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Computer Law & Security Review

# Use of artificial intelligence by tax administrations: An analysis regarding taxpayers' rights in Latin American countries ☆

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ARTICLE INFO

*Keywords:*
Artificial intelligence
Tax law
Right to defense
Tax administration

ABSTRACT

In this paper, we analyze taxpayers' rights to have access to artificial intelligence algorithms and formulas that have been used by tax administrations in Latin America. We consider two applications of artificial intelligence: in the characterization of taxpayers' risk and the robotization of tax audit actions. Very little has been described in the literature on how these technologies coexist with taxpayers' rights, especially in the exercise of their right to defense in administrative and contentious proceedings. The evidence reflects that, although in the countries under study the access to these techniques is not clearly regulated, general principles derived from the fundamental rights declared by each country make it possible to safeguard taxpayers' right to access this information.



## 1. Inroduction

Tax administrations have the main function of managing tax compliance to detect and prevent criminal behavior and provide service and education to help taxpayers meet their tax obligations with the least complexity and burden of compliance.[1] Along these lines, the OECD[2] has suggested that all organizations, including tax authorities, keep pace with technological development and, as necessary, change their services and distribution for the best use of new technology. Recent studies show that computerized inspection systems contribute to better fiscal risk management.[3]

Although Latin American tax administrations have accepted OECD recommendations - such as Chile, Brazil, Mexico, Peru, among others - very little has been described in the

☆ Article developed within the internal research project of the Vice-Rector of Research and Advanced Studies of the Pontificia Universidad Católica de Valparaíso, COD. PROJECT: 039.406/2019.

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[1] Munawer Sultan Khwaja, Rajul Awasthi and Jan Loeprick, 'Risk-Based tax audits: approaches and country experiences' (2011) The World Bank <https://openknowledge.worldbank.org/bitstream/handle/10986/2314/627010PUB0Risk000public00BOX361489B.pdf?sequence=1> accessed 22 February 2020.

[2] OECD, Organisation for Economic Co-operation and Development, 'Technologies for better tax administration: A practical guide for revenue bodies' (2016) Paris: OECD Publishing. DOI: 10.1787/9789264256439-en.

[3] OECD, Organisation for Economic Co-operation and Development, 'Tax administration 2017: Comparative information on OECD and other advanced and emerging economies' (2017) Paris: OECD Publishing. DOI: 10.1787/tax_admin-2017-en.

https://doi.org/10.1016/j.clsr.2020.105441

literature on how computer systems coexist with taxpayers' rights. Even at the regulatory level, an asymmetric treatment of these rights has been seen among different Latin American countries.[4] Studies in Spain conclude that in the face of massive data processing by the tax administration, the legislation must recognize the right of the interested party to access, rectify, delete and even oppose the processing of their personal-data.[5] In our opinion, not only the right of access to information should be considered, but also the right to be informed of the models, formulas or algorithms used to collect such information, allowing control of arbitrariness, on the one hand, and it is proper and essential for the exercise of the right of defense.

The main objective of this study is to specify the legal limits in the use of technology aimed at automating the decision making of the different legal operators in the taxation field. For the development of this problem, two types of artificial intelligence (AI) applications were considered: in the characterization of taxpayer risk and the robotization of actions in tax audits, drawing on the experience of the Finnish tax administration by introducing a Robotic Process Automation (RPA) into audit processes, which enables the configuration of computer software to capture and interpret existing applications.

It is important to note that the use of technological tools to determine tax differences or apply tax fines, conceals a more complex conflict of a possible affectation of fundamental rights. In this regard, should it be a right to examine the data processing system that resulted in tax collections or fine applications? Can the right to due process be affected if the tax judge rejects the possibility of accessing information from the data processing system to assess its accuracy? can a robot have the power to generate tax audits and make decisions?

Computers systems have normative implications, not only in aspects of social life but also in the way lawmakers around the world design social and legal institutions in the era of AI.[6] Conclusions will be presented at the end of the text.

## 2. General aspects of technological systems used by tax administrations

New technologies have led to critical changes in international politics, reducing information collection costs, decreasing market friction and significantly driving the process of world market expansion.[7] In taxation, the impact has focused on digitalization, robotization, machine-to-machine (M2M) technologies and blockchain[8]. This has aroused the interest of researchers who mainly point to the negative effects on tax collection[9] and the cost that companies must assume when implementing electronic tax systems[10].

But new technologies can also be used to improve taxpayer services and achieve tax compliance, and to implement new audit mechanisms, especially considering the large volume of data generated, known as 'big data'.[11]

Big data refer to the large volume of information assets, of high speed and/or in a variety of formats, that demands cost-effective and innovative ways of processing for better a knowledge, decision making and process automation.[12] It is characterized by having three dimensions: volume, speed and variety. Under a common denominator approach, the European Data Protection Supervisor has defined big data analytics as to the practice of combining and analyzing large volumes of information from diverse sources using sophisticated algorithms to inform decisions.[13] Big data analytics uses sophis-

[4] Antonio Faúndez-Ugalde, Rachid Osman-Hein and Mario Pino, 'La auditoría tributaria por sistemas electrónicos frente a los derechos de los contribuyentes: un estudio comparado en América Latina' (2018) Revista Chilena de Derecho y Tecnología, 7(2), pp. 113-135. doi:10.5354/0719-2584.2018.51099.

[5] Bernardo Olivares 'Technological innovation within the Spanish tax administration and data subjects' right to access: An opportunity knocks' (2018) Computer Law & Security Review, 34(3), pp. 628-639. Doi https://doi.org/10.1016/j.clsr.2017.11.012

[6] Han-Wei Liu, Ching-Fu Lin y Yu-Jie Chen, 'Beyond State v Loomis: artificial intelligence, government algorithmization and accountability' (2019) International Journal of Law and Information Technology. DOI: 10.1093/ijlit/eaz001. It should be noted that there is no unanimity regarding the concept of artificial intelligence, being able to distinguish a conceptual field that could be called strong and a weaker or less rigorous one. A strong concept of artificial intelligence includes those technological developments in which "the machines" are capable of learning and developing processes that evolve in ways that are not determinable, not completely predictable and eventually not completely traceable or explainable by their creators. In a weaker version, artificial intelligence can be understood as "the ability of a non-natural entity to make choices by an evaluative process" (Turner, Jacob, 'Robot rules: regulating artificial intelligence' (2019) 16, London: Palgrave Mac Millan). It is in this sense that the reference to artificial intelligence is predominantly used in this article.

[7] See Anne Bardopoulos 'eCommerce and the effects of technology on taxation' (2015) 29 Disponible en Springer: DOI: 10.1007/978-3-319-15449-7; Nocoli Nattrass, Jeremy Wakeford and Samson Muradzikwa, 'Macroeconomics theory and policy in South Africa' (2003) 309 Ciudad del Cabo: David Philip.

[8] Valentine Vishnevsky and Viktoriia Chekina, 'Robot vs. tax inspector or how the fourth industrial revolution will change the tax system: a review of problems and solutions' (2018) 6 Journal of Tax Reform, 2018, 4 (1), pp. 6–26. DOI: 10.15826/jtr.2018.4.1.042.

[9] See David Agrawal, 'The Internet as a Tax Haven? The Effect of the Internet on Tax Competition' <http://dx.doi.org/10.2139/ssrn.2328479> accessed 22 February 2020; Maya Bacache-Beauvallet, Maya and Francis Bloch, 'Special issue on taxation in the digital economy' (2018) Journal of Public Economic Theory, 20 (1), pp. 5-8. DOI:10.1111/jpet.12285; Maya Bacache-Beauvallet 'Tax competition, tax coordination, and e-commerce' (2018) Journal of Public Economic Theory, 20 (1), pp. 100–117. DOI:10.1111/jpet.12254; Paul Belleflamme and Eric Toulemonde 'Tax incidence on competing two-sided platforms' (2018) Journal of Public Economic Theory, 20 (1), pp. 9–21. DOI:10.1111/jpet.12275; Marc Bourreau, Bernard Caillaud y Romain De Nijs 'Taxation of a digital monopoly platform' (2018) Journal of Public Economic Theory, 20 (1), pp. 40–51. DOI:10.1111/jpet.12255; Francis Bloch y Gabrielle Demange 'Taxation and privacy protection on Internet platforms' (2018) Journal of Public Economic Theory, 20 (1), pp. 52–66. DOI:10.1111/jpet.12243.

[10] See Fatih Yilmaz and Jacqueline Coolidge, 'Can e-filing reduce tax compliance costs in developing countries?' (2013) Policy Research Working Paper, 6.647: 1-57. DOI: 10.1596/1813-9450-6647.

[11] Vishnevsky and Viktoriia (n 8) 10.

[12] Antonio Seco and Andrés Muñoz 'Panorama del uso de las tecnologías y soluciones digitales innovadoras en la política y la gestión fiscal' (2018) Banco Interamericano de Desarrollo.

[13] See European Data Protection Supervisor (EDPS), Meeting the challenges of Big Data – A call for transparency, user control, data protection by design and accountability, Opinion 7/2015, 19 November 2015, p.7;

ticated techniques and tools, generally beyond business intelligence, to discover deeper knowledge, make predictions or generate recommendations; including data mining, machine learning, pattern matching, forecasting, visualization, semantic analysis, network and cluster analysis, multivariable statistics, graph analysis, simulation, complex event processing and neural networks.[14] Continued and intensive analysis of big data is necessary to improve the already high standards of user experience that we all enjoy and that we would be quite reluctant to abandon.[15]

The OECD has recommended that tax administrations intensify international cooperation for access to massive user data on online platforms.[16] Thus, 19 of 22 countries surveyed in America, Asia Pacific, the Middle East and Africa, use big data tools as part of their taxpayer audit process.[17]

In Latin America, new technologies are being used by most tax administrations to introduce regulations related to remote audits in the legal system, through electronic systems,[18] Chile[19] and México[20] are two examples of this. Studies show that online tax audit minimizes face-to-face interactions between taxpayers and inspectors, reducing tax compliance costs and eventually allowing to increase revenues for the government,[21] also contributing to global transparency in automatic information exchange.[22] In the United Kingdom, technological applications are used to better track tax revenues, while the Australian Government is conducting a comprehensive review aimed at strengthening government services.[23]

From a technical point of view, the digital consumer is a great contributor to the web and data content that feeds the intelligence of applications and platforms,[24] giving rise to big data. Data mining and AI were born from these technological processes and have been incorporated into the planning of tax audits, mainly to detect patterns of fraud or tax evasion.[25]

Since 2000, the Internal Revenue Service (IRS) of the United States has restructured and modernized its operational divisions. For this, they improved data capture through information systems,[26] also using data mining techniques for different purposes, such as measurement of taxpayer compliance risk, detection of tax evasion, electronic fraud, fraud by tax credits and money laundering.[27] To accomplish all the above, the IRS developed logistic regression models, decision trees, neural networks, clustering algorithms and visualization techniques such as link-analysis, among others.[28]

In 2004, Peru perfected an AI tool based on neural networks to detect tax evasion, through the application of diffuse and association rules in the pre-processing of variables and classification and regression trees (CART).[29] Approximately on the same date, investigations were conducted in Brazil to apply the HARPIA project (Risk Analysis and Applied Artificial Intelligence) to detect various types of fraud through the application of AI.[30] This project contributed to the elaboration of two processes: first, a detection system based on outliers that help customs officials identify suspicious customs operations; and second, an information system for foreign products and exporters that aims to help importers in the registration and classification of their corresponding products and exporters. Likewise, since 2016, Brazil began applying selective intelligent inspection based on big data and data analytics, destined to control VAT (ICMS) and vehicle tax.[31]

In 2007, the Chilean tax administration (SII) applied for the firs-time data analysis in the form of clustering algorithms to characterize taxpayers obliged to declare VAT. These algorithms extract patterns from data sets and are particularly

[14] Seco and Muñoz (n 12).

[15] Vagelis Papakonstantinou and Paul de Hert 'Big data analytics in electronic communications: A reality in need of granular regulation (even if this includes an interim period of no regulation at all)' (2020) Computer Law & Security Review, 36. Doi: https://doi.org/10.1016/j.clsr.2020.105397.

[16] OECD, Organisation for Economic Co-operation and Development 'Resumen de los desafíos fiscales derivados de la digitalización: Informe provisional 2018' (2018). Explanatory note. <https://bit.ly/2RG2VgM> accessed 22 February 2020.

[17] Timm Gillis, Adrienne McStocker and Alec Percival 'Indirect tax compliance in an era of big data' (2015) Tax Planning International: Indirect Taxes, 13 (3), pp. 1-6.

[18] Faúndez-Ugalde, Osman-Hein and Pino (n 4) 115.

[19] See SII, Servicio de Impuestos Internos de Chile 'Plan estratégico 2018-2022' (2018) <https://bit.ly/2KVOTVY> accessed 22 February 2020.

[20] See María Mancilla 'Auditoría tributaria de los precios de transferencia de las multinacionales en México' (2010) Cuadernos de Contabilidad, 11 (29), pp. 473-492 <http://bit.ly/2PfVoUd> accessed 22 February 2020.

[21] Anna Kochanova, Zahid Hasnain and Bradley Larson 'Does e-Government improve Government capacity? Evidence from tax compliance costs, tax revenue, and public procurement competitiveness' (2017) The World Bank Economic Review. DOI: 10.1093/wber/lhx024.

[22] Xiaoqing Huang 'Ensuring taxpayer rights in the era of automatic exchange of information: EU data protection rules and cases' (2018) Intertax, 46 (3), pp. 225-239.

[23] Claire O'Neill 'Using digital delivery to enhance the integrity of tax systems' (2017) in OCDE (compilador), Tax administration 2017: Comparative information on OECD and other advanced and emerging economies (pp. 163-168). Paris: OECD Publishing. DOI: 10.1787/tax_admin-2017-16-en.

[24] Raúl Katz 'El ecosistema y la economía digital en América Latina' (2015) Barcelona: Editorial Ariel.

[25] Pamela Castellón and Juan Velázquez 'Caracterización de contribuyentes que presentan facturas falsas al SII mediante técnicas de data mining' (2011) Revista de Ingeniería de Sistemas, XXV, pp. 77-104.

[26] Deborah Nolan 'Los sistemas de información de apoyo a la fiscalización' (2001) in Centro Interamericano de Administraciones Tributarias – CIAT (coord.), La función de fiscalización de la administración tributaria y el control de la evasión (Santiago, CIAT) pp. 1-8. <https://www.ciat.org/Biblioteca/AsambleasGenerales/2001/Espanol/chile35_2001_tema2_3_usa.pdf> accessed 22 February 2020.

[27] GAO, Government Accountability Office - United States 'Data Mining: Agencies have taken key steps to protect privacy in selected efforts, but significant Compliance Issues Remain' (2014).

[28] Castellón and Velázquez (n 25) 82.

[29] CIAT, Centro Interamericano de Administraciones Tributarias 'Métodos de selección de declaraciones sujetas al control concurrente ocupando herramientas de minería de datos' (2004) Programa Regional (TC-00-05-00-8-RG) Superintendencia Nacional de Administración Tributaria, Perú.

[30] Luciano Digimpietri, Norton Trevisan, Luis Meira, Jorge Jambeiro, Cristiano Ferreira, Andreia Kondo 'Uses of Artificial Intelligence in the Brazilian Customs Fraud Detection System' (2008) Proceedings of the 9th Annual International Digital Government Research Conference.

[31] Seco and Muñoz (n 12) 103.

used in the analysis of human behavior in social communities (e.g. civilizations or countries, whose common characteristics are language, race, and cultural aspects), and within these, subgroups are formed, for example, based on socioeconomic background.[32] Subsequently, following the international trend, in 2009 the SII developed risk models for different stages of the taxpayer's life cycle, in which neural networks, decision trees and logistic regression were used. Also, potential users of fake invoices were detected for the first time, using information from their VAT and income tax declaration in micro and small businesses.[33]

The above techniques are essential for tax audit processes, as they consider variables that directly affect the processing of information conducted by tax auditors. The use of automated processes optimizes resources and facilitates findings based on direct evidence, as they provide empirical records to auditors to carefully analyze the segmented results. However, the tax audit is carried out by computer systems using artificial intelligence does not mean that its purpose has changed. The objective is the same, what changes are the type of procedure and, therefore, can directly impact taxpayers' compliance costs,[34] who not only assume a cost in capital goods, but also a cost in time, effort and resources to learn to use electronic declarations properly and efficiently.[35] Additionally, the use of these tools provides the tax administration with new means that can affect taxpayer data; the way in which the fiscal audit decisions are made, and the position in which the taxpayers will find themselves in the face of the fiscal audit actions. In this way, the application of these new technologies will have a direct impact on the rights of taxpayers. In this sense, the management and administration of the State must reconcile the developments and improvements of its own inspection processes with the means that allow the proper fulfillment of the duties of the taxpayers, and, as a substantive matter, respecting their rights, that may be affected in this evolution.

## 3. Comparison of taxpayers' rights in Latin America countries

Taxpayers' rights have been defined as the obligations or duties that the State must fulfill, through its tax administration office, in terms of tax collection, control and education functions.[36] When these rights are embodied as fundamental rights, they have been characterized as fundamental rights of the taxpayer, with a double character of constitutional rules limiting the tax power. This is, at the same time that they give rise to norms that help to limit the powers of the tax authority, they are also defining norms of fundamental rights and guarantees,[37] which can be synthesized in the idea of fundamental rights as sources or norms competition materials.

Some legislations expressly declare taxpayers' rights, as is the case of Chile in article 8 bis of the Tax Code. However, the fact that a country does not expressly declare taxpayers' rights in its legislation does not mean that taxpayers are excluded from protection against the acts of the tax administration,[38] insofar as the scope of protection of said rights may result from different constitutional, legal or conventional sources, even when they do not specifically refer to protection in the tax field. Thus, a systematic interpretation of taxpayers' rights is not required to determine its scope of application.[39] This has already been recognized in the field of conventional protection of rights, in cases where it could be considered that internal legislation conflicts with the respective treaty. This happened in the case of *Industrial Molina Limitada v Servicio de Impuestos Internos*,[40] which gave way to one of the first sentences that, in the field of taxation, prioritizes rights recognized in the American Convention on Human Rights over sources of internal law.

This case was related to the prescription of the tax authority's collection action, given that more than 6 years had elapsed since the beginning of the case and the notification date of the first instance sentence. In summary, the jury sentenced that, although it agreed that the presentation of the claim was sufficient to suspend the course of the prescription dictated by the Tax Code, it could not accept, because of the aforementioned regulations - internationally formed by the Pact of San José of Costa Rica and by the International Covenant on Civil and Political Rights of the United Nations, and nationally formed by article 5 of the Political Charter-, that such suspension operated even for a period longer than that assigned by the legislation for the extraordinary purchasing prescription, that is, indefinitely in practice. This led to the annulment of the first instance sentence because the process violated number 1 of article 8 of the aforementioned Convention, which states that "*everyone has the right to be heard, with due guarantees and within a reasonable period of time, by a competent, independent and impartial judge or tribunal, established previously by law, in the substantiation of any criminal accusation made against it, or for the determination of its rights and obligations of civil, labor, fiscal or any other order character*".

In such situations, the solution has been to accept the possibility that the judge to consider the primacy of the rights established by the American Convention on Human Rights when integrating the internal legal system.[41] Although the method

[32] Sandra Lückeheide, Juan Velázquez and Lorena Cerda 'Segmentación de los contribuyentes que declaran IVA aplicando herramientas de clustering' (2007) Revista de Ingeniería de Sistemas, XXI, pp. 87-110.

[33] Castellón and Velázquez (n 25) 83.

[34] Faúndez-Ugalde, Osman-Hein and Pino (n 4) 115.

[35] Yilmaz and Coolidge (n 10).

[36] Jessica Romero and Mario Cruz 'Acceso al derecho a la justicia con la implementación del uso de las tecnologías de la información y las comunicaciones (TIC) en la tutela de los derechos del contribuyente' (2016) Ciencia Jurídica, 5 (10), pp. 189-217. DOI: 10.15174/cj.v5i2.197.

[37] Octavio Campos 'Direitos fundamentais dos contribuintes: Breves considerações' (2010) Nomos, 30 (1), pp. 125-160. <http://bit.ly/2Piw3bX> accessed 22 February 2020.

[38] Faúndez-Ugalde, Osman-Hein and Pino (n 4) 117.

[39] Rafael Oliver 'The taxpayer's right to electronic communication with the tax authorities' (2015) Revista d'Internet, Dret i Política, 21, pp. 1-19. DOI: 10.7238/idp.v0i21.2736.

[40] Supreme Court Judgment, dated April 14th 2014, "*Industrial Molina Limitada v Servicio de Impuestos Internos*", rol n 5.165-2013.

[41] Antonio Faúndez-Ugalde 'The effective jurisdictional guardianship with in relation to the right to be judged within a reasonable time in tax proceedings: comparative experience be-

of articulation between conventional instruments and the internal legal system has not been clearly resolved, beyond the doctrine of control of conventionality developed by the Inter-American Court itself, it does appear as indisputable that international sources are a relevant source - and eventually prevailing - to affirm the existence of rights that, in certain cases, can be invoked by taxpayers.

Regardless of the doctrinal current assumed, taxpayers' rights do not need to be to be expressly declared in internal legislation, insofar as its recognition follows from various guarantees at the international constitutional and conventional level. Certainly, the lack of a catalog can diminish the guarantees of certainty when requiring the application of rights as limits to the authority's powers of inspection; but this does not justify ignoring the need that the use of artificial intelligence tools must operate under efficient safeguard mechanisms, respecting the rights related to data collection and management, the integrity of the systems, and access to information, both as a form of control of arbitrariness in the exercise of supervisory powers, as part of the right of defense when proceeding against the taxpayer.

In attention to these standards, we will proceed to analyze the artificial intelligence systems applied by the tax administrations concerning techniques for the characterization of taxpayer risk and in the robotization of tax audit actions. In each case, legal limits will be considered for the application of the referred technological tools in Latin American countries.

## 4. Techniques for characterization of taxpayers' risk

Techniques that identify patterns of taxpayers' behavior have been key to detecting fraud or tax evasion, also allowing measurements of the risk of compliance with tax obligations. For this purpose, tax administrations have focused on the use of business intelligence, defined as a set of information systems that support decision-making, based on other storage, analysis and data extraction technologies.[42] One of the basic components of business intelligence has been data mining, an exploration and analysis process that uses software and large volumes of data to discover meaningful patterns or rules.[43] There are three data mining techniques[44]: Self-Organizing Maps (SOM), Neural Gas (NG) and Classification Tree Analysis (CTA). SOM is used for data clustering and segmentation, generating groups with objects of behavior similar to each other, but different from the objects of another group.[45] Unlike SOM, in the NG system neurons move freely, giving the algorithm a better ability to approximate data distribution in the input space. Finally, CTA is one of the most used for classifications, where the algorithm forms all possible pairs and combinations of categories, grouping those that behave homogeneously concerning the response variable in a group while keeping separated those categories that behave heterogeneously.

The United States tax administration has used data mining in cases of tax fraud and other crimes.[46] However, the use of this technological tool has not been free of judgment, as was the case in the *State v Loomis* case, where the Supreme Court of Wisconsin, in 2016, confirmed the conviction based on a risk assessment report derived from the Correctional Offender Management Profiling for Alternative Sanctions (COMPAS). Critics pointed out that the sentence would not have included the operation of the risk assessment tool, generating a negative impact on the rights of the defense, as much of the information used by COMPAS was taken as a trade secret that prohibited the defendant from assessing its accuracy,[47] causing an inadmissible case of algorithmic structural discrimination.[48]

Although the State v Loomis case is within the scope of criminal law, its effects also reach tax law against the use of automated or AI systems designed to characterize taxpayers' risk. In this sense, an impugnment to such systems must be guaranteed, ensuring full disclosure with qualified transparency in all its steps, that is, in the "data entry" stage, at the time of "data processing" and in the "prediction output".[49] However, transparency in the delivery of information can generate problems in cases where public institutions contract suppliers in which they ensure confidentiality clauses aimed at preventing knowledge of algorithms. The latter has occurred in countries such as the United States with the Freedom of Information Act (FOIA), in force since 1967. According to this law, all persons have the right to access government information, including, in 1996, the Electronic Freedom of Information Act Amendments, which established the obligation of all agencies to provide reading rooms for citizens to access records. The obstacles did not take long to arrive as in the case of *Tax Analysis v US Department of Justice* (1996), the ruling stating that in the case of software offered by private providers

tween Chile and Brazil in contrast with the American Convention on Human Rights' (2019), Revista de Investigações Constitucionais, 6(3), DOI: http://dx.doi.org/10.5380/rinc.v6i3.64284.

[42] Erick Thomsen 'OLAP: Construindo Sistemas de Informações Multidimensionais' (2002) Rio de Janeiro: Campus.

[43] See Michael Berry and Gordon Linoff 'Mastering Data Mining: The Art and Science of Customer Relationship Management' (2000) Industrial Management & Data Systems, 100 (5), pp.245-246, https://doi.org/10.1108/imds.2000.100.5.245.2. Fabrício Sobrosa and Sady da Silva 'Information architecture analysis using business intelligence tools based on the information needs of executives' (2013) Journal of Information Systems and Technology Management, 10 (2), http://dx.doi.org/10.4301/S1807-17752013000200004.

[44] Castellón and Velázquez (n 25) 85.

[45] See Andriy Andreev and Argyris Argyrou 'Using self-organizing map for data mining: a synthesis with accounting applications' (2012) Data mining: foundations and intelligent paradigms, pp.321-342; Juha Vesanto, Mika Sulkava, Jaakkp Hollmén 'On the decomposition of the Self-Organizing Map distortion measure' 2003) Proceedings of the Workshop on Self-Organizing Maps (WSOM 2003), Hibikino, Kitakyushu, Japan, pp. 11-16.

[46] GAO (n 27) 50.

[47] Liu, Lin and Chen (n 6).

[48] Juan Corvalán 'Inteligencia artificial: retos, desafíos y oportunidades – Prometea: la primera inteligencia artificial de Latinoamérica al servicio de la justicia' (2018) Revista de Investigações Constitucionais, 5(1), pp. 295-316.

[49] Liu, Lin and Chen (n 6) 13.

to public bodies it is not possible to obtain disclosure through the FOIA.[50]

It is also true that the information processing stage of any automated system can be a 'black box',[51] complicating the impugnment of the technological system in use by the tax authority. The problem may be even greater in cases where AI techniques that include automated learning are applied, characterized by an inherent lack of transparency since decision rules automatically. In this way no one, not even programmers, can adequately explain how and why certain decisions and determinations are taken.[52]

The above problems could also occur in Latin American countries. In the case of Chile, as indicated above, in 2007 the SII developed the first experience in the characterization of taxpayers obliged to declare value-added tax (VAT) applying clustering algorithms of the Self Organizing Feature Map (SOFM) and K-means type, managing to validate a model of taxpayer behavior. The data that served as a basis for such tools were derived from two returns submitted by the taxpayers themselves, first, Form 29 on the Value Added Tax Return, a document that provides information on the monthly purchases and sales operations of the taxpayers, both taxed and exempt from such tax. The second document is Form 4415 on the declaration of commencement of activities, which provides information on the name of the taxpayer and its representative, identification number, the address, the type of contract that links it to that address, the e-mail address, the branches, the capital to be contributed and the tax regime to which it is subject.

With these data obtained in 2005, degrees of similarities or differences were generated between the clustered objects, for which it is essential to identify the "feature vector" that contains the attributes or variables selected to represent each object in the data set so that, once processed, cleaned and transformed, the data mining algorithms can be applied to check whether the selected vector is the right one. In the case under study, it was possible to characterize the behavior of a taxpayer within its group about the payment of taxes within the legal deadlines; it was also characterized a group of taxpayers for generating losses, another that sells directly to the final consumer, another in which the taxpayers carry out exempt activities, another composed of intermediary taxpayers and another group where the taxpayers withholding taxes meet.[53]

Subsequently, in 2009, data mining techniques were focused on potential taxpayers who issued false invoices, applying, in the first instance, SOM, natural gas, and decision trees, to identify those variables that are related to fraud and/or non-fraud behavior and detect patterns of behavior associated with this problem. In a second stage, neural networks and Bayesian networks were applied to establish to what extent fraud and non-fraud cases can be predicted with the available information.[54] The data used in this study comprised the years 2005, 2006 and 2007, with a vector of characteristics associated with Form 29, Form 22 on the income tax return, 31 tax ratios that relate the information on VAT and income tax and the profitability of the company with its liquidity and 92 indicators linked to the historical behavior, the behavior of its related parties and its particular characteristics. The latter is currently part of the so-called Comprehensive Tax Compliance System (SICT) developed by the SII.

It should be noted that the data mining techniques applied by the SII since 2007 for the characterization of taxpayers are based on internal instructions as part of the tax intelligence, not finding an express regulation at the level of law. These internal instructions were configured in 2009 when the SII's organic structure was restructured, with the creation of the Data Warehouse Office as part of the IT Sub-directorate, which in 2016 was renamed the Business Intelligence IT Office.[55] One of the main functions of this office is to provide data warehouse computing solutions or data storage[56] and data mining, to facilitate the search for patterns of taxpayer behavior, to characterize risk. Before this risk management tool, the SII developed its strategic plan based on taxpayer segmentation.[57]

However, does the taxpayer who has been characterized as at risk of non-compliance with tax obligations have the right to know the technological systems that have processed such information to guarantee impugnment? As indicated above, the automated systems or AI mechanisms that set in motion the control attributes of the SII, produce regulatory effects that may result in the determination of tax differences or the application of tax fines. In this sense, the possibility that these systems may make mistakes must be admitted, especially as there are studies that reveal that judges and individuals are submissive to computer-generated numbers, which is known as "anchoring effect".[58] Hence the importance of opening these technological tools to the public under specific conditions, to guarantee a certain level of transparency and responsibility.[59] However, these measures may collide with private law, particularly with intellectual property in defense of trade secrets. Such protection is far from the public sphere where article 8 of the Political Constitution of the Republic of Chile prescribes the following: "The acts and resolutions of the State organisms are public, as well as their foundations and the procedures they use".

Antinomies such as the one described above have occurred in the practice of public law, as in the case of *Zubizarreta v Servicio de Impuestos Internos*, Rol C1034-11 of the Council for Transparency, related to the Integrated Taxpayer Information

[50] Liu, Lin and Chen (n 6) 18.

[51] FrankPasquale 'Secret Algorithms Threaten the Rule of Law' (2017) MIT Technology Review <https://www.technologyreview.com/s/608011/secret-algorithms-threaten-the-rule-of-law/> accessed 22 February 2020.

[52] Liu, Lin and Chen (n 6).

[53] Lückeheide, Velázquez and Cerda (n 32) 90.

[54] Castellón and Velázquez (n 25).

[55] SII, Servicio de Impuestos Internos 'Reorganiza las unidades que conforman el departamento Subdirección de Informática y establece sus ámbitos de competencia' (2016) Resolución Exenta SII nº110.

[56] See Arun Sen and Atsh Sinha 'A comparison of data warehousing methodologies' (2005) Communications of ther ACM, 48(3), pp. 79-84.

[57] SII, Servicio de Impuestos Internos 'Plan Estratégico 2018-2022' (2018) <http://www.sii.cl/sobre_el_sii/plan_estrategico_sii.pdf> accessed 22 February 2020.

[58] Liu, Lin and Chen (n 6) 9.

[59] Liu, Lin and Chen (n 6) 14.

System - SIIC (currently replaced by the Comprehensive Tax Compliance System - SICT), a technological tool designed to "have a comprehensive view of the taxpayer".[60] In this lawsuit, the taxpayer requested information from its SIIC for the 2008 period, where there was an impugnment of its income tax return. The SII denied the request, arguing that such disclosure could affect the legal or judicial defense of the Treasury, invoking the secrecy or reservation of the information in accordance with article 21 number 1 of the Transparency Law. The SII also indicated that if free access was granted to the SIIC annotations, the exercise of the supervisory attributes granted by the legal system would be affected, as the publicity of such data would reveal the method and evaluation criteria used. Although the Council for Transparency rejected the grounds invoked by the SII, forcing it to deliver the SIIC information to the taxpayer, the focus was on the information already processed or "prediction output", not on the processing itself. In this sense, the discussion must reach the core of the automated system on how information is collected, in a way that allows the taxpayer to evaluate SIIC operations.

At the jurisprudence level of the Chilean tax and customs courts, the SII repeatedly uses the SIIC as a means of proof, managing to establish a characterization of the taxpayer that affects the controversial facts of the trial.[61] In this sense, although Chilean law recognizes taxpayers' rights,[62] can they access the logical or arithmetic operations that allow a computerized control system applied by the tax administration to achieve the characterization of taxpayers' risk? Undoubtedly, this claim of the taxpayer can be in the context of a tax audit of the tax administration itself, and in a jurisdictional instance in a tax trial, where the origin of the administrative act that establishes tax differences is discussed. In the latter case, the principle of procedural publicity relative to the parties of the trial is presented, aimed at ensuring that the taxpayer's defense can timely know the accusations or evidence presented against it. Therefore, it is argued that this argument does not correspond to a publicity requirement of the process, but rather to a requirement of a much more elementary right: the right to defense or the right of bilateralism of the audience.[63]

Considering the above, being able to access information on the computer systems applied by the SII for the characterization of taxpayers' risk is a superior right related to the right to defense, which is otherwise recognized in the new article 8 bis number 4 of the Chilean Tax Code that indicates the following: "*Article 8 bis. Without prejudice to the rights guaranteed by the Political Constitution of the Republic and the laws, the following are taxpayers' rights: […] 4° That the actions of the Service, whether or not they constitute actions or control procedures: a) State precisely the reasons that motivate the corresponding action. In effect, all actions of the Service must be found, that is, express the facts, the right and the logical and legal reasoning to reach a conclusion, whether the respective legal norm expressly provides it or not…*". Therefore, the taxpayer has the right to be informed of all the actions of the SII, whether or not they are auditing procedures, indicating the logical and legal reasoning conclude, regardless of whether the law indicates it or not expressly. Thus, information on logical or arithmetic operations (logical reasoning) that support the result (conclusion) of information processing, which is typical of the right to defense, must be provided.

In 2004, an AI tool based on neural networks was perfected in Peru to detect tax evasion.[64] However, considering what is indicated in article 92 of the Peruvian Tax Code, taxpayers have the right to know the status of the inspection procedures and the administrative file in accordance with what is indicated in article 131 of the same legal text. The National Superintendence of Customs and Tax Administration (SUNAT) provides taxpayers with Form 5030 on the request for access to public information, by virtue of which background information may be required, among others, on the strategies and other issues under the responsibility of the National Intendancy of Strategies and Risks. As it is name indicates, the main function of the latter institution is to establish guidelines to improve tax compliance and combat tax evasion and avoidance through risk management. If such strategies include the exercise of artificial intelligence tools, they must operate efficiently safeguard mechanisms, ensuring the duty to inform taxpayers of the logical or arithmetic operations that support such audits, as a manifestation of the right to defense.

Brazil has also developed AI tools such as the HARPIA project, designed to detect outliers in foreign trade operations.[65] Here, automated processing derives from the registration and classification of products and their respective exporters, a mechanism that must be available to taxpayers who are interested in the fiscal administration act. These are complex processes that can generate information crossings with the so-called "*arquivos digitais*", which are requested by the fiscal auditor of the Federal Revenue Secretariat (SRF) through the system of validation and authentication of digital files (SVA). The procedure of this type of audit is regulated in the Normative Manual of Digital Files (MANAD), approved by the Normative Instruction MPS/SRP 12 of 2006 of the SRF.[66] Precisely, under the same foundations indicated for the two previous legislations, it is all these technological systems that should be available to taxpayers if they support an administrative act that determines tax differences or other legal effects.

In Mexico, AI has also been applied in tax control processes. The Tax Administration Service (SAT) is working on a technological platform with AI algorithms that integrates various

[60] SII (n 55) 36.

[61] See Tribunal Tributario y Aduanero de Valparaíso, sentencia 28/04/2016, RUC 16-9-0000156-1, RIT ES-14-00036-2016; Tribunal Tributario y Aduanero de Valparaíso, sentencia 30/03/2015, RUC 14-9-0001169-6, RIT GS-14-00091-2014; Tribunal Tributario y Aduanero de Valparaíso, sentencia 25/03/2015, RUC 14-9-0001061-4, RIT GS-14-00085-2014; Tribunal Tributario y Aduanero de Valparaíso, sentencia 27/11/2014, RUC 13-9-0001439-7, RIT GS-14-00177-2013.

[62] See article 8 bis of the Tax Code (Decreto Ley 830 de 1974).

[63] Francisco Leturia 'La publicidad procesal y el derecho a la información frente a asuntos judiciales. Análisis general realizado desde la doctrina y jurisprudencia Española' (2018) Revista Chilena de Derecho, 45 (3), pp. 647-673.

[64] CIAT (n 29).

[65] Digimpietri et al. (n 30).

[66] Arquivos Digitais – Auditoria Fiscal de Empresas, <http://idg.receita.fazenda.gov.br/orientacao/tributaria/auditoria-fiscal/arquivos-digitais-auditoria-fiscal-de-empresas> accessed 22 February 2020.

information sources. The objective of this platform is to detect, with a high degree of certainty, companies that simulate operations or evade their obligations, to strengthen the mechanisms that ensure compliance with tax obligations by taxpayers.[67] These processes go hand in hand with the obligation of taxpayers to keep electronic accounting and send it monthly to the SAT, which constitutes an important source of information for automated data processing. However, if article 34 of the Regulations of the Fiscal Code of the Federation is reviewed, the SAT may require the taxpayer to make available the equipment and diagrams where electronic accounting is stored, all of which are devoid of a procedure to ensure the correct manipulation of the data and of the profiles used to access the technical and computer equipment; nor is it reported how the information will be destroyed after the audit is over. These audit processes must be regulated, as well as ensuring the right of taxpayers to access electronic files that are formulated in such processes, as part of the right to defense.

In Argentina, mechanisms for crossing information through risk matrices have been evaluated since 2010.[68] A data processing model was proposed that allows defining and rating a certain group of taxpayers, according to their risk profile for the treasury. This methodology involves the construction of a warehouse from different data sources, then design a Cross-Industry Standard Process for Data Mining (CRISP-DM).[69] This model must also include the protection of taxpayers' rights; however, Argentina's tax legislation says nothing about the right of the taxpayer to know, at any time, the administrative file that supports the data processing model, although it has been the Federal Public Revenue Administration (AFIP) itself that has declared the right to know the background of an inspection,[70] which is sufficient to consider the knowledge of the logical or arithmetic operations that support such audits.

In Ecuador, the Internal Revenue Service (SRI) created a transfer pricing risk model that applied to the 2012 to 2017 business years, whose implementation was intended to strengthen the policy to combat tax evasion and tax fraud.[71] For the construction of the risk model, the SRI gathered the experience of the Tax Administration Service of Mexico and applied CRISP-DM based on the understanding and preparation of the information available to the SRI to create the main risk variables and indicators in the application of transfer pricing. Once the information was obtained, the data were modeled using AI (neural networks), principal component analysis, Kohonen networks, K-media clusters, two-stage clusters, decision trees, optimal bands and text mining. Regarding these techniques, Ecuador's legislation does not expressly describe the rights of taxpayers, although the SRI has taken the initiative to develop a systematic instruction of such rights based on different articles dispersed in the Tax Code.[72] Accordingly, in the case of an inspection, at least what is established in article 85 of the Tax Code must be considered, that is, notify all administrative acts to the petitioners or claimants and to those who may be directly affected by those decisions. This notification must include all actions of the SRI, which includes taxpayer characterization processes.

In Colombia, the Directorate of National Taxes and Customs (DIAN) has the power to cross digital information using various sources, such as the Single Model of Income, Service and Automated Control (MUISCA), commerce chambers, public instrument records, the banking system, as well as with data collected by the Financial Information and Analysis Unit (UIAF), in addition to the information provided by entities outside the country.[73] Along the same lines, article 193 of Law 1607 of 2012 stipulates that the DIAN must safeguard electronic information in its storage and handling, to prevent it from being modified or deleted. Likewise, it recognizes the taxpayer's right to access, at any time, the administrative file, and ensures how the information will be destroyed after the audit is completed, which is part of the due process in all the actions of the authority. This allows the taxpayer to be aware of the tax file and of all the actions that give rise to the administrative act, among these, to know the tools of information crossing applied in the audit processes.

Therefore, although the Latin American legislation under study does not expressly contemplate a procedure for taxpayers to access the algorithms applied in their control processes, such interest can be protected by taxpayers' rights, mainly because of the right to defense as part of due process, a fundamental right that is recognized by these countries and international treaties. Additionally, it can be considered that, at the very stage of the tax audit and the justification of the acts of the tax audit, access to the applied procedures is a necessary element to assess whether said acts correspond to objective criteria of differentiation that justify certain differences in treatment. In this way, it seeks to avoid that, under the cloak of technological opacity, there may be arbitrary acts against taxpayers' subject to tax audit processes.

## 5. Robotization techniques in tax audit actions

Watson, an AI computer system developed in 2011 by International Business Machines Corp. (IBM), revolutionized the professional practice of management and advice of public and private companies. Watson was the most important technology to arrive in the field of law and allowed professionals to

[67] See <https://www.gob.mx/innovamx/articulos/inteligencia-artificial-131287> accessed 22 February 2020.

[68] Rodrigo López-Pablos 'Elementos de ingeniería de explotación de la información aplicados a la investigación tributaria fiscal' (2013) <https://arxiv.org/pdf/1309.2351.pdf> accessed 22 February 2020.

[69] López-Pablos (n 70).

[70] See 'Derechos y obligaciones de los contribuyentes y usuarios aduaneros', Administración Federal de Ingresos Públicos, <http://bit.ly/2PiQ2Yn> accessed 22 February 2020.

[71] See <https://www.ciat.org/construccion-de-un-modelo-de-riesgo-de-precios-de-transferencia-en-ecuador/> accessed 22 February 2020.

[72] See '¿Qué derechos tengo como contribuyente?' <http://www.sri.gob.ec/web/guest/que-derechos-tengo-como-contribuyente> accessed 22 February 2020.

[73] Enrique González, Indira Romero and Ramón Padilla 'Buenas prácticas aplicadas en países de América Latina para reducir la evasión por saldos a favor en el IVA' 2019, CEPAL.

think innovatively.[74] Three years later, a group of students from the University of Toronto who had access to the different APIs offered by Watson, developed a new computer system named Ross, which - according to one of its creators - would be "capable of doing what lawyers would take hours to do".[75]

The Outsourcing Unit as part of the London School of Economics and Political Science, has developed case studies in the application of Robotic Process Automation (RPA) for the business environment Although the term RPA suggests physical robots that roam around offices performing human tasks, RPA is a software-based solution, ideal for replacing humans in so-called "swivel chair" processes; processes where humans take inputs from a set of systems (for example, email), process those inputs using rules, and then input the outputs into registry systems.[76]

Furthermore, its application has been extended to applications for bank loans, insurance cases and taxes.[77] In the field of tax law, studies by one of the world's largest auditors, Price Waterhouse Coopers (PwC), began applying RPA to facilitate common tax compliance functions, which automatically read and extract data from such PDF files, freeing up time for more strategic and valuable activities, including review and analysis. In another example, a PwC tax professional used an RPA tool to prepare and file return filing extensions during the 2019 tax filing season. Time trials performed by multiple users of the automation versus the manual process showed time savings of 70%[78]

In the case of tax administrations, the OECD reported that robotics was being applied to replace certain audit actions.[79] An example of this is Finland, where its tax administration introduced RPA technology that allows the configuration of computer software to capture and interpret existing applications to process a transaction, manipulate data, trigger responses, and communicate with other digital systems. The use of RPA for these activities offered the Finnish tax administration the potential to reduce workload in 52 years of effort per person, as well as an improvement in the quality of work and a reduction in errors. The same report highlights that Tax Finland has completed the development of its first demonstration robots using processes in the tax audit work. Thus, the robot applications are being used to undertake data quality checks and to assemble data from different sources, allowing Tax Finland to collect data from sources that are useful but currently take too long for their tax auditors to collect.

Given these new forms of robot-person interaction, the following question has raised[80]: Who are the decision makers? Is it the government officials involved or the software programs they trust? One possible solution is to draw a line between nondiscretionary and discretionary decision-making process concerning public officials' use of automated machines.[81]

Australia published Report 46 on Automated Assistance in Administrative Decision Making, which contains best practice principles for the development and operation of expert computer systems used to make or assist in the making of administrative decisions.[82] Defines expert systems as computing systems that, when provided with basic information and a general set of rules for reasoning and concluding, can mimic the thought processes of a human expert. The same document indicates that given the difficulties that can be involved in constructing an expert system that is capable of making a decision based on interpretation and representation of the law, the Council considers that using an expert system to make a decision—as opposed to helping or guiding a decision maker in making the decision—would generally be suitable only for decisions involving non-discretionary criteria. On the other hand, it is fundamental to administrative decision making that, if a decision involves the exercise of discretion, the decision maker must exercise that discretion personally and not be fettered in doing so.

Although the above question is pertinent to the disciplinary responsibility of the officials, there is a previous problem related to the competence that the law grants to state officials, which must be exercised within a statute that establishes their obligations, duties and rights. Therefore, the previous question should be complemented with the following: can a robot that intervenes in non-discretionary decisions have the competence to carry out a tax audit?

If the problem is transferred to the Chilean legal system, the public function is developed between the State and an official,[83] but not between the State and a robot. For the SII, its competence is established mainly by what is indicated in article 1 of the Chilean Tax Code, that is, matters of internal taxation. The possibility to delegate such powers is limited to certain cases, such as the delegation of the citing act of article 63 of the Tax Code and the power to apply sanctions as indicated in article 116 of the same text. Therefore, any power delegation must necessarily be authorized by the legal system; so, can a public official delegate its powers to a robot to generate tax

[74] Paul Lippe and Daniel Katz '10 predictions about how IBM's Watson will impact the legal profession' (2014) American Bar Association Journal <http://www.abajournal.com/legalrebels/article/10_predictions_about_how_ibms_watson_will_impact> accessed 22 February 2020.

[75] Jeff Gray 'University of Toronto's next lawyer: A computer program named Ross' (2014) The Globe and Mail <https://www.theglobeandmail.com/report-on-business/industry-news/the-law-page/university-of-torontos-next-lawyer-a-computer-program-named-ross/article22054688/> accessed 22 February 2020.

[76] Leslie Willcocks, Mary Lacity and Andrew Craig 'The IT function and Robotic Process Automation' (2015) The Outsourcing Unit Working Research Paper Series, 15/05, <http://eprints.lse.ac.uk/64519/1/OUWRPS_15_05_published.pdf> accessed 15 may 2020.

[77] Karen Osmundsen, Jon Iden and Bendik Bygstad 'Organizing Robotic Process Automation: balancing loose and tight coupling (2019) Proceedings of the 52nd Hawaii International Conference on System Sciences <https://hdl.handle.net/10125/60128> accessed 15 may 2020.

[78] Steven Mezzio, Robin Stein and Scott Stein 'Robotic process automation for tax' (2019) Journal of Accountancy <https://www.journalofaccountancy.com/issues/2019/dec/robotic-process-automation-for-tax.html> accessed 15 may 2020.

[79] OCDE (n 3) 122.

[80] Liu, Lin and Chen (n 6) 16.

[81] Liu, Lin and Chen (n 6) 18.

[82] See <https://www.ag.gov.au/LegalSystem/AdministrativeLaw/Pages/publications/report-46.aspx> accessed 17 may 2020.

[83] Jorge Bermúdez 'Derecho administrativo general' (2014) Santiago: Thomson Reuters.

audits? If possible, can these powers be extended to decision-making in that audited case? In Chile, it would not be possible to delegate these powers to a robot, since recognition by the legal system is required for this purpose. Such faculty is also not regulated in the other countries of Latin America.

The answers to these questions are complex. It is argued that the fact that algorithms are implemented in all government agencies can only magnify and perpetuate the risks of biases and hidden errors.[84] Consequently, the possibility of drawing a line between the non-discretionary and discretionary decision-making processes regarding the use of automated machines by public officials seems to be an appropriate solution, but in cases where the robot has autonomous non-discretionary, there must also be a regulatory regulation on its powers to represent the tax administration.

## 6. Conclusions

Having shown that the AI mechanisms used by some tax administrations have normative implications in social life, it is essential to specify the legal limits of their application in safeguarding taxpayers' rights, regardless of the way in which these are enshrined in the legal system, and the regulatory level at which their guarantee is found.

Considering this, the characterization techniques used by Latin American tax administrations, such as Chile, Peru, Brazil, Colombia, Ecuador, Argentina and Mexico, have been essential to detect fraud or tax evasion sources, also allowing to obtain measurements of risk of compliance with tax obligations. The most used tools have been clustering algorithms of the type Self Organizing Feature Map (SOFM), K-means, neural networks, and Bayesian networks, allowing to validate a model of the behavior of the contributors. The data that serves as a basis for such tools are derived, among others, from tax returns, returns related to the life cycle of the taxpayers, ratios of income and profitability of the company with its liquidity and indicators linked to the historical behavior, the behavior of its related and its particular characteristics. However, these attributes or variables may contain errors that affect the final result of the algorithm. Thus, the exercise of artificial intelligence tools must operate under efficient safeguard mechanisms, ensuring the duty to inform taxpayers of the logical or arithmetic operations that support such audits, as a manifestation of the right to defense.

However, none of the legislations understudies contemplates a procedure for taxpayers to access the algorithms applied in the control processes, which does not mean that the tax administrations of those countries are excluded from such obligation.

At the level of jurisprudence, the experience of the countries is varied. In the United States, in the *State v Loomis* case, the Wisconsin Supreme Court, in 2016, upheld the conviction based on a risk assessment report derived from the Correctional Offender Management Profiling for Alternative Sanctions, without allowing the accused access to the algorithm to evaluate its accuracy, generating criticism at the doctrinal level because of the negative impact on the fundamental rights of the defense. Likewise, in the case *Tax Analysis v US Department of Justice*, the ruling denied the possibility of accessing information from public entities on the grounds that the software offered by their private suppliers was outside the regulation of the Freedom of Information Act, i.e. in this case the intellectual property of individuals was privileged. On the other hand, in Latin America, at least in Chilean jurisprudence, access to information for taxpayers has been favored, as occurred in the *Zubizarreta v Servicio de Impuestos Internos* case, where the Council for Transparency ordered the tax entity to provide the taxpayer with information on the Integrated Taxpayer Information System on aspects that affected its characterization. In the case of Peru, the National Superintendence of Customs and Tax Administration has taken the initiative in providing taxpayers with Form 5030 on the request for access to public information, incorporating among such background, those derived from the National Strategy and Risk Office; therefore, if such strategies include the exercise of artificial intelligence tools, access to information is protected.

Finally, regarding robotization techniques in fiscal audit actions, Finland's experience stands out, which reduced the workload by 52 years of effort per person, as well as improved work quality and reduced error numbers. However, given the use of this type of technology, problems may arise regarding the disciplinary responsibility of the officials, and in relation to the competence that the law grants to fiscal officials, which must be exercised within a statute that establishes their obligations, duties and rights. Thus, the public function is developed between the State and an official, but not between the State and a robot. In the Latin American countries under study, this control mechanism is not regulated, and there must be an explicit recognition by the legal system to apply these technologies.

Munawer Sultan Khwaja, Rajul Awasthi and Jan Loeprick, 'Risk-Based tax audits: approaches and country experiences' (2011) The World Bank <https://openknowledge.worldbank.org/bitstream/handle/10986/2314/627010PUB0Risk000public00BOX361489B.pdf?sequence=1> accessed 22 February 2020.</END>

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Antonio Faúndez-Ugalde, Rachid Osman-Hein and Mario Pino, 'La auditoría tributaria por sistemas electrónicos frente a los derechos de los contribuyentes: un estudio comparado en América Latina' (2018) Revista Chilena de Derecho y Tecnología, 7(2), pp. 113–135. doi:10.5354/0719–2584.2018.51099.</END>

Bernardo Olivares 'Technological innovation within the Spanish tax administration and data subjects' right to access: An opportunity knocks' (2018) Computer Law & Security Re-

[84] Cathy O'Neil 'Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy' (2016) New York: Crown.

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Han-Wei Liu, Ching-Fu Lin y Yu-Jie Chen, 'Beyond State v Loomis: artificial intelligence, government algorithmization and accountability' (2019) International Journal of Law and Information Technology. DOI: 10.1093/ijlit/eaz001. It should be noted that there is no unanimity regarding the concept of artificial intelligence, being able to distinguish a conceptual field that could be called strong and a weaker or less rigorous one. A strong concept of artificial intelligence includes those technological developments in which "the machines" are capable of learning and developing processes that evolve in ways that are not determinable, not completely predictable and eventually not completely traceable or explainable by their creators. In a weaker version, artificial intelligence can be understood as "the ability of a non-natural entity to make choices by an evaluative process" (Turner, Jacob, 'Robot rules: regulating artificial intelligence' (2019) 16, London: Palgrave Mac Millan). It is in this sense that the reference to artificial intelligence is predominantly used in this article.</END>

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