Scientific Journal of
Applied Social and Clinical Science

ISSN 2764-2216 vol. 5, n. 12, 2025

ARTICLE 8
Data de Aceite: 21/11/2025

IMPLICATIONS OF THE DIGITAL AGE ON SUSTAINABILITY: A REFLECTION FROM THE PERSPECTIVE OF RESPONSIBLE ENVIRONMENTAL ETHICS

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Abstract: This paper reflects on the implications of digital age practices in the three dimensions of sustainability. The constituents show the ethical conflicts that arise from these practices. To this end, it begins with a documentary review of the cutting-edge knowledge on the subject and the identification of the environmental, social, and economic impacts of digital technologies. The results suggest the need to show not only the complexity of the effects of digital technologies, but also the precepts that environmental ethics and responsibility allow us to raise awareness in order to steer the course of the negative effects of this technological field.

Keywords: Technological criticism; Principle of responsibility; Dimensions of sustainability; Digital ubiquity; Technoscientific progress; Digital technologies; Ethical conflicts.

Introduction

The impact of digital technologies has transformed human life, evident in human relationships, economic structures, and social interactions. The digital age is characterized by the ubiquity of technologies such as artificial intelligence, the *Internet* of Things (IoT), and automation, which together have generated direct and indirect effects on sustainability processes and, therefore, on the living conditions of our planet. From this perspective, the article highlights the most significant components of the semantic field of the digital age, namely: the characterization of frontier digital technologies in terms of their false neutrality, self-propagation, messianism, denaturalization, and dehumanization; and their effects on the various dimensions of sustainability. The aim is to contribute to the debate on the effects of technology with some ethical considerations that question and reorient the trends of technology in the digital age.

The components of the work deal with the characterization of the fundamental elements of the digital age and their implications for sustainability. First, the nature of digital technologies is analyzed to identify their effects on the configuration of today's societies. Subsequently, the environmental, social, and economic externalities derived from technological development and its interrelation between digitization and production and consumption models are examined. From an ethical perspective, it reflects on the conflicts emerging from their actions and, concealed by the false neutrality of digital innovations, the dehumanization of social interactions, and the crisis of responsibility in the face of automation and artificial intelligence. In this regard, theoretical elements are outlined, based on the ethics of responsibility and the precautionary principle.

Research method

This work begins with a description of the manifestations of the digital age and a qualitative analysis of its nature and effects, developed using heuristic and hermeneutic methodologies. The former is used to define the semantic field of digital space, and the latter to evaluate the nature of the interactions between the digital age and the dimensions of sustainability. The aim is to contribute to the ethical framework that warns of the reflective shortcomings of the development and impact of the digital age

on sustainability, specifically. The argumentative structure is based on Bloom's Taxonomy, as it is used to carry out a progression of analysis that begins with conceptual identification and ends with the ethical evaluation of digital impacts on sustainability.

Heuristic methodology is used for conceptual exploration to formulate hypotheses about the interaction between digital technology and environmental crisis. Through systematic analysis and reflection, the contradictions inherent in the contemporary technological paradigm and its implications for social and economic dynamics and their relationship with the environment are defined. In relation to applied hermeneutics, this study revisits the theories of Gadamer and Ricoeur ( ) to highlight the importance of understanding the context and perspectives of the author in dialogue with the reader and, thereby, constructing profound meanings. This translates into internalizing the dialogical process of interpreting key texts on the digital age and its relationship with sustainability. This privileges comprehensive analysis that contextualizes the conflicts between technological development and the duty of ethical responsibility. Establishing a reflective framework enables the evaluation of tensions and, consequently, their implications for technological action.

The analysis is developed progressively based on the cognitive levels of Bloom's Taxonomy. Each ascent in the taxonomy ensures the inclusion of discoveries and understanding of the levels of complexity of the implications of digital technology on sustainability, thus identifying the following levels:

- Level 1: Recognition, which begins with the identification of key concepts framed in the digital age and sustainability, such as technological ubiquity, planned obsolescence, self-propagation, messianism, false neutrality, and ethical responsibility.
- Level 2: Understanding the relationship and relevance between concepts in the semantic field of the digital age, especially those referring to the effects of digital technology practices on the social, economic, and environmental dimensions of sustainability.
- Level 3: Differentiation of the impacts of the digital age by unmasking its essence, such as: technological ubiquity, planned obsolescence, self-propagation, messianism, false neutrality, and as foundations for new ethical horizons of reflection.
- Level 4: Evaluation of the scope and limitations of digital age technology in relation to the dimensions of sustainability.
- Level 5: Reflection on the results based on the identification of the ethical conflicts generated by digital technology.

The choice of heuristic and hermeneutic methodologies allows us to specify the path of identification, understanding, explanation, and generation of alternatives that allow us to influence ethical dilemmas.

Implications of digital-age on the classic dimensions of sustainability

Analysis of the behavior of digital era components shows that the externalities of

digitization transcend the technical sphere and permeate the environmental, social, and economic structure of today's societies.

Environmental impacts

Massive digitization has led to intensive consumption of technological devices and *software*. This behavior has resulted in increased extraction of natural resources, including lithium, coltan, and cobalt minerals, which are essential for the manufacture of mobile phones, computers, and electric vehicle batteries, among other things. Solid electronic waste contains toxic materials that contaminate the soil and surface and groundwater, posing a significant risk to human health and living conditions in nature. In addition, the exploitation of elements for large-scale production has led to the forced displacement of indigenous peoples in mining regions, for example, in the Democratic Republic of Congo and Bolivia.

Another important behavior to highlight is the relationship between the ecological footprint and digital infrastructure, which mainly includes data centers, telecommunications networks, and cloud services due to their high energy consumption and increased greenhouse gas emissions. It is estimated that the technology industry is responsible for approximately 2% of global CO_2 emissions. This proportion is comparable to the aviation industry. In this regard, an analysis by The Guardian (2024) revealed that CO_2 emissions generated by the data centers of large technology corporations, such as Google, Microsoft, Meta, and Apple, were significantly higher than officially reported between 2020 and 2022. This increase was largely due to the intensive use of artificial intelligence applications, whose high energy consumption has exacerbated the environmental impact of the digital industry.

In addition, data center electricity consumption is projected to double by 2030, which would increase CO_2 emissions in the technology industry. This trend has led some technology companies to commit to using renewable energy in their production; however, these measures remain insufficient to offset the global impact.

Social impacts

Digitalization has had an impact on society. On the one hand, it has democratized access to information and education, thereby facilitating digital inclusion in cases where the infrastructure is available and, conversely, digital marginalization where it is not, thus perpetuating inequalities in access to education, health services, and employment opportunities, among others. Thus, the digital divide translates into structural exclusion of marginalized sectors, which in turn generates social strata based on access to and mastery of technological tools.

The massive use of digital platforms has profoundly transformed human interactions. This can generate countless behaviors of dehumanization; a fragmentation of the social fabric and interpersonal relationships; and a loss of contact with the natural environment, as users are abstracted from their time in cyberspace. It is estimated that the time spent on social media varies according to age group, with certain segments of the population having higher digital consumption. In Mexico, according to INEGI's National Survey on the Availability and Use of

Information Technologies in Households (ENDUTIH) (2023), young people aged 18 to 24 spend more time using the *Internet,* with an average of 5.9 hours per day. They are followed by the 25-34 age group with 5.6 hours and adolescents aged 12-17 with 4.7 hours per day. According to the Mainsite portal (2024), on a global scale, the average *Internet* user spends approximately 143 minutes per day on social media. However, this average can vary significantly between countries and age groups.

The intensive use of these digital platforms has raised concerns about their impact on mental health and social interactions. A study published in *Frontiers in Digital Health* (2023) reveals that constant connectivity on social media can cause digital stress in adolescents, leading to feelings of sadness and frustration, as well as problems and misunderstandings when their friends are unavailable. In addition, compulsive use of digital services has been observed to be prevalent among adolescents. According to a report by the Spanish Mental Health Confederation (2024), 11.3% of young people aged 15 to 24 are at high risk of compulsive *Internet* use, a figure that rises to 33% in the 12 to 16 age group. This behavior highlights the need to reflect on this consumption and raise awareness of the balanced use of digital platforms, especially among young people, in order to safeguard the quality of human interactions and their social well-being.

On the other hand, although social media platforms have played an important role in communication among people around the world, they have also increased social isolation, discourse hegemony, market penetration, political polarization, and ideological alienation, especially among young people. Research such as that by Virós et al. (2024) shows that excessive use of social media can deteriorate the quality of human relationships and contribute to an increase in mental health problems, such as anxiety and depression. This study shows that platforms such as TikTok and Instagram have a greater negative impact on the psychological well-being of adolescent girls than on adolescent boys. Young women, who make more intensive use of these networks, feel more observed and pressured by their image, which increases their need for external validation.

Similarly, Turkle (2012) argues that technology leads to isolation, in a framework of relationships where one is "alone, but together"; to the promotion of superficial relationships and emotional dependence on machines. Digital technologies allow us to be constantly connected, but this connectivity can undermine the ability to have meaningful and authentic conversations, which are essential for the development of deep human relationships.

Economic impacts

Digitization has profoundly transformed the global economy to one extreme. In this regard, new markets have been created and, as a result, the efficiency of most economic sectors has increased. However, the effects of planned and perceived obsolescence strategies have been used by manufacturing empires to maintain consumption. This behavior is an expression of technological self-propagation, but also of its false neutrality; because, rather, the logic of technological development is profit at the expense of exploiting nature and human beings.

Technology has profoundly influenced the decision-making of the population, particularly in vulnerable sectors such as children and adolescents. Through mechanisms of algorithmic manipulation and digital persuasion, platforms foster a constant need for social validation through symbolic indicators such as "likes," reinforcing feelings of belonging, consumption, and identity. This deliberate design seeks to maximize interaction and exposure time, generating patterns of emotional dependence and a digital subjectivity shaped by commercial interests.

Economically, both perceived and programmed obsolescence induce the continuous replacement of devices and forced integration into algorithm-controlled digital environments. This logic of constant renewal exemplifies what Hans Jonas calls "technological self-propagation," a phenomenon in which innovation does not respond to essential human needs, but rather to an internal logic of technical expansion and profitability. As this German philosopher warns, "technological progress, once unleashed, becomes autonomous and develops with an internal compulsion, without restraint or defined objective except its own continuation" (Jonas, 1984, p. 57). This alienating dynamic is what sustains the accumulation of capital by digital empires, while diminishing user autonomy and deepening structural inequalities.

Furthermore, this digital age has deepened the concentration of capital in a small group of multinational technology corporations. Companies such as Google, Facebook (Meta), Apple, Microsoft, and Amazon have consolidated dominant positions in their respective sectors, establishing quasi-monopolistic structures that reinforce global economic power and economic dynamics. This concentration has contributed significantly to increasing economic inequality by allowing a small group of individuals to accumulate unprecedented levels of wealth.

According to data referenced by Zuazo (2018), eight billionaires hold wealth equivalent to that of the poorest half of the world's population. Of these eight, at least six are directly linked to the technology sector: Bill Gates (Microsoft), Jeff Bezos (Amazon), Mark Zuckerberg (Meta), Larry Ellison (Oracle), Larry Page and Sergey Brin (Google), as well as the family of Steve Jobs (Apple). This concentration of wealth shows the systemic imbalance promoted by digital capitalism, whose control of information, personal data, and technological infrastructure translates into massive accumulation of capital and global political and economic power.

On the other hand, automation and the accelerated deployment of artificial intelligence have caused structural disruption in the labor market. Traditional sectors such as manufacturing, transportation, and retail have experienced a significant reduction in the number of employees as a result of the replacement of human tasks by automated systems. This phenomenon has led to the precariousness of working conditions, the type of hiring, imposed flexibility, and growing uncertainty about job stability (Brynjolfsson & McAfee, 2014).

Although new jobs related to the development and maintenance of emerging technologies have been created, these jobs tend to be concentrated in highly specialized sectors that require advanced technical skills, excluding large segments of the traditional workforce that do not have the skills or access to retraining processes. This gap

accentuates socioeconomic inequality and generates new forms of structural exclusion.

Likewise, the expansion of the current technological model has led to the introduction and accumulation of toxic materials in the production processes of digital devices; examples of this are heavy metals and highly polluting chemical compounds. These elements, present both in the production stages and in the disposal of electronic waste, pose a great direct risk to human health and environmen , especially in communities exposed to electronic waste dumps or mining areas without environmental regulation.

Below, we outline the multidimensional impacts of digitalization on the classic dimensions of sustainability—environmental, social, and economic—as well as the implications associated with the rise of digital technologies in the areas of labor, culture, health, and education.

a) Dimensions of sustainability

Environmental: Nature deficit disorder, planned obsolescence, digital carbon footprint, denaturalization, environmental fatigue, and dehumanization.

Economic: Technological self-propagation, surveillance capitalism, exploitation of minorities, attention economy, capital mutation, and CIG economy.

Social: Forced displacement, Internet regulation, narrative control, intellectual property, social polarization, digital divide, alienation, and the construction of fake news, among others.

b) Other dimensions

Labor: Digital skills, wage polarization, job perpetuation, labor market polarization, and workforce pigeonholing.

Cultural: Culture of violence, fundamentalisms, cultural erosion, soft power, anti-values.

Education: Tailored scientific projects, manipulation of knowledge, scientific reductionism, digital illiteracy.

Health: Accelerated thinking syndrome, cardiovascular disease, sleep disorders, and gaming disorder.

Discussion

The results of the study show that the digital age holds both the possibility of improving the living conditions of humanity and the risk of deepening inequalities, xclusions, and irreversible damage to the human and natural environment. This duality depends, to a large extent, on the intentionality—explicit or implicit—of those who design and promote digital technologies, as well as on the degree of ethical control that national and international institutions are able to exercise over their development, but above all on the economic intentions of those who direct these types of technologies.

In this sense, it is essential to resort to the ethics of responsibility proposed by Jonas, who warns of the technical power that technological civilization, currently achieved by empires, has. At this threshold of technological development, the conditions of possibility of life on the planet—that is, its essence—can be radically and irreversibly altered. According to Jonas, the fundamental

principle for acting in the face of this threat is the heuristics of fear, understood as a rational attitude of prudence in the face of the possible catastrophic effects of technology. The author argues that: "Act in such a way that the effects of your action are compatible with the permanence of authentic human life on Earth" (Jonas, 1984, p. 36). Thus, technological development should be guided not by the logic of efficiency or immediate economic benefit, but by an ethic that takes into account the fragility and vulnerability of the natural world and human beings.

The digital age and environmental ethics

As a result of the assessment of the impacts of technology in the digital age, it is concluded that these are ambivalent. On the one hand, they allow for the optimization of production processes and the reduction of emissions in strategic sectors such as transportation and energy; on the other hand, they generate significant negative externalities in ecological, social, and economic terms, which tend to intensify in the absence of adequate regulatory frameworks and ethical mechanisms.

This scenario would require the formation of interdisciplinary teams to address the ethical conflicts inherent in technological development in the digital age from a critical and proactive perspective. These groups would have to base their analyses on principles such as precaution, responsibility, and intergenerational justice, as formulated by Jonas in "The Imperative of Responsibility." In this regard, the philosopher points out that human action mediated by technology requires a forward-looking ethic that considers not only immediate h y effects, but also possible irreversible impacts on human life and the biosphere.

Therefore, the work of international institutions and organizations in response to the effects of digital technological development should be geared toward building a global agenda that incorporates coordinated and cross-cutting actions. In particular, it is proposed that such interventions focus on:

a) Forming interdisciplinary, transdisciplinary, interinstitutional, and intersectoral collaborative groups to identify in advance the possible irreversible effects of technological innovation processes and to outline the traceability of technologies.

b) Making visible and holding accountable the actors involved in the generation, implementation, and distribution of digital technologies.

c) Establishing clear and binding regulatory frameworks to guide their development with sustainability criteria.

d) Promote a culture of precaution that encompasses not only the design of devices, but also the socioeconomic processes that sustain them.

Digital inequality and social exclusion

One of the potential contributions of the digital age to improving quality of life lies in democratizing access to information and education through technologies such as the *Internet*. However, this opportunity is deeply conditioned by the persistence of the digital divide, understood as inequality

in access, use, and meaningful appropriation of information and communication technologies, but also by the technological dependence promoted by their creators. Thus, far from resolving structural inequalities, this divide tends to perpetuate and deepen them, disproportionately affecting rural populations, indigenous communities, women, older people, and economically marginalized sectors (Castells, 1996).

In this scenario, the role of the state is fundamental, as public policies must address the development and regulation of digital technologies as a matter of social justice, guaranteeing conditions of equitable access through sustained investment in digital infrastructure, especially in historically excluded regions. It is also a priority to design and implement digital literacy programs that not only provide technical skills but are also based on ethical principles oriented toward the critical, reflective, and responsible use of technologies.

Particular attention should be paid to the deployment of artificial intelligence and automation, whose consequences on the labor market are already evident in various sectors. Faced with the progressive displacement of the workforce by intelligent systems, nation states have a responsibility to formulate strategies that ensure the redistribution of the benefits of digitization. This involves, among other measures, the search for and creation of new job opportunities, the strengthening of social safety nets, and the promotion of inclusive production models centered on human dignity.

The digital economy and the concentration of capital

The profits obtained by large technology corporations are largely explained by reduced input costs, the relative decrease in labor costs through automation processes, and the ability to incorporate cutting-edge technologies quickly and efficiently. This process facilitates the exponential growth of these companies, as they concentrate a substantial portion of global capital and exert a disproportionate influence on decisions that affect the fate of various sectors of humanity, as well as on the configuration of environmental conditions.

The magnitude of this concentration has been documented by organizations such as Oxfam, which in its 2023 report points out that the richest 1% of the world's population concentrates nearly 50% of the wealth generated, while the poorest half owns only 0.75% of global capital (Oxfam, 2023). This economic inequality reflects not only a material imbalance but also a profound asymmetry in the ability to influence global decisions on resource use, technology policy design, and the direction of digital development on a global scale.

Against this backdrop, the growing co-opting of multilateral institutions by corporate interests is cause for concern, particularly in strategic sectors such as communications, digital infrastructure, and artificial intelligence. The autonomy and effectiveness of organizations such as the UN, WHO, and UNESCO are being called into question by pressure from corporate empires with the capacity to influence political, financial, and regulatory agendas (Zuboff, 2019).

In contrast, the possibilities of reversing this technological trend, marked by self-propagation—that is, the automatic and unthinking drive toward innovation for innovation's sake—are limited if regulatory measures and economic alternatives are not seriously pursued to reduce dependence on the continuous extraction of critical raw materials and mitigate their ecological and social impacts. Furthermore, it is recognized that the type of consumption in particular can change the development landscape for companies.

Integrating ethics into digital technology

One of the most obvious phenomena in today's society is the widespread fascination with technological devices and their intensive incorporation into everyday life. This phenomenon has led to an uncritical acceptance of technical progress, whose innovations are occurring at a speed that exceeds the collective capacity to reflect on their ethical, social, and environmental implications. The fascination with technological novelty, fueled by persuasive design strategies and planned obsolescence, has created a structural disconnect between technological development and the regulatory frameworks that should guide it.

This gap has given rise to multiple problems. On the environmental front, the pace of innovation requires intensive extraction of materials such as lithium, coltan, and rare earths, whose ecological and social impact is considerable, particularly in communities in the Global South (Pierri, 2005). In the social sphere, there has been a documented increase in levels of alienation, especially among children and adolescents, who experience a new symbiotic relationship with their devices that leads to new forms of emotional dependence and a loss of meaningful connections in the real world (Turkle, 2012). In the economic dimension, the ability of large technology corporations to influence consumer decisions through personalization algorithms and neuromarketing techniques has consolidated an unprecedented model of capital concentration, based on the monetization of attention and the compulsion to consume digitally (Zuboff, 2019).

This disconnect between technology and ethics creates hyperconnected but deeply isolated individuals who replace authentic conversation with the immediate gratification of a notification or a "like" (Turkle, 2012). Given this scenario, it is urgent to integrate a structural ethical reflection that questions the purposes of technology.

The responsibility of governments, the scientific community, and large technology corporations is central to the ethical definition of the direction of digital technological development. This shared responsibility involves not only risk assessment but also advance deliberation of the social, environmental, and cultural impacts of such development and innovation.

In this context, the Precautionary Principle stands as a fundamental regulatory tool, establishing that, in the face of the possibility of serious or irreversible damage, the absence of scientific certainty should not be used as a justification for postponing measures to prevent such damage (EU Commission, 2000). Applied to the field of technology, this principle requires that all innovation incorporate ethical and environmental assessment mechanisms from its initial design and development stages.

Such an approach opens up the possibility of creating spaces for interdisciplinary deliberation, where scientific, technical, social, and philosophical knowledge converge in the search for solutions that prioritize sustainability. This would not only allow for a balance between technological, social, and environmental systems, but also advance toward models of social and economic justice that address the structural inequalities exacerbated by digitalization.

Conclusions

Based on the objective outlined—to reflect on the implications of digital age practices in the three classic dimensions of sustainability—the methodological design of the study is structured around two main methodologies: heuristics and hermeneutic . Heuristics allows us to identify and systematize the relevant literature that frames the problem area, generating preliminary hypotheses and interpretive frameworks around the relationship between digital technology and sustainability. Hermeneutics, for its part, enables the construction of an ethical reflection through the critical and contextualized analysis of technological discourses, incorporating dialogue between diverse theoretical, philosophical, and environmental perspectives.

From a discursive point of view, the work is structured around the presentation of different levels of cognitive complexity based on Bloom's Taxonomy, which allows for an argumentative progression that ranges from the identification of key concepts to the critical evaluation of their implications. This organization facilitates not only a gradual understanding of the nature of the digital phenomenon, but also a problematization of its dehumanizing and denaturalizing effects on the environment. Taken together, the methodological proposal supports a comprehensive approach that links conceptual analysis, critical interpretation, and ethical guidance.

Thus, the results allow us to understand the profound implications of the digital age on the classic dimensions of sustainability. These implications encompass both opportunities and structural challenges. On the one hand, digitization has facilitated unprecedented connectivity, access to large volumes of information, and the optimization of processes in key sectors such as education, health, energy, and transportation. At the same time, however, it represents a growing threat, manifested in multiple dimensions:

a) The effects on the environment are mainly manifested in the intensive consumption of non-renewable natural resources used in the manufacture of electronic devices, as well as in the growing accumulation of technological waste. The extraction of critical minerals such as lithium, cobalt, coltan, and rare earths has severe ecological impacts, including the degradation of ecosystems, the contamination of water bodies, and the disruption of the livelihoods of communities affected by mining activities. In turn, the massive generation of electronic waste poses an urgent challenge in terms of environmental management, due to the toxicity of its components and the limited capacity for recycling and reuse at the global level.

In light of this problem, technologies must prioritize energy efficiency, reduce the use of toxic materials, and extend the useful life cycle of devices. Complementarily, companies must assume expanded responsibility

for the fate of their products, which includes managing their own electronic waste, as well as ensuring reparability, modularity, and reuse. These actions require the support of robust regulatory frameworks at the national and international levels, establishing standards for sustainable production, incentives for green innovation, and enforcement mechanisms to ensure compliance. Only through this coordination between government regulation and corporate responsibility will it be possible to mitigate the environmental impact of contemporary technological development and move toward a truly sustainable digital transition.

b) At the social level, one of the most persistent and structural effects of the digital age is the widening of the digital divide, particularly in historically marginalized communities such as rural, indigenous, and low-income communities. This divide inhibits equitable access to key opportunities such as education, citizen participation, and communication, perpetuating historical forms of exclusion and marginalization. In this context, access to digital connectivity becomes an instrumental right, the exercise of which conditions the fulfillment of other fundamental rights, such as the right to education, information, and freedom of expression. The state, as the guarantor of social rights, has a responsibility to promote technological literacy programs that strengthen the critical capacities of users, especially in historically disadvantaged sectors. These policies should be aimed not only at providing physical access to technologies, but also at promoting meaningful appropriation based on ethical and democratic principles.

Likewise, it is urgent to reflect on the transformation that digital technologies have brought about in human relationships, particularly with regard to affectivity, communication, and identity construction. As noted in this paper, the intensive use of digital devices has an impact on the mental health, socialization patterns, and emotional development of vulnerable groups such as children and adolescents. In this regard, it is essential that interdisciplinary teams — made up of specialists in health, education, psychology, technology, and philosophy— guide the responsible use of these technologies, establishing limits that guarantee the protection of the social fabric and quality of life in highly digitized contexts.

c) Economically, the digital age has led to a growing concentration of power and capital in the hands of a small number of global technology corporations. This phenomenon not only distorts economic competition, but also consolidates unequal access to digital resources, deepening the structural gaps between the Global North and South, as well as between privileged sectors and historically marginalized populations.

Given this scenario, it is urgent to design public policies that allow for the redistribution of the benefits generated by technological development. Among these measures, the following stand out: the application of antitrust regulations; the promotion of alternative economic models; the implementation of incentives for open, local, and accessible innovation; and the formation of teams of collaborators to discuss ethical dilemmas from interdisciplinary, transdisciplinary, intersectoral, and interinstitutional perspectives. These strategies would not only diversify the actors in the digital ecosystem, but also reduce technological dependence and stimulate more equitable, inclusive, and sustainable production processes.

From an ethics-based approach, it is essential to question the essence of modern technology and its most problematic structural features. Jonas warns that current technological development is marked by a false neutrality—as it hides political and economic intentions—a messianic character—by promising the solution to all human problems—and a tendency toward self-propagation—that is, to reproduce itself without prior ethical judgment about its necessity or convenience (Jonas, 1984). Ignoring these features can lead us to a deepening of the social, economic, and environmental crises we already face, since technology, without an ethical principle to guide it, can become an autonomous force that overwhelms our capacity for control and liberation.

Thus, the reflection developed throughout this work is not limited to identifying the effects of the digital age that affect the dimensions of sustainability, but seeks to articulate a critical and proactive view of the possible paths for its transformation. A deep understanding of these impacts requires recognizing that technological development is not a neutral process, but a phenomenon fraught with ethical, social, and environmental implications that must be deliberated collectively. Therefore, the future of the digital age will depend on the ability of contemporary societies to integrate an ethical and responsible approach into the creation, implementation, and use of technologies. Only through concerted action between governments, businesses, and citizens will it be possible to shape a truly sustainable digital age that promotes collective well-being, respects the ecological limits of the planet, and safeguards the dignity of present and future generations.

The potential of interdisciplinary, transdisciplinary, interinstitutional, and intersectoral work to assess the possible implications of digital technologies remains to be explored.

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