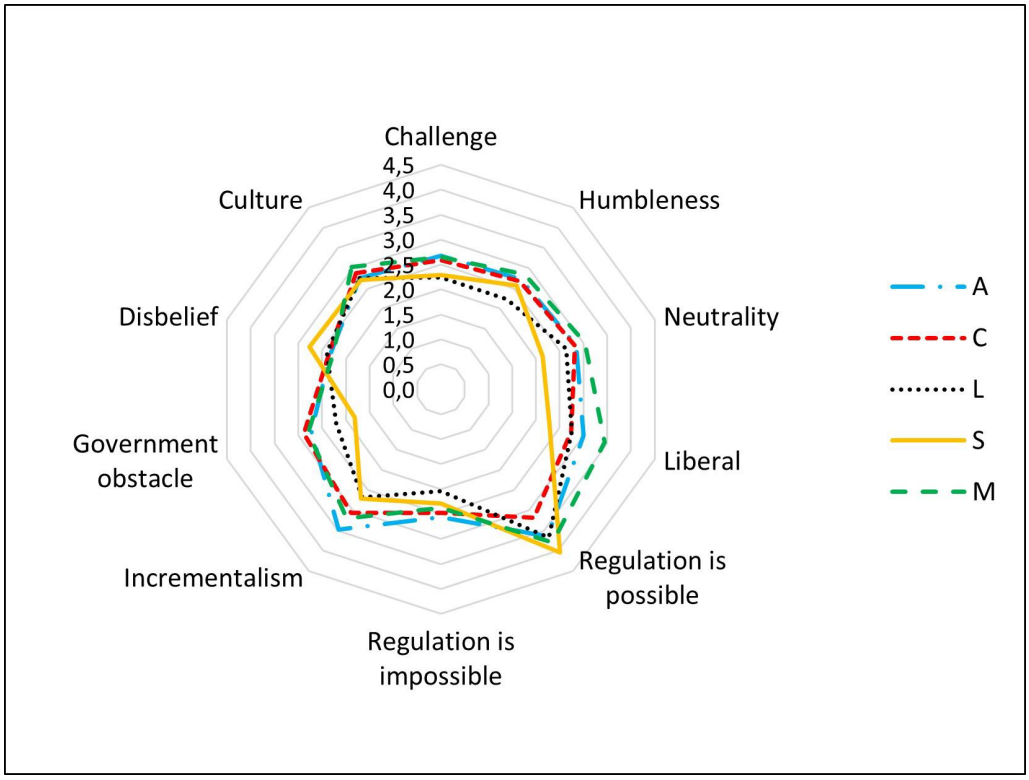

Figure 4. Radar chart of QDA group means for Values as independent variables across academic areas

Note. A = Administration, Accounting, and Economics; C = Information Systems, Informatics and Computer Science, Engineering, Mathematics, and Statistics; L = Law; S = Sociology, Anthropology, Political Science, and Philosophy; M = Multidisciplinary, including at least one grand area of interest; Challenge = Likes a challenge; Humbleness = Changing someone's mind isn't easy; Neutrality = A win-win solution for everyone; Liberal = Minimal state intervention in the economy; Regulation is possible = Internet is a regulated environment; Regulation is impossible = Internet is an unregulated space; Incrementalism = Gradual, small, and continuous changes; Government obstacle = Government inefficiency hinders progress; Disbelief = The time spent discussing a bill is wasted; Culture = The big challenge is not legislative, is cultural.

Among the Values presented (Figure 4), the belief that the **government is an obstacle** had greater discriminant power, particularly in Sociology and, to a lesser extent, Law area – both of which considered this Value less critical. These two fields also stood out in their evaluation of **incrementalism**, indicating a slightly lower level of importance. Sociology appeared isolated again, assigning less importance to the Values of **neutrality** and **liberal**, while researchers with multidisciplinary background – instead of those from the Administration area – stood at the opposite extreme of evaluation. The IS area slightly highlighted the Value it **is possible to regulate** ICT as less important.

The assessed Needs exhibited clear trends (see Figure 5), placing **transparency** and the requirement for **long-term planning** as very important. The only Need showing a mild tendency toward lower importance was **nationalism**. Sociology differentiated itself from other fields in assessing Needs, particularly valuing **social protection**, **diversity**, respect for **human dignity**, and the role of **government as a protagonist**. Conversely, Sociology assigned lower importance to the need for **adherence to society**. The Administration field, in contrast, placed the need for respecting **human dignity** at the opposite extreme of Sociology's evaluation, deeming it less critical. Similarly, Law area exhibited a slightly lower rating for the necessity of **long-term planning**.

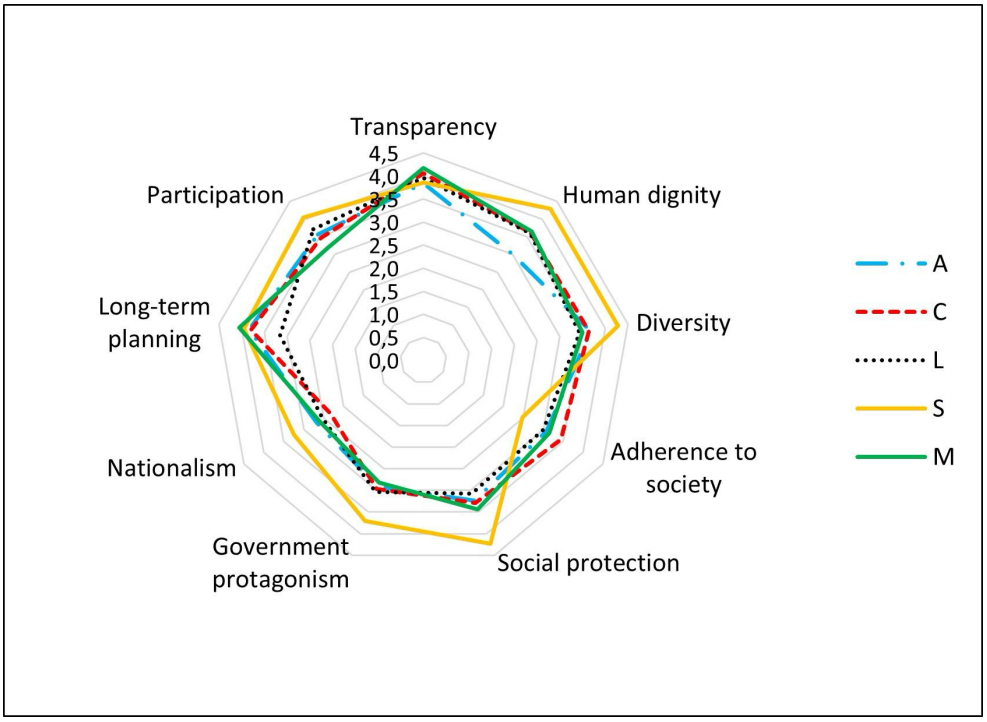

Figure 5. Radar chart of QDA group means for Needs as independent variables across academic areas
Note. A = Administration, Accounting, and Economics; C = Information Systems, Informatics and Computer Science, Engineering, Mathematics, and Statistics; L = Law; S = Sociology, Anthropology, Political Science, and Philosophy; M = Multidisciplinary, including at least one grand area of interest; Transparency = It is crucial that society can follow; Human dignity = Monitoring attacks against human dignity; Diversity = Assess how it affects the different actors; Adherence to society = Must listen to society; Social protection = Preparing and protecting society for change; Government protagonism = It requires the analysis of those who are in government; Nationalism = Commitment to the nation; Long-term planning = It requires long-term planning; Participation = It is necessary to encourage public participation.

Concerns followed a similar pattern (see Figure 6), with high importance rankings for issues such as **justice divide**, **digital divide**, and **results and impacts**. Conversely, concerns with lower importance rankings included **punitive bias** and **outdated legal institutes**. Researchers with multidisciplinary backgrounds assigned greater importance to both concerns. Sociology once again stood out, emphasizing the **universality of benefits**, and together with Law exhibited a slightly lower assessment of the **business environment**. Administration placed relatively less importance on the concern of access to justice (**justice divide**).

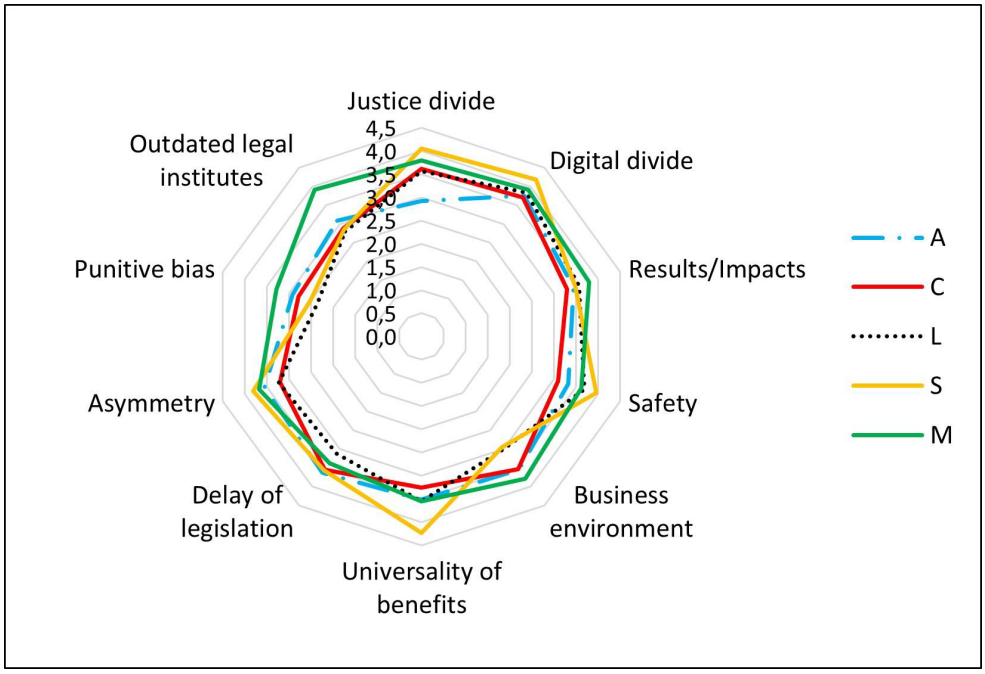

Figure 6. Radar chart of QDA group means for Concerns as independent variables across academic areas

Note. A = Administration, Accounting, and Economics; C = Information Systems, Informatics and Computer Science, Engineering, Mathematics, and Statistics; L = Law; S = Sociology, Anthropology, Political Science, and Philosophy; M = Multidisciplinary, including at least one grand area of interest; Justice divide = Imbalance in access to the legal system; Digital divide = Inequality in access to, use of, and benefits from ICT; Results/Impacts = Social impact and results; Safety = Individual protection, security; Business environment = Business environment less attractive than in other countries; Universality of benefits = Benefits for all without distinction; Delay of legislation = Lag in legislation due to the speed of technological evolution; Asymmetry = Some are subject to regulations, others are not; Punitive bias = The fear of being punished hinders innovation; Outdated legal institutes = Legal assets which no longer make sense.

5. DISCUSSION

The sample of respondents provided minimal cover of the study's GAA to the application of discriminant analysis. However, the overall response rate was only 6%, which dropped to 5% of email invitations after excluding invalid respondents. This low response rate raises concerns about the reasons behind non-participation. While part of this can be attributed to many researchers' reluctance to engage in surveys, non-involvement in ICT regulation discussions may also be a contributing factor.

The study exclusively captures the perspectives of respondents with a positivist legal culture (civil law). Generationally, the sample largely consists of individuals who are not digital natives (84%), which is expected in a population of professors and researchers today. This demographic trend suggests that the results might shift over the next 10 to 20 years as newer generations enter academia.

A form of multidisciplinary engagement was incidentally observed in respondents holding undergraduate, master's, and doctoral degrees across at least two GAAs. These individuals were analyzed as a multidisciplinary group, though their level of participation and contribution did not differ significantly from those in single academic fields. Interestingly, this group placed greater emphasis on liberal perspectives than expected, particularly compared to respondents in the Administration area, which is traditionally more aligned with business environments. Another unexpected finding was the multidisciplinary group's heightened concern for the

punitive bias of regulation and **outdated legal institutions**. Could this reflect a predisposition toward flexibility, innovation, and embracing challenges?

Academic participation in regulatory discussions was generally limited, with engagement primarily restricted to reading regulatory proposals in public consultations. Direct contributions were minimal. This finding aligns with Whitford and Anderson's (2021) observation of academia's underrepresentation in policymaking. However, it contrasts with the widespread recognition among respondents of both the necessity of participation and the feasibility of regulating ICT. Disillusionment with public consultation mechanisms—driven by limited outreach, tight deadlines, and previous negative experiences where suggestions and criticisms were disregarded—could explain the low levels of active engagement. Notably, respondents from IS and Sociology felt their contributions were particularly ineffective. This lack of impact may justify the IS field's slightly lower confidence in the feasibility of ICT regulation and its heightened concern regarding the challenge of enforcing existing regulations.

Among academic disciplines, Sociology exhibited the highest level of participation, likely due to its tradition of engaging in public policy formulation and evaluation. Naturally, alongside the Law field, Sociology contributed more actively through criticism, suggestions, participation in public hearings, and advisory roles for policymakers, corporations, and multilateral organizations, both formally and informally.

Overall, respondents acknowledged the relevance of ICT regulatory challenges identified in the literature, with the exception of the **apocalyptic AI vision in cinema**. Additionally, most independent variables showed no significant discrimination across academic areas, suggesting a shared foundation of values, perceptions of needs, and concerns that could facilitate constructive discussions on regulating emerging ICT.

The strong support for **transparency**, respect for **human dignity**, **diversity**, and **long-term planning**, alongside concerns about the **justice divide**, **digital divide**, and **universality of benefits**, aligns with existing policy frameworks and ethical guidelines for ICT regulation (e.g., IEEE, 2019; High-Level Expert Group on Artificial Intelligence, 2019). However, two exceptions emerged with slightly lower importance ratings: **nationalism** and concerns about **punitive bias** against innovations. The former may reflect the disruptive impact of the internet and the globalized digital economy on traditional concepts of borders and sovereignty.

Sociology's emphasis on **human dignity**, **diversity**, **social protection**, **government leadership**, and the **universality of benefits** aligns with its established academic tradition. Conversely, the lower importance placed on incrementalism and **adherence to society** was unexpected, given Sociology's historical support for debate and social participation, which aligns with an incremental legislative approach. This finding may indicate a heightened sense of urgency regarding regulation due to perceived risks to values such as **human dignity** and **diversity**.

A final observation concerns the Administration field, which assigned lower importance to both respect for **human dignity** and concerns about **access to justice**. A worrisome result, perhaps expected, that aligns with the discipline's greater focus on liberal values.

6. CONCLUSION

This study responds to the call for research that bridges the gap between ethics and the challenges of regulating ICT. It offers a deeper analysis of the differences among four grand academic areas in Brazil—Administration, IS, Law, and Sociology—each encompassing related disciplines. As a pioneering investigation into an issue that inherently requires a multidisciplinary approach, it highlights the central role of the IS field in regulatory discussions.

Through discriminant analysis of survey data from 139 professors and researchers, we examined their experiences, contributions, and perceptions of key regulatory challenges

identified in the literature. Additionally, we explored their values, needs, and concerns, reflecting the worldview of Brazilian politicians and specialized bureaucrats from the executive branch and public prosecution service. These officials participated in ICT regulation discussions in 2019 and were interviewed in the previous phase of this research.

The purpose of this study is not to generalize the results from a limited sample of Brazilian professors and researchers. However, it moves beyond common assumptions about the defining characteristics of each academic area, offering an objective depiction of how different fields perceive the problem of regulating emerging ICT.

Despite broad recognition of the importance of ICT regulation, participation across academic disciplines remained low. The limited engagement of the IS field is particularly concerning, as it may compromise the technical effectiveness of regulations, create legal uncertainty for businesses and IS professionals, and hinder the scientific advancement of the field. Consequently, one of the study's key takeaways is the potential discrediting of public consultations and hearings as effective mechanisms for academic involvement. This underscores the need for further research into how academia participates in regulatory discussions and how the declining credibility of these instruments affects researchers. For instance, comparing public consultations that received contributions with those that did not could help identify participation barriers, such as dissemination methods, proposal submission deadlines, contribution channels, and the review and consolidation of feedback. These findings have practical implications for policymakers, who must explore alternative mechanisms to enhance engagement from diverse academic fields, ensuring these processes are not merely symbolic and do not fall into disrepute.

Beyond its immediate regulatory implications, this study also contributes to the academic discourse on multidisciplinary, interdisciplinary, and transdisciplinary collaboration in scientific research. Future studies could further refine these discussions by adopting methodological approaches that mitigate the self-selection bias of surveys, allowing for a deeper investigation into some of the study's most challenging findings. Specifically, this includes the Sociology field's lower emphasis on incrementalism and adherence to society, and the Administration field's diminished focus on respect for human dignity and concerns about access to justice, particularly in the context of a digital business landscape characterized by disruptive, winner-takes-all dynamics.

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