ARTIFICIAL INTELLIGENCE AND LABOR: ethical, legal and socioeconomic issues

INTELIGÊNCIA ARTIFICIAL E TRABALHO: questões éticas, jurídicas e socioeconômicas

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ABSTRACT:
This article studies the impacts that the new economy, resulting from automation, represents for Law. Its hypothesis is that a new social security, based on universal basic income, funded by taxing the use of automation tools, should replace systems based mainly on the employment relationship; and principles related to transparency, explicability and non-discrimination should create obligations for developers and users of AI-powered worker selection tools. Methodology: hypothetical-deductive procedure method, with a transdisciplinary and qualitative approach, and bibliographic review research technique. Results: i) Labor regulation must be planned beyond substitution, focusing on a new economy, in which formal jobs, inserted in a paradigm of social and economic protection, are eroding, and the great challenge will be to protect decent work standards concurrently with the enlargement of dignity for non employed workers; ii) A universal basic income funded by taxes on automation would be interesting, but problematic from the point of view of solidarity in its costing, since the stress of national economies can cause fear on governments. And globally, such taxation, if adopted differently, can cause great tax competition between countries; iii) Transparency obligations are necessary to mitigate bias in hiring tools, but not self-sufficient, because the bias is complex, mainly due to the multiplicity of discriminatory factors and to the opacity of the logic in machine learning.
Keywords:
artificial intelligence. social security; universal basic income. Discrimination. Transparency.

RESUMO:
Este artigo estuda os impactos que a nova economia, decorrente da automação, representa para o Direito. Sua hipótese é que uma nova seguridade social, baseada em renda básica universal, custeada pela tributação do uso de ferramentas de automação, deve substituir os sistemas baseados mormente na relação de emprego; e princípios atinentes à transparência, à explicabilidade e à não discriminação devem criar obrigações para desenvolvedores e usuários de ferramentas de seleção de trabalhadores por IA. Metodologia: método de procedimento hipotético-dedutivo, com abordagem transdisciplinar e qualitativa, e técnica de pesquisa de revisão bibliográfica. Resultados: i) A regulação trabalhista deve ser planejada para além da substituição, focando-se em uma nova economia, em que empregos formais, inseridos em um paradigma de proteção social e econômica erodem, e o grande desafio será proteger os padrões de trabalho decente em concomitância ao alargamento da dignidade para não empregados; ii) A renda básica universal custeada por tributos sobre a automação é interessante, porém problemática quanto à solidariedade no seu custeio, pois o estresse das economias nacionais pode causar temor aos governos. E globalmente, se adotada de modo díspar, pode ocasionar grande concorrência tributária entre países; iii) Obrigações de transparência são necessárias para atenuar o viés em algoritmos de seleção de trabalhadores, mas não autossuficientes, pois o viés é complexo, principalmente em razão da multiplicidade de fatores discriminatórios e da opacidade da lógica no aprendizado de máquina.
Palavras-chave:
Inteligência Artificial. Seguridade Social. Renda básica universal. Discriminação. Transparência.

1 INTRODUCTION

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The scenario for the future of employment in Brazil is worrying, due to the impact that automation should cause in the coming decades, and this situation becomes even worse because the workers who should suffer more from automation in the future are those included in social groups most vulnerable — young people and women with low income and education (LIMA et al., 2019). As a result — and also because of the country's poor performance in terms of its unemployment rate in recent years — Brazil has the challenge of creating not only new non-automated jobs in the long run, but also more job opportunities in the short term, which will require a combined effort by governments, companies, and unions. And if attempts to mitigate the impacts of automation fail, Brazilian society will suffer from the aggravation of terrible socioeconomic problems, such as the concentration of the benefits of automation in the hands of a small elite, high unemployment rates and low rates of gross domestic product (GDP) increase.

Such a discussion deserves attention of economic analysis of Law, since the adoption of automation tools, among them those of artificial intelligence (hereinafter IA) can be revealed, instead of an increase in effectiveness — for making the productive processes of goods and services more efficient, and facilitating hiring procedures, for example —, an increase in costs related to legal liabilities arising from expenses with lawsuits for discrimination against companies. In addition, for Constitutional Law, fundamental rights related to equality, such as workers' social security and non-discrimination, are addressed by the following discussion.

The research problem that motivated this work can be described in the following question: what legal principles should support public policies aimed at containing the aggravation of socioeconomic crises resulting from the replacement of workers with automatons, as well as from the probable aggravation of discrimination resulting from the application of AI technologies in the procedures for selecting and recruiting workers? As a hypothesis, it appears that a new social security system, based on universal basic income, funded by taxing the use of automation tools, should replace systems based mainly on the employment relationship; and principles related to transparency, explainability and non-discrimination should create obligations for users and developers of AI hiring tools.

The general purpose of this article is to study the impacts that the new economy, resulting from AI and automation, causes on Law. In view of that, the development of the text was subdivided into three sections, each one being related to a specific objective of it. Thus, the first section is dedicated to delineating the impact that the adoption of AI tools represents for the reduction of the number of jobs for human beings. The second one, on the other hand, analyzes

the basic characteristics of the new economy resulting from automation, and how public policies to protect people due to that new economy should be designed. Finally, the third section deals with analyzing the specific case of the adoption of AI tools for the selection and recruitment of workers, and what legal principles should be included in its regulation to avoid the legal liability of its users and developers due to the possible discrimination (of gender, race, ethnicity, national origin, etc.) that such tools may perpetrate.

Methodologically, the hypothetical-deductive procedure method was used for this work, with a transdisciplinary and qualitative approach (although quantitative information was used at times) and a bibliographic review research technique.

2 THE IMPACT OF AI TOOLS ON LABOR

Significant competitive advantages are being accumulated for those who are willing to take business risks, developing products and services of commercial success in AI. However, the biggest challenge faced by societies and companies would be to take advantage of the benefits of using AI technologies, offering vast opportunities for new products and services and major productivity improvements, avoiding the dangers and disadvantages in terms of increased unemployment and greater inequalities in wealth (MAKRIDAKIS, 2017).

Pessimistic positions fear that when AI applications become more intelligent than human, all organizational decisions will be made by them, from the least important (which already seems to be directed by digital assistants like Siri or Cortana), to the more significant (such as driving automobiles and managing nuclear plants). The pessimistic perspective is also concerned with social discontent, as the amount of work available to people will decrease with the increasing wealth inequality between employers and employees, or between AI application owners and the rest. But at the same time, it is necessary to verify that the march of technological evolution cannot be interrupted, which means that the only rationally acceptable alternative to this is to identify the risks involved and plan effective actions to avoid their negative consequences.

The main recent manifestations of digitization include the widespread use of mobile internet, cloud services, big data and increased computing power. But the biggest impacts of AI on the world of labor — from machine learning, advanced interactive robotics and autonomous transport — are yet to come. Instead of operating based on pre-programmed rules, machines nowadays learn to use neural networks and large data sets — which increases the possibilities for automation in many fields, such as language translation, pattern recognition, disease

diagnose and autonomous modes of transport (KOSKI; HUSSO, 2018, p. 13-16). The use of automation technology in those new areas means that many information occupations whose tasks are not routine and repetitive will also be affected.

The rate of development of real technology leads to uncertainties, but changes in employment are unlikely to occur as rapidly as the pace of technological evolution. And the impacts of technology on society will be filtered by several factors — for example, companies' unwillingness to adopt new technologies when they demand a major reorganization, the incompatibility between legislation and new circumstances, and ethical issues that await solution in the face of the new scenario.

But being AI a general-purpose technology, it already allows for radical innovations on products and processes in many different sectors. Changes can occur quickly and render existing physical and intellectual capital unproductive. Furthermore, the advancement of information and communication technologies (ICTs) has meant that more and more products are developing a global market, that the reproduction of digital products is almost free, and that the main economies of scale (software and electronic services, for example) are available shortly after production. As a result, a very small group of companies can accumulate a large part of profits and markets, set up monopolies and undermine the possibility of competition — which increases the risk of unequal income distribution.

In order to analyze the impact of AI at work, an economically pragmatic theory of observation of what is an employment (or job) is necessary. In this sense, Agrawal et al. (2018b, p. 308-309) establish that a job is a collection of tasks. With the use of AI tools, some tasks previously performed by humans can be automated, which means that the order and emphasis of the remaining tasks can change, and new tasks can thus be created. In this sense, the collection of tasks that make up a job can be changed, and AI increasingly remodels services, performing various tasks, constituting an important source of innovation, but threatening human jobs. Because of that, Huang and Rust (2018) developed a theory of substitution of tasks by AI to deal with this impact. In such a theory, they note that there are four intelligences required for tasks: (I) *mechanical* (routine and repetitive skills, which require limited training or education, such as call center employees, retail salespeople, waiters and drivers); (II) *analytical* (technical skills that require training and knowledge in data and analysis, such as those of technology-related workers, data scientists, accountants, financial analysts, automotive service technicians and engineers); (III) *intuitive* (professions that require deeper thinking, creative thinking and problem-solving skills, such as marketing managers, management consultants, lawyers,

physicians, sales managers and senior travel agents); and (IV) *empathetic* (professions that require empathy and social, communicative and relationship-building skills, such as politicians, negotiators and psychiatrists).

Those four intelligences can be ordinal and parallel: ordinal because some human intelligences (for example, intuitive and empathetic) are more difficult to replicate by AI, which leads to more time being necessary for the development of successful AI applications with this type of intelligence; and parallel because once the AI has reached a certain level of intelligence, all the lower AIs can coexist to provide service. This quadruple division establishes how companies must decide between humans and machines to perform these tasks.

Furthermore, the substitution of work by AI occurs mainly with tasks, and not at the employment level, taking place in relation to those for "inferior" intelligence tasks (easier for AI) first. AI replaces some of the tasks in a job first — a transition stage thought to be one of improvement — and then progresses to entirely replace human labor — when the AI system acquires the ability to take on all tasks in a job. The progression of replacing AI tasks from lower to higher intelligences results in predictable changes over time in the relative importance of intelligences to employees. An important implication of this theory is that analytical skills will become less important for hiring human workers, as AI takes on more and more analytical tasks, with even more importance being given to human work with regard to intuitive and empathetic "softer" skills. Eventually, in a somewhat more distant future, AI will be able to perform even intuitive and empathetic tasks, which enable innovative forms of human-machine integration for service delivery, but also result in one of the main threats to human employment in the future.

Agrawal and Goldfarb (2019) also make an important contribution to the task-based technology and workforce model — carrying out a theorization somewhat different from that of Huang and Rust, in two types: (I) *prediction* tasks; and (II) *decision* tasks, being that the former ones are perfect complements to the latter, considering that prediction is worthless without a decision. In this structure describing how the IA directly replaces capital by work (in the case of forecasting tasks), and indirectly affects the decision of tasks (by increasing or decreasing the relative returns to labor versus capital in them).

For any occupation, therefore, a key predictor of whether AI will replace human labor is the degree to which the primary skill of such an occupation involves prediction. Transcription jobs, for example, are being automated quickly, as their main skill is to predict which words to type when listening to a recording; and taxi drivers are a good example of professionals who

will have their jobs seriously threatened when AI is employed to predict ideal routes through streets.

The effects of AI on labor are not uniform across professions — as some occupations are more exposed to the risk of substitution than others (FELTEN; RAJ; SEAMANS, 2019). In addition, access to complementary skills and technologies can play an important role in determining the impact of AI on occupations. In other words, the impact of AI is not based on a monolithic force, mainly negative, with significant nuances in the understanding and interpretation of its effects on the labor market. While many fear that AI may replace work, it does not have a significant effect on job growth, and may even increase wages. Most of that salary increase will occur in occupations that already involve a significant amount of use and automation of technology, as there will be access to possible man-machine complementarities in the performance of their tasks.

Johnson and Vera (2019) point out that team intelligence plays a crucial role in the effectiveness of a technology in the world. In that sense, AI will only reach its full potential if, as part of its intelligence, it also incorporates sufficient team intelligence to work well with people. The more intelligent the technological system, the greater the need for collaborative skills, in this sense. The future success of an AI technology would therefore lie in its ability to work well with people (although current examples of AI technologies demonstrate mainly individual competence, without the need for collaboration, such as winning chess and Go games).

The establishment of human-machine cooperation, therefore, suggests the overcoming of the traditional approach, based on the allocation of functions, in favor of the development of a more sophisticated strategy, based on supplementation or improvement, instead of substitution — that is, team building, with interdependence being the essence of that type of work. And AI will only become an effective member of a collaborative collectivity if it is designed to support the management of interdependencies with people.

One of the main challenges that AI faces in terms of team building is that such technology is generally seen as opposed to the formation of groups. But such a view turns out to be false, as the development of increasingly sophisticated AI resources must accompany increasingly sophisticated human-machine interaction. Intelligent systems must be designed from the start to join human capabilities, providing essential resources in tasks in which human intelligence is limited, leveraging that intelligence where it is uniquely powerful. It is in this sense that, when studying AI use cases in financial services, Fernández (2019) presents as a relatively common option and that, in most cases offers a reasonable balance between risks and rewards, the use of AI tools in conjunction with traditional techniques — that is, using AI as part of a

process to reinforce and validate decisions, where there is no mere uncritical acceptance of the results provided by the algorithms.

For Webster and Ivanov (2020, p. 136-138), human labor will continue to be one of the factors of production — however, it will be less and less a key component in productive processes in general. This is because the human qualities that demand problem solving, emotional intelligence, interpersonal communication, sophistication and qualification — such as creation, interpretation, collaboration and negotiation — will be increasingly valued because of that, as well as because of the physical capabilities that robots perform with difficulty. However, even with such appreciation, it will be impossible to avoid the flooding of labor markets with workers displaced by robots and AI. Thus, educational establishments and skills training (schools, universities, technical courses, etc.) will have to adjust to the needs of the new economy and to the demands of workers.

The advent of AI systems can make jobs scarce even for highly educated workers — so universities will have to educate and retrain their graduates to develop highly cognitive competence tasks in line with the new job demand related to AI (LAU; BONILLA; GÁRATE, 2018, p. 626). The most effective way to do this is to teach students to be effective thinkers, being knowledge related to quality information essential. Universities thus have both the challenge and the opportunity to configure the new cadre of professionals in the development of superior cognitive skills — among which are media and information skills that enable future professionals to compete in the employment arena.

3 NEW ECONOMY DUE TO AI AND SOCIOECONOMIC ADEQUACY POLICIES

AI certainly presents challenges in terms of wage inequality and unemployment, and policymakers should play a crucial role in determining the patterns of diffusion and the impact of this technological revolution. But the economic effects of recent technological advances go beyond their impact on the job market. AI technologies can directly benefit consumers, for example, by providing more and better information about production, distribution, uses and risks of products and services. Furthermore, the functioning of existing markets will also be strongly impacted by such technologies, redefining their meaning, dimension and ways through which companies interact with each other and with their consumers. But the well-being of consumers can also be threatened by such advances, since they increase the risk of new illusory forms of collusion between organizations, as well as new ways of exploitation practices of companies (ABRARDI; CAMBINI; RONDI, 2019, p. 23). In this sense, Martins (2019, p. 648)

describes that the power asymmetry between companies and consumers in the context of the use of AI for developing market strategies occurs, primarily, due to: i) the consumers' ignorance about the algorithm design; ii) the data collected from its customers, which facilitates discrimination; iii) because companies can take advantage of the difficulties that consumers have in processing complex choices, thus increasing quality and price parameters to increase their advantage due to the foreseeable errors and behaviors of the consumer.

Thus, in relation to both the production of goods and services, and to labor and consumer markets, a new economy is being formed due to the incorporation of AI tools. And governments, laws and regulations must take this new economy into account. As labor is becoming more flexible, its concentration on contracts, governments, and tax systems should follow the new economic reality, mainly due to the sharing economy. In addition, since many workers become redundant, it will be necessary to guarantee safe livelihoods for people displaced and excluded by technology — with emphasis on policies of universal basic income. The need for this type of program is emphasized, since the stability of the political economy lies in the maintenance of consumers.

There is great concern about the assumptions of the human being's ability to be relevant in the new economy thereby. It is essential to assess whether all human beings are able to develop the skills needed by the market, as the ability of each human being to absorb, retain and process information is very variable. Thus, there is a risk that many will be excluded from the new economy, simply because they are unable to develop the necessary skills. Workers currently employed in positions related to customer service, telemarketing, cleaning, surveillance, logistics, vehicle management and other simpler professions are already seeing severe changes in their fields due to automation — and this trend will potentially extend to any and all employment of a more repetitive nature, protocol and that does not represent human involvement in more complex contexts.

The historic period that begins now is about to show a reduction in employment opportunities and a decrease in wages for skilled workers for tasks that can be replicated or overcome by increasingly intelligent and cost-effective technological devices. And if reality confirms the thesis according to which the threat of automation for the future of work, and especially if the technological extinction of jobs proves to be more profound than expected — it may even be precipitating the end of capitalism as known until then — it will be necessary to build the foundations of a new political economy, different from private profits and paid work (ESTLUND, 2019, p. 325-326). Through disruptions and automation, companies are increasingly finding ways to escape from the end of the socially constructed contract incorporated in the hitherto

normal employment relationship. As a result, more and more workers are moving away from the restrictions and protections of that relationship — and contributing to the murder of employment regulation or to extend its existence incoherently with the socioeconomic context will not prevent this exodus. It is necessary to improve and reinforce employees' rights and labor standards, which incorporate norms in evolution of decent work, and which are necessarily linked to employment practices. But it is also essential to provide, for occupations belonging to the growing group that does not fit the standard employment relationship, basic material requirements for decent living for those who choose that path, or for those who cannot establish a stable job belonging to employment relationship. Therefore, in addition to safeguarding a few "fortified territories" in the employment relationship as a guarantee of labor rights, a broader base of economic security must be built for all, including for those who do not live on stable employment.

In this sense, the position defended by Supiot (2014), according to which global society must return to the "Spirit of Philadelphia" in order to develop a new perspective on social justice in an era characterized by the total market is interesting: in Philadelphia, 1944, the first international declaration of rights with universal purpose — and also with the presentation of the objectives of the International Labor Organization — was elaborated. The aforementioned Declaration, considered to be antipode to ultraliberal dogmatics by Supiot due to its social background, based on Human Rights and inspired by historical experience (not on the unjustifiable dogmas of an infallible market) deserves to be revisited and reaffirmed in the face of a new gain of power of the ultra-liberal economic processes that the operations carried out by AI in the most varied fields of work and consumption can acquire. Thus, principles related to the taxation of the huge gains that companies based on the production and distribution of goods and services based on such technology, the consequent development of a pension capable of giving material dignity to the excluded workers while educationally rehabilitating themselves looking like a new profession and / or social assistance that provides such dignity to the irreversibly excluded would be an interesting route.

It will also be necessary to create approximately 340 million jobs globally in the 2020-2030 decade, due to a complex formed mainly by (ABELIANSKY et al., 2020, p. 22-23): i) trends in population growth; ii) changes in the age structure of the population; iii) changes in the gender composition of the workforce; iv) changes in age and gender-specific labor force participation rates; and v) the desire to reach unemployment rates of 8% for young people and 4% for adults. Most of those jobs will have to be created in low and middle-income countries, being that their creation results from a complex interplay between supply and demand. In this

sense, economic policies can facilitate the job creation process, with supportive legislation being drafted, providing guarantees for the acquisition, by workers, of the skills needed in the face of rapid technological changes, as well as promoting healthy aging of the workforce.

The needs for job creation resulting from automation until 2030 are substantial, but not insurmountable. Estimates place that industrial robots will worldly replace 37.9 million workers in 2030, in a scenario of high displacement, and 12.2 million workers in a scenario of low displacement (ABELIANSKY et al., 2020). Manufacturing workers appear to be the most vulnerable, and the largest number of jobs to be replaced due to their adoption will be in Asia. Despite increasing automation, the calculated shift in jobs due to automation by 2030 is reduced by job creation, which needs to accommodate projected demographic trends, changes in labor force participation and unemployment rate goals.

The relationship between the needs for job creation due to demographic changes and the projected shift due to automation is remarkable: the jobs needed to meet the growing demand of the young working-age population in low-income countries (more laborious, routine and less qualified jobs, then), are the most susceptible to automation. This challenges such countries if the growing youth workforce is not well-educated and qualified, or if they are left with only the allocation to perform predominantly repetitive and routine tasks. Politically, investing in high-quality education for individuals who are not in the workforce yet will be important to face competition both from their peers internally and from that offered by the use of robots in high-income countries.

Higher-income countries with an aging workforce will be challenged by the need to keep older workers healthy and productive. In those scenarios, automation can prove to be beneficial, since the demands related to the older workforce generally consist of jobs with higher qualifications and less physical demands. In such countries it will be important to draft laws that allow people to work at older ages and public policies to encourage companies to hire older workers, as well as projects to promote the collaboration of robots with them (as machines could help them in tasks that are already impossible or very exhausting). Lifelong learning programs will also be essential to keep this group active in the workforce.

Agrawal et al. (2018a) highlight two types of political implications related to the technological advances of AI: policies that affect the patterns of diffusion of the use of AI technologies and policies that address the consequences of this diffusion. The policy categories related to the most relevant dissemination standards relate to issues involving users' privacy, AI use in commerce, and accountability for that use. The structuring of policies related to these topics should focus on achieving the desired balance between encouraging the diffusion of technology

and assuming the relevant ethical values of society. As AI spreads, it will have consequences for jobs, inequality, and competition. Addressing those consequences will be the role of educational policy, of the social safety net, and of antitrust laws.

But great opportunities in terms of increased productivity, even for developing countries, may arise with technological developments towards the use of AI, given the very low capital costs required by some of its applications, in addition to an increase in potential for productivity, especially among the least qualified ones (ERNST; MEROLA; SAAMAN, 2018). Concomitantly, risks related to the increase in inequality must be faced so that the benefits of AI-based technological evolution are shared.

There are significant opportunities arising from AI, including for developing countries. And the risks are less linked to job losses, and more associated with the worsening of income inequalities (internally and globally), as the specific digital nature of AI facilitates its diffusion, but creates great initial advantages that can contribute to further increase plus market concentration and inequality. However, AI's versatility and general use nature also allow the creation of specialized systems potentially beneficial in a wide range of occupations, even among the least qualified or the least productive countries. And this factor, coupled with the huge reduction in capital costs caused by AI applications, as well as the technological change driven by the relative supply of low — or high — skilled labor, allows developing countries to benefit from AI, as long as it is fully widespread and that technological openness is widely shared.

In this sense, one can consider having a moderate optimism about the opportunities and risks of AI, as long as public policy-makers and social partners consider its peculiar characteristics — suggesting the adoption of a wide range of measures (ERNST; MEROLA; SAAMAN, 2018):

(I) Policies for the improvement and acquisition of new skills, although necessary, are not enough — and, therefore, guarantees that companies do not gain market dominance must be added to them (since, on the contrary, they may come to exclude users its algorithm, including maintaining and replicating prejudiced biases);

(II) People must have more control over their individual information;

(III) Long-term political proposals for a fairer global economy, brought about by significant economic rewards that AI-based innovations promise, must be developed — and this includes continual reduction in working hours, sharing of revenue revenues from innovation through participation policies in profits already successfully implemented in some countries in the past;

(IV) AI applications and impacts must be continuously monitored by national and international actors — behold, as technology evolves, new risks and opportunities arise, requiring constant regulatory adjustments to ensure that technological openness is widely shared;

(V) Constant knowledge exchanges between policy-makers and regulators to avoid regulatory capture must be developed, as well as adequate support for local actors to benefit from the advantages of AI.

AI has the potential to reshape skill demands, career opportunities and the distribution of workers across industries and occupations. But researchers and public policy-makers are not equipped to predict job trends resulting from the application of AI. Typically, technology is designed to perform a specific task, which alters the demand for specific skills in the workplace. The resulting changes in the demands for skills are widespread across the economy, influencing occupational skill requirements, career mobility and the well-being of society. The identification of specific paths of this dynamics has been restricted by crude historical data and limited tools to model resilience (FRANK et al., 2019, p. 6537).

Those obstacles can be overcome by prioritizing detailed data collection, responsive to real-time changes in the labor market and respecting regional variability. Better access to unstructured data about skills contained in resumes and job offers, coupled with new indicators of recent technological changes (patent data, for example) and models to labor dependencies between cities and regions, will allow the creation and adoption of new techniques to understand and predict the future of labor, as well as the use of new data-oriented tools (including machine learning applications and systemic modeling able to more accurately reflect the complexity of labor systems).

The rise of AI presents many options to society, each of them representing an exchange. Currently, while such technology is still in its infancy, there are three particularly important exchanges at the level of society (AGRAWAL; GANS; GOLDFARB, 2018b, p. 458-460):

(I) *Productivity versus distribution:* the problem with the application of AI is not creating wealth, but distributing it. AI can exacerbate the problem of income inequality for two reasons:

By assuming certain tasks, AIs can increase competition among humans for the remaining tasks, reducing wages and the fraction of the income earned from work due to the fraction obtained by the owners of capital;

Prediction machines, like other computer-related technologies, can acquire biases related to skills, so that AI tools disproportionately increase the productivity of highly skilled workers.

(II) *Innovation versus competition:* AI has economies of scale, and its tools generally have some degree of increasing return — with better prediction accuracy leading to more users, more users generating more data, and more data leading to better prediction accuracy. Companies have more incentives to build prediction machines if they have more control, but together with economies of scale, this can lead to monopolization. Faster innovation may benefit society from a short-term perspective, but it may not be ideal from a social or long-term perspective.

(III) *Performance versus privacy:* the more data available for analysis and learning, the better the performance of AI tools. But the provision of personal data generally leads to losses in terms of privacy. Thus, jurisdictions will have to deal with a delicate balance when it comes to this conflict.

Due to those economic and legal risks, the antitrust and privacy protection authorities of users will face enormous and unprecedented challenges to face the new complex environment (ABRARDI; CAMBINI; RONDI, 2019, p. 24):

(I) Access to data may obliterate the creation of new competing networks and investment in innovation by new market participants — which also leads to the incentive of anti competitive conduct in areas not related to price, such as capture, extraction and exclusion of data;

(II) Increased capacity to track individuals allows new forms of price discrimination;

(III) The use of AI can increase the occurrence of anti competitive conduct. The use of advanced machine learning algorithms can increase the opacity of the pricing processes adopted by companies, making it difficult to detect and punish such anti-competitive conduct by antitrust authorities;

(IV) The use of large amounts of data by AI increases the risk of data manipulation, which can have serious social and political implications — such as the possibility of political exploitation of the results of data research performed by AI. Biased search rankings can change the voting preferences of undecided voters significantly, and imperceptibly by people.

Lexer and Scarcella (2019) analyze tax and social security policy instruments to face the effects of AI in the labor markets, focusing on the possibility of setting up a long-term mass unemployment scenario. In this sense, the introduction of universal basic income programs becomes mainly a matter of political decision-making in terms of which legal-philosophical approach should be adopted when designing social security in this new economy. In this sense, the following questions arise: should social welfare still serve as a last resort and focus on targeted support, or should it guarantee minimum standards for everyone unconditionally and regardless of an individual's need? Although the introduction of universal basic income is in

accordance with many current Constitutions (depending on the interpretations of the almost ubiquitous principle of equality), the concrete design of a universal basic income is important when considering the legal security values of solidarity. Such a combined strategy would require a lot of revenue and, therefore, its accessibility is questionable, since it would demand significant amounts of material and financial resources from governments.

From a taxation point of view, a "tax on robots", on the value created by the use of automation technologies, or on the costs of technology, may still be viable options to replace the revenue that would be lost as a result of the exemption from production because of the unnecessary taxation on wages resulting from automation, and that would necessary to sustain a social security system. In fact, South Korea, Italy, the Canton of Geneva (Switzerland) and the United States (with regard to autonomous vehicles) have already tried to implement taxes on robots (KOVACEV, 2020, p. 202-213). But that solution also presents several difficulties in its design and implementation. In the design of those measures, it will be necessary to balance the tax base and the tax rate to avoid discouraging innovation. And within a global scenario, the introduction of this type of instrument by a single State (or by a few) can have significant negative impacts, such as leading companies to move their production processes to countries where the tax burden is less heavy and, therefore, would promote tax competition between states.

4 BIAS IN AI-POWERED HIRING TOOLS

Despite the tendency to think about the uses of AI for a short or distant future, it is necessary to understand that the influence of automation on the labor market is already occurring — mainly, in the current historical moment, in procedures of hiring job candidates. Increasingly, machine learning algorithms and models are used in all the small decisions that make up the modern hiring pipeline, from which resumés are selected for interviews, for example. Thus, those algorithms and models can amplify problems of prejudiced bias and injustice for many historically marginalized groups (SCHUMANN et al., 2020). In addition, numerous invasive devices affect work activities today, and constitute a growing terrain for new forms of AI-assisted monitoring and algorithms (on badges, tablets, wearables, collaborative software, virtual personal assistants, facial recognition systems, etc.). Legally, such tools constantly collect, produce, share and combine data that can be used by the employer for several reasons, which leads to variations in the prerogatives related to subordination, which are central to the

employment relationship (ALOISI; GRAMANO, 2019). When it comes to recruiting, managing and verifying the workforce, AI applications are seen as effective combinations of big data analysis and algorithmic governance. And only recently, international, European and national institutions in general have started to consider the possibilities of updating the existing regulation on the matter to face the complex and far-reaching challenges of those applications.

Companies are increasingly adopting AI tools to minimize human bias, reduce costs and streamline the recruitment process. Big data and AI technologies support HR decision-making in a variety of talent acquisition tasks — CV classification, establishing predictive matches between job candidates and vacancies using data, correcting bias in the information used in job position descriptions, and using of bots to schedule interviews with candidates, for example. Although such AI tools can help organizations to efficiently navigate the large set of possible candidates, those algorithms are ultimately human decision-making processes incorporated into the code (YARGER; PAYTON; NEUPANE, 2019). Discrimination in data-driven recruitment generally occurs when the systematic bias of (human) decision makers is learned and internalized by the algorithmic classifier, leading to ethical and legal problems (SCHMALEBBACH; LAUMER, 2020).

Thus, concerned about the affectation of the current multimodal algorithms by sensitive elements and internal prejudices in the data, Peña et al. (2020) developed a fictitious bench for automated recruitment tests, which they called *FairCVtest*. The model is fictitious because it includes a large set of 24,000 (twenty-four thousand) synthetic profiles with information normally found in the CVs of job seekers (called *Fair-CVdb*). In such profiles, scores were established based on the candidates' gender and ethnicity characteristics, which resulted in discrimination in the learned models aimed at generating candidate scores for hiring purposes. Discrimination was also observed from the image of each candidate's face. In such a test, they trained automatic recruitment algorithms using a set of multimodal synthetic profiles consciously classified with gender and race bias. *FairCVtest* uses AI to extract confidential information from unstructured data and exploits it in combination with data biases in prejudiced (and therefore undesirable and unfair) ways. In that scenario, the system exposed sensitive information from the images (gender and ethnicity) and modeled its relationship with prejudiced bias. This discriminatory behavior of the algorithm was not limited to the case studied, where the bias is in the target function: the selection of resources or unbalanced data can also become sources of bias. This is common when data sets are collected from historical sources that do not represent the diversity of society.

Lambrecht and Tucker (2019) exemplify the gender bias in automatic hiring tools very well in their field study about an algorithm that displayed, on Facebook, ads promoting job opportunities in the fields of science, technology, engineering and mathematics in 191 (one hundred and ninety-one) countries. Such an ad was explicitly intended to be gender-neutral in its display. But in reality fewer women were exposed to the advertisement than men, as younger women constitute a demographic group considered more expensive to display ads. Thus, an algorithm that simply optimizes the cost-benefit ratio in the display of ads will display ads that should be gender-neutral in an apparently discriminatory way.

The study by Desiere and Struyven (2020), by its turn, using a recently developed AI-based profile model of the Flemish public employment service, exemplifies how the AI-based profile discriminates against foreign job candidates: with a maximum level of accuracy, job seekers of foreign origin who end up finding a job are 2.6 times more likely to be incorrectly classified as "high risk" job seekers.

Although AI may bring many benefits to workers — such as increasing human capacities, promoting creativity, including underrepresented populations, reducing inequalities (economic, social, gender, etc.), reinvigorating inclusive growth, sustainable development and well-being —, it also increases authoritarian attitudes. In fact, it is difficult to say how monitoring, tracking, scoring, incentive through nudges and fines, classifications and metrics related to technology tools can be manipulated and adapted to infer unspecified characteristics or to predict unknown behavior. Those systems are not neutral, as they can promote discrimination and exacerbate inequality, paving the way for social unrest and political turmoil.

The great potential of AI and prediction algorithms to increase efficiency and allow companies to focus on innovation (and no longer on mundane tasks) makes it possible that such technologies will occupy an increasingly substantial space at the work environment — including in the hiring processes (RAUB, 2018, p. 569-570). However, it is also very clear that, with the incredible potential of AI, there can also be several challenges that can increase the responsibility of employers due to the technological impact.

Although AI is not free from prejudice, completely abandoning its use in hiring processes because of its possible bias does not mitigate the occurrence of prejudice. In this sense, employers who intend to take advantage of the benefits of AI to increase efficiency in hiring processes must prepare themselves to ask difficult questions and ensure their responsible implementation. A balance between human responsibility and a responsibly designed and chosen AI system can help to address those major tensions.

Prejudice inculcated in AI-powered decision-making processes (either in the initial coding of that intelligence, or inserted in the data through the learning algorithms) is rooted in human nature much deeper than it is admitted. The result of this is that much attention should be paid to short-term issues with biased algorithms and long-term issues associated with regulation and increasing diversity in the technology industry.

Evidence of the extent to which AI-powered hiring tools have been adopted worldwide is scarce, but a recent report estimated that 99% of Fortune 500 companies use some sort of candidate tracking system in their hiring process, due to their perceived efficiency and cost savings (QU, 2019). The main concerns about those systems include the lack of transparency and the potential limitation of access to jobs for specific profiles. Regarding the latter, however, several suppliers of those systems claim to detect and mitigate discriminatory practices against protected groups and to promote diversity and inclusion in the workplace. However, those "bias mitigation" claims are rarely examined and evaluated and, when made, they are almost exclusively from the US socio-legal perspective. Sánchez-Monedero, Dencik and Edwards (2020), however, critically examined how three important automated hiring systems in regular use in the UK — *HireVue*, *Pymetrics* and *Applied* — understand and seek to mitigate discriminatory algorithmic bias. Using publicly available documents, they describe how their tools are designed, validated and audited for prominent prejudices, assumptions and limitations, before placing them in UK's socio-legal context.

Although some companies that develop such type of systems provide some documentation to prove that they focus specifically on mitigating discriminatory bias, access to relevant information to assess such a claim remains an essential problem for carrying out any thorough analysis. But those companies are generally vague and abstract in doing so. Furthermore, they do not make it clear how relevant stakeholders (mainly job seekers) can access and understand information about how their eligibility decisions may have been achieved through the systems. Thus, there is a lack of information about how the systems work, the approach taken to deal with discriminatory hiring practices and, crucially, where and how they are used around the world, which therefore constitute a significant problem. Given that it is not even clear if automated systems for selecting and recruiting workers provide significant benefits to employers, it is even questionable whether their use should be restricted or discouraged by regulators in the data protection and equality sectors.

The negative impact of hiring algorithms can be mitigated by adopting measures that provide greater transparency for employers to the public, which would allow State institutions and human rights activists to hold employers accountable for hiring based on biased hiring

algorithms (LAGENKAMP, COSTA; CHEUNG, 2020). In this sense, employers using such algorithmic tools would have to be required by Law to adopt technological structures for automated contracting transparency (in the so-called "regulation-by-design"), as well as to publish reports of algorithmic transparency.

Western national legal systems share an effective and adaptable arsenal to face the challenges that AI poses in terms of interference in the private sphere of employees, such as: (I) the recognition of human dignity as a fundamental right to be protected also in the workplace; (II) the involvement of unions in regulation; (III) authorization of technological facilities that can be used as surveillance tools. In addition, the recognition that employee's under-sufficiency is compounded by the use of tools that interfere with their privacy. Jurisprudence and Court decision also play important roles in defining the interpretation of Law, updating it in relation to the most recent technological innovations. But there is no reason to be overly optimistic about future developments in monitoring technologies. The European GDPR, for example, proves to be very weak in regulating decisions powered by AI-driven data, as on the one hand, it covers decisions based solely on automated processing, to make anonymous not only the profile of the data subjects, but also any other automated processing form; on the other hand, it is conceived in an outdated way in the understanding how data are used (ALOISI; GRAMANO, 2019).

Furthermore, employers who use AI-powered hiring tools are simply not in a position to minimally predict how a Court would analyze an algorithmic selection procedure related to the legal obligation of non-discrimination (SCHERER; KING; MRKONICH, 2020). This is why legal standards for the evaluation of such procedures must be urgently considered and established, otherwise there will be fears in the implementation of this type of system — which, in turn, results in delay in technological innovation and consultative legal techniques.

Although algorithmic tools offer employers a vehicle for more effective and inclusive HR selection decisions, the use of such tools to improve hiring and other HR decisions has lagged behind the use of algorithms in other commercial operations. In order for this not to become legally evident too late, the legal discipline on the matter will have to evolve quickly. But for now, courts, agencies and employers must be aware of the incompatibility between the state of the technology and existing legal standards, so that the promise of these technologies is not missed.

Raghavan et al. (2020) identified candidate-tracking algorithm providers, having documented information they disclosed about their development and validation procedures, and evaluated their practices, focusing particularly on efforts to detect and mitigate algorithmic bias.

From such a study, the authors found that, given the proprietary and sensitive nature of the models created for real customers, it is often not feasible for external researchers to conduct a traditional audit — but they were still able to collect valuable information by investigating the publicly available statements from suppliers. Thus, the authors listed the following policy recommendations for mitigating algorithmic bias:

(I) *Transparency*: although there are exceptions, suppliers in general are not transparent about their practices. Thus, there is a need for more transparency about such selection and recruitment procedures to design effective policies and allow meaningful oversight;

(II) *Multiplicity in the analysis of biases*: the disparate impact theory — according to which, legally, the plaintiff must show that a particularly facially-neutral employment practice causes a disparate impact in relation to a protected class (BAROCAS; SELBST, 2016, p 701) — is not the only indicator of bias in a system. Suppliers must also monitor other metrics, such as differential validity (which occurs when an assessment is better at classifying members of one group than another).

(III) *Relativization of the importance of outcome-based bias metrics:* outcome-based bias measures (including tests of disparate impact and differential validity) are limited in their power. They require representative data sets for specific candidate groups and do not critically examine the suitability of individual forecasts. In addition, such metrics depend on access to protected attributes, whose data is not always available.

(IV) *Reconsideration of legal standards for algorithmic learning and algorithmic opacity:* legal standards of validity under uniform guidelines in the light of machine learning have to be reconsidered. As machine learning can discover relationships that are incomprehensible to humans (since learning starts to take place from logics that were not foreseen by the initial programmer of the algorithm, and can be created from an opaque logic, typical of the machine language), a statistically valid assessment can inadvertently leverage ethically problematic correlations.

(V) Algorithmic polarization techniques have significant implications for "*alternative business practices*", since they automate the search for less discriminatory alternatives.

5 CONCLUSION

The risk of increasing social inequality brought about by digitalization and the application of AI in production processes is as important as the risk of substituting humans by machines. That technology has demonstrated the possibility of economic transformation in the

sense of relativizing both material investment barriers (capital, human labor) and policies (borders, territories), favoring the creation of large global technological monopolies by a few companies.

Dealing with task replacement before replacing full-time jobs is a more plausible way to address the future of working with AI. And a good way to theorize about tasks is to divide them into four types: mechanical (routine and repetitive, with little training or education); analytical (requires training and knowledge in data and analysis); intuitive (require deeper thinking, creative thinking and problem-solving skills); and empathetic (they demand empathy and social, communicative and relationship-building skills). In this form of structuring ideas, one has that mechanical and analytical tasks are likely to be replaced long before intuitive and empathetic ones. And, with that, jobs based specifically on those first two types of tasks are at much greater risk than those related to the last ones. But intuitive and empathetic capabilities will, over time, be replicated by AI. Another way of looking at tasks performed in productive processes, due to their degree of possibility of substitution due to automation, is with the division between forecasting tasks and decision tasks, integrated and interdependent types — but it is important to note that workers focused on the skills of predicting the next moments are far more substitutable than those who decide.

The impact of AI at work is contingent according to each professional, cultural and regional context, and as many tasks and human jobs are being replaced by machines, others, less replicable by automated processes, may even become valued. Furthermore, it is very plausible to think that, to be successful, AI will not simply replace jobs — it will instead collaborate with humans.

Due to all these technological and social transformations, labor regulation must be considered beyond substitution, focusing on a new economy, increasingly global and less material, requiring coordinated legal strategies between national and international regulatory scenarios. In this new economy, formal jobs, inserted in a paradigm of social and economic protection, are eroding (through automation, business strategies to escape from the legal paradigms of employment). And this does not necessarily mean its abrupt end, but the challenge of maintaining the legal protection of decent work standards concomitant to the expansion of socioeconomic dignity, for workers not included in employment relationships.

There are at least three major socioeconomic and legal options that must be made very carefully when regulating the new economy brought about by the use of AI. The first of them concerns to the conflict between the ideals of productivity and distribution — as the use of AI can cause human labor to be devalued due to the decrease in tasks and jobs. Second, innovation

is encouraged by the prospect of greater economic return — however, the greater the control of the market by the companies with capital and the possibilities of innovating technologically, greater is the risk of setting up monopolies by companies with such technology increases, which consequently puts innovation itself at risk. And thirdly, the better the quality and quantity of data available for analysis and learning by AI tools, the better its performance will be — but on the other hand, passive data collection can lead to damages to people's privacy.

On the one hand, the new AI-related economy can be characterized by greater possibilities for consumer protection, since more information of better quality can be accessible to them through the use of AI tools. However, other tools may be available to companies, which will give them more capacity to track individuals and, with that, develop new forms of price discrimination. Furthermore, advanced machine learning can make companies' pricing even more opaque, making it harder to detect and punish anti-competitive conduct. And the use of large amounts of data by AI increases the risk of data manipulation, which can have serious social and political implications — such as the possibility of political exploitation of the results of data research performed by AI.

There are important political proposals for redistribution to avoid an eventual more pessimistic scenario in relation to the substitution of humans by machines with automation and the introduction of AI in the labor market — perhaps the most salient of them currently refers to the creation of a universal basic income, which could be fostered by a tax on the use of robots and AI by companies. Such measures are supported by most Western constitutional principles regarding equality, but several issues may arise, in an attempt to design public policies in this sense, when trying to balance them with solidarity in the cost of security. In addition, a huge budgetary effort would be required from national economies, which could put off their development due to governments' fear of the political costs that the stress of their economies could cause. And globally, taxation on automata in only a few countries can move companies to less regulated locations, causing great tax competition between countries.

Employers must take advantage of the benefits of using AI and predictive algorithms in general in hiring processes as well, due to increased efficiency. However, they must be alert to the possibility of prejudice in such processes — which could lead to their condemnation to crimes and torts. Therefore, such adoption must be very responsible and parsimonious, as human prejudices stain the programming of AI and the data from which it learns.

Given the evolution of technology, the legal parameters for protecting workers against discrimination must be updated. Legislative updating is a time-consuming and insufficient strategy, however. Therefore, regulatory bodies, the Judiciary and employers must be aware of such

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changes in order to update their standards of interpretation of law from the technological context. It is important to maintain decent standards for employees in their work environment and the participation of workers' collectives in the regulation of labor relations. But current legislation, such as European Union's GDPR (2016) which, in its articles 5º, 1, a and 12º, already places the principle of transparency and the prohibition of discrimination by sensitive data (art. 9º, 1) — and consequently, those inspired by it, such as the Brazilian LGPD[2] which, in its art. 6º, IX, establishes the principle of non-discrimination, of transparency in its arts. 6º, IV, art. 9º, §1º, art. 10, §1º and art. 40 — suffer from an old-fashioned approach, disregarding the possibilities for the data collected from employees by systems to monitor their behavior in the workplace to be used for other unforeseen purposes, negatively enhanced by prejudiced biases.[3]

The creation of legal obligations to maintain transparency structures in the algorithms' design, combined with the publication of periodic transparency reports by employers using automated hiring tools, is an important strategy for mitigating bias in hiring algorithms. But despite the fact that legal measures that oblige suppliers of algorithmic hiring tools to act with transparency are necessary, they are not self-sufficient. Several metric parameters of the algorithmic bias must be considered by the suppliers, and no parameter is important in itself — given that the topic "discriminatory bias" presents several complexities: multiplicity of factors (race, gender, ethnicity, national origin, social class, etc.); opacity of algorithmic logic in machine learning, among others. Then, other strategies in hiring personnel should be used by companies, when they reveal less discriminatory potential.

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[2] According to art. 4º of Medida Provisória nº 959, 2020, such act will only be completely enforced from May 3rd, 2021.

[3] It is necessary to say that some related principles can also be found in current Brazilian Parliamentary Bills, such as: PLC 21/2020, which brings non discrimination (art. 6º, III) as well as transparente and explainability (art. 6º, IV); PLS 5051/2019 (VALENTIM, 2019 a), which embodies equality (art. 2º, I), pluralista and diversity (art. 2º, II), and transparency, accountability and the possibility of auditing the systems (art. 2º, IV); and PLS 5619/2019 (VALENTIM, 2019b), which carries on its text transparency (art. 2º, IV), diversity maintenance (art. 4º, VI), design that permits human intervention (art. 4º, VII), decidability without discriminatory bias(art. 4º, VIII) and possibility of mitigating technological risks (art. 4º, IX).

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