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Digital ethics and taxpayers' attitude in Greece: Evidence and policy recommendations for the future

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New technologies transform public policies and the services provided to citizens, contributing significant added value to them individually or collectively. The same applies to the case of Artificial Intelligence (AI) in Tax Administration (TA). Contemporary TA integrates in its operation a number of algorithmic applications in high impact areas of taxation. This paper aims to analyze Greek taxpayers' attitudes regarding issues of digital ethics in the context of digital transformation of Greek TA, examining in particular the possible effects of AI applications in matters of efficiency, transparency and corruption in the country. The present research is based on a large-scale representative sample of 965 taxpayers who were contacted through the authors' questionnaire, allowing them to capture a wide range of views and explore taxpayers' attitudes. The research shows that taxpayers in Greece are currently positively influenced by Tax Administrations' digital revolution. To this end, digital revolution of Public Administration (PA) in general has positively influenced taxpayers' attitudes as citizens. Issues, however, of digital ethics seem to raise questions about the new AI strategy in Greece. Finally, it offers a fresh view, adding new dimensions of analysis and some new insights in the existing body of knowledge on the use of AI implementation on taxpayers' attitudes, leading to some useful implications for public servants and TA in Greece.

Key words: Digital ethics policy, TA, taxpayers' attitude, Greece.

INTRODUCTION

The current Greek Prime Minister announced the establishment of a High-Level Advisory Committee for Artificial Intelligence (AI) in Greece, at a time when the European Union is in the midst of passing its AI Act (COM/2021/206 final). The purpose of the Committee is to get Greece ready for the tremendous breakthroughs that are happening in AI technology and its applications. This decision comes at a time when the Greek Minister of Finance sets currently in place additional security measures against tax evasion in Greece. A new comprehensive action plan to tackle burgeoning tax evasion in Greece is under way, setting new rules for tax

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compliance, expanding the use of electronic transactions but also advancing the electronic tools of the Greek TA. According to the latest report on the VAT deficit, the so-called VAT Gap (European Commission, 2023a), Greece presented a reduction in the deficit by 3.2 percentage points in 2021, however the country still ranks third among the EU countries with high VAT Gaps, right after Romania with 36.7% and Malta with 25.7%, losing 3.23 billion euros in revenue per year. However, Greece has to improve standards of corruption in the country. According to the 2023 Rule of Law Report (European Commission 2023b), Greece still needs to address major issues of corruption, despite the outstanding legislative and administrative reforms that have been made, since 2010 onwards.

Under this light, this research is based on a large-scale survey conducted for the capture of Greek public opinion, regarding digital ethics issues in the context of digital transformation of the TA in Greece, examining in particular the possible effects of AI applications in matters of efficiency, transparency and corruption. What is the general taxpayers' attitude towards AI implementation for taxation and corruption purposes? How comfortable are they with certain decisions being made by a computer rather than a human being? What concerns have they about the use of AI by government for public policy? How concerned are they about the impact of AI on the economy and jobs and how ready are they to accept their use for the improvement of transparency, efficiency and good governance in TA? What aspects of digital ethics can and should be implemented in the near future in Greece and in TA in specific?

As the digital transformation of OECD member states has been significantly activated after COVID, surveys on public perception of IT, transparency, efficiency and corruption are showing the first results (OECD 2023a). However, no research to date correlates the assessment of public opinion on issues of AI, transparency, efficiency and corruption compared to the way PA and TA operate. The present research, more specific, is based on a large-scale representative sample of 965 taxpayers who were contacted through the authors' questionnaire, allowing them to capture a wide range of views and explore taxpayers' attitudes on the above topics. For a better understanding, similar questions have been addressed for PA issues in general. This study also aims to specify the legal limits in the use of technology aiming in AI implementation in Greece, under the light of digital ethics and conclude with a set of recommendations. Research results will be presented at Chapter 4.

RELATED LITERATURE

AI research is evolving widely, causing high expectations for solving complex issues and, for others, a high degree of mistrust about the actual effectiveness of the phenomenon. Although to date there is no commonly accepted definition of AI (Nilsson, 2009) existing efforts have been criticized for being too anthropocentric (Wang, 2019). Research on AI addresses issues such as governance and the use of AI for the common good (Samoili et al., 2020; Floridi et al., 2021a; Stahl, 2021) sustainable environmental and social development (Truby, 2020), and as a powerful anti-corruption tool (Wirtz and Müller, 2019; Adam and Fazekas, 2021), for improving accountability, transparency (Sturges, 2008; Bertot et al., 2010; Aarvik, 2019), and tax compliance (Carrero and Ribeiro, 2020; Raikov, 2021).

Digital ethics in TA

Three main schools of thought on ethics: metaethics, normative ethics, and applied ethics are usually discussed (Fieser, and Dowden, 2011). Applied ethics combines consequential and nonconsequential approaches in specific contexts such as business ethics (Breidbach and Maglio, 2020). According to the Oxford Handbook of Business Ethics (2010), it is about "rules, standards, codes, or principles, which provide guidelines for morally right behaviour and truthfulness in specific situations." Close to business ethics, Capurro (2009) argues that digital ethics or information ethics in a broader sense deal with the impact of digital Information and Communication Technologies (ICT) on our societies and the environment at large.

Digital ethics, as a concept, usually also address areas of fundamental rights enshrined in the EU Charter of Fundamental Rights. According to the Proposal for AI Act (COM/2021/206 final):

"The use of AI with its specific characteristics (e.g. opacity, complexity, dependency on data, autonomous behaviour) can adversely affect a number of fundamental rights enshrined in the EU Charter of Fundamental Rights ('the Charter'). This proposal seeks to ensure a high level of protection for those fundamental rights and aims to address various sources of risks through a clearly defined risk-based approach. With a set of requirements for trustworthy AI and proportionate obligations on all value chain participants, the proposal will enhance and promote the protection of the rights protected by the Charter: the right to human dignity (Article 1), respect for private life and protection of personal data (Articles 7 and 8), non-discrimination (Article 21) and equality between women and men (Article 23). It aims to prevent a chilling effect on the rights to freedom of expression (Article 11) and freedom of assembly (Article 12), to ensure protection of the right to an effective remedy and to a fair trial, the rights of defence and the presumption of innocence (Articles 47 and 48), as well as the general principle of good administration. Furthermore, as applicable in certain domains, the proposal will positively affect the rights of a number of special groups, such as the workers' rights to

fair and just working conditions (Article 31), a high level of consumer protection (Article 28), the rights of the child (Article 24) and the integration of persons with disabilities (Article 26). The right to a high level of environmental protection and the improvement of the quality of the environment (Article 37) is also relevant, including in relation to the health and safety of people. The obligations for ex ante testing, risk management and human oversight will also facilitate the respect of other fundamental rights by minimising the risk of erroneous or biased AI-assisted decisions in critical areas such as education and training, employment, important services, law enforcement and the judiciary. In case infringements of fundamental rights still happen, effective redress for affected persons will be made possible by ensuring transparency and traceability of the AI systems coupled with strong ex post controls."

What happens, however, in Tax Administrations? Since a considerable range of activities of Tax Administrations (OECD, 2021a; Blanco, 2022; OECD, 2023a) have been digitally restructured, new challenges, however, often raise important ethical issues, where the main recipients are the taxpayers. In particular, issues such as extended use of data, AI, the ever-expanding application of algorithms for decision and policy-making, but also its gradual decline of human participation or supervision in automated (often opaque or discriminatory) procedures raise questions of fairness, accountability and eventually protection of human rights (Pasquale, 2017; Anderson et al., 2018; Floridi et al., 2021b; Tsamados et al., 2021; Panagopoulou-Koutnatzi, 2023), critical aspects of the now well-known term "digital ethics".

Use of AI by TA

Digital ethics become a crucial topic for TA, since the use of AI by TA is currently a major strategic target. It is well known that technology is transforming the way governments function across various sectors (World Bank, 2016). For this reason, OECD countries continue to demonstrate their clear strategic vision for digital government through the development and implementation of national digital government strategies, with common priorities such as increasing the accessibility and proactive delivery of services, and treating data as a key strategic asset to create public value. Almost all countries (29 out of 30, 97%) had a National Digital Government Strategy in place in 2022 (OECD, 2023b).

TA is an important application of e- government for almost all the OECD countries (OECD, 2023a). The benefits of digital technology are well documented; leaving no doubt that it can also ease tax compliance, reduce tax collection costs, and increase administrative efficiency (Chen et al., 2017). For this digital transformation journey, around 75% of OECD Tax Administrations have a digital transformation strategy in place. Tax Administrations report that these strategies are driving their services to become 'smarter', allowing taxpayers to complete increasingly complex tasks digitally, more efficiently and 24/7(OECD, 2023a). To this end, a Digital Transformation Maturity Model has been developed by the Forum on TA which allows self-assessment by Tax Administrations of the current level of maturity and to facilitate consideration of future strategy (OECD et al., 2022).

As Tax Administrations become familiar with big data management, they are adopting these applications at an accelerating rate. Around 90% of OECD Tax Administrations report using data science and analytical tools, and this facilitates the use of data in all aspects of an administration's work. The IRS, for example, has already a long history in AI and data analytics: both supervised and unsupervised machine learning methods were used to detect noncompliance (including questionable refunds on individual income tax returns) using a combination of conventional approaches and machine learning. From 2015 to 2019, the IRS prevented the issuance of $11 billion in invalid refunds (Holtzblatt and Engler, 2022).

AI is also broadly used for risk assessment and also fraud detection, with TA making significant progress on AI. Around 50% of administrations are using it for risk assessment and also fraud detection. The Italian Revenue Agency was authorized to use an algorithm that cross references financial data with tax filings, earnings, property records, bank accounts, and other electronic payment information to detect taxpayers with elevated risks of non-paying. This led to the identification of 1 million high-risk cases and prevented fraud amounting to $6.85 million in 2022 (Beebe, 2023). Biometric and facial recognition methods are currently used for tax identification purposes. A few administrations (i.e. Argentina, Australia, Austria, Brazil, China, and Singapore) are also using facial recognition or finger print to authenticate the digital identity of a taxpayer (OECD et al., 2022).

However, AI can also be used for tax compliance purposes. Communication, interaction and the facilitation of cooperation with taxpayers, as systematically supported (OECD, 2021b) constitute a key core for the smooth operation of the TA, in a climate of practical taxpayer compliance. Modern Tax Administrations, today, implement the above through a series of contact points, such as: face-to-face interactions, phone calls, multi-functional websites, etc. A significant number of existing services are being improved today with the use of innovative technologies, such as AI, thus enabling real-time interaction between the TA and taxpayers. For example, a growing number of Tax Administrations are confirming the use of AI through virtual assistants to facilitate responses to taxpayer queries, with the aim of encouraging a new culture of self-service. Popular areas of AI integration are the use of chatbots for information provision and the use of algorithms to detect suspicious transactions and prioritizing enforcement, when taxpayers

show signs of default. According to the European Commission (OECD et al., 2022) different EU Tax Administrations have started to use chatbots for specific tax matters (that is, Latvia, Austria, Germany).

Use of AI by Greek TA: From technological steps to AI

Since 2016, TA in Greece –Independent Authority for Public Revenue (IAPR)- is in effect an autonomous body in the sense that it enjoys full operational freedom, although the Ministry of Finance may control or affect targets and strategies. The IAPR is responsible for collection of direct and indirect taxes at national level, including customs duties, while a solid Digital Transformation Plan is executed from 2010 onwards, especially after the economic adjustment programs in the country (IMF 2011, 2013, 2014).

TA in Greece, has not only made significant administrative reforms, but also prioritized major IT reforms. Currently, a broader digital transformation, expansion of electronic services for taxpayers and utilization of new technologies to improve its efficiency has been achieved. To this end, in recent years, the IAPR has been making use of resources of the National Strategic Reference Framework and the Recovery and Resilience Fund for the purpose of the Digital Transformation of the Tax and Customs Administration, while recently has been announced a promising wide scale AI implementation strategy. AI implementation, though, as shown below, is not yet applicable.

However, good national practices exist in several IT areas. Successful examples of this strategy are listed below:

1. Digital platform/portal for taxpayers' requests (My AADE): A new digital portal of the IAPR, for all services provided to citizens and businesses through the renewed digital environment of the portal, taxpayers can easily have access to all IAPR digital applications, quickly finding the service taxpayers are interested in manage contact information.
2. Digital platform/portal for additional tax obligations (My Car, My Property, My Business Support)
3. Implementation of the e-invoice system (my data): A new electronic platform by which the IAPR introduces electronic accounting books into the daily lives of businesses. Electronic Books is a very important step in the digital transformation of the TA and its relationship with businesses. The IAPR's goal is primarily to serve businesses by providing an innovative digital platform for fulfilling their tax obligations, which will lead to the automation of tax declaration and will relieve them of their current obligations, such as Filing of Customers-Suppliers Lists. Along with reducing the administrative costs of businesses, IAPR e-books enhance the transparency of transactions by providing a digital business collaboration environment for the pricing of goods and services.

Use of big data and analytics for tax audit and collection

As of 2021 onwards, Risk Management and Selection Department of IAPR Central Management) carries out centrally selections both for tax audits and supportive procedures. To this end, an Integrated Information System for Auditing Services (ELENXIS) is developed, operating a centrally developed selection method and data systems supporting risk analysis to assist in selecting taxpayers for tax audit. Tax audits must primarily be focused on those taxpayers, at which the risk of significant tax concealment and of unauthorized claim for tax refund or subsidies, respectively, is the biggest.

Legislative and administrative reform

The overall legislative and administrative reform is supportive of using new technologies and additional analytics-driven approaches under proper governance. In 2023, a new law (L.5073) was passed for stamping down tax evasion in Greece. Among others, the government's package of interventions incorporates measures such as videotaping of tax audits, discouraging the use of cash under the threat of high fines, while expanding the use of Points of Sale (POS). Furthermore, tax audits are becoming stricter, with the addition of new criteria to the audit process, while a reward is provided for those who report digitally documented tax evasion. Last but not least, electronic invoicing will become mandatory for the majority of businesses.

RESEARCH METHODOLOGY

This Chapter describes the research design and methods used in this study. The paper analyzes survey data collected from a sample of taxpayers (n = 965) living in Greece. The case of Greece has been chosen for the following reasons:

The digital transformation of the state (PA and TA) is developing by leaps and bounds from 2020 onwards, making satisfactory progress compared to other countries in recent years (DESI Report, 2022). As far as advanced technologies are concerned, although AI constitutes key strategic area of action within the Digital Transformation Bible (2020-2025), the country's national strategy is still in the preparation stage. Indicatively, it is reported that although 13% of businesses in Greece use big data, which is generally in line with the EU average (14%), their performance is nevertheless much lower than the EU average in terms of usage of cloud computing and AI. Citizens' levels of trust towards the state occupy particularly low percentages, compared to other countries (World Employment and Social Outlook Trends, 2022).

The survey was posted to Facebook and sent by email to citizens with only requirement to be taxpayers in Greece, when submitting the questionnaire. The survey was available between 5th of January till 31st of May 2023, and originally 1500 questionnaires were distributed, yielding a 64.33% response rate. The final dataset consisted of 965 online responses (Table 3). More specific, the questionnaire (Table 2) consisted of fifteen questions, asking taxpayers to evaluate on a scale of 1 to 5 (1 = Not at all, 2 = A little, 3 = Moderate, 4 = A lot, 5 = Very much) their trust in PA and TA and

Table 1. AI State of play and TA in Greece, 2021.

State of play	Status
ICT-Distributed ledger technology / Blockchain	Not applicable
ICT-Artificial intelligence (AI), including machine learning	Not applicable
ICT-Cloud computing	In place
ICT-Data science / analytics tools	In place
ICT-Robotics Process Automation (RPA)	Not applicable
ICT-Application programming interfaces (APIs)	In place
ICT-Whole-of-government identification systems	In place
ICT-Digital identification technology (e.g. biometrics, voice identification)	Not applicable
ICT-Virtual assistants (e.g. chatbots)	Not applicable

Source: Isora (2021).

express their perceptions on different aspects of digital ethics in view of the forthcoming implementation of AI in PA and TA. Scope of the survey was to trace the main taxpayers' attitudes on the following concepts: The analysis of the survey data collected was carried out through the statistical process. After data collection, data were exported to an Excel file containing all the variables with their responses and timestamp as a single user identifier (ID). Then, the file was imported in statistical data processing software IBM SPSS v. 27.0 (Statistical Package for the Social Sciences) for statistical processing and analysis of the data.

RESULTS

Digital maturity of taxpayers in transactions with the Government

Digital maturity of the survey participants -taxpayers is particularly high in areas such as transactions with the PA, TA and other areas of daily transaction (Table 4), demonstrating not only the high degree of trust in electronic transactions and with agencies of the State, but also their positive attitude towards the expansion of electronic transactions in all the actions of the Greek PA (Table 1). This is also confirmed by the degree of trust in the use of electronic services of the PA and the TA (Table 10).

Moderate degree of trust in the ethical functioning of the institutions

Taxpayers' attitude in the ethical functioning of the institutions is reflecting low percentages of trust on behalf of the participants in their functioning. A comparative overview of the results shows that TA enjoys the greatest trust of the participants, not only in relation to other State bodies but also in relation to other third parties as representatives of the institutions (Public Enterprises, Private Enterprises, media) (Table 5).

Familiarity with AI topics

The vast majority of taxpayers regarding the concept and content of AI respond positively stating that the concept of AI is known and taxpayers are able to explain the content well. The majority of respondents declare knowledge about the content of the concept but with elements of doubts (Table 6).

Strong expectation of AI application in areas of citizen services, taxation and anti-corruption

Taxpayers strongly believe that AI can be applied and therefore contribute primarily to matters of providing services to citizens in the operation of the PA (as well as in matters of transport), in the operation of the TA and also in matters of corruption (Table 7).In the question "If the use of AI by the PA, can contribute to (a) Health and medical care, (b) Climate change, (c) Finding jobs, (d) Providing services to citizens, (e) Taxation, (f) Corruption, (g) Transport", taxpayers stated that AI can contribute "Very Much" foremost to issues of providing services to citizens as well as transport issues (24.4%) while it is also necessary underscore the high expectation of the participants in the contribution of AI to corruption issues (21.6%). Taxpayers also assess the potential contribution of AI as important in taxation (19.3%), health and medical care (19.2), finding jobs (18.5%) and climate change (14.6%). More specific details are shown in Table 7.

Strong challenges and risks of digital ethics in the application of AI especially in matters of privacy / confidentiality, maintaining jobs and respecting human dignity

Taxpayers may respond positively to the application of AI in important areas of human activity, however significant reservations remain regarding its ethical application. In

Table 2. Survey questionnaire.

(i) Taxpayers' digital maturity in Greece
Q1. I usually use Internet for (a) information seeking, (b) navigation in social media, (c) buying products, (d) e transactions with PA and Banks.
(ii) Taxpayers' attitude towards institutions in Greece
Q2. How much do you trust (a) PA, (b) TA, (c) Private Organizations, (d) Public Organizations, (e) Media
(iii) Taxpayers' familiarity with AI applications
Q3. Are you familiar with the term "Artificial Intelligence"?
(iv) Taxpayers' perceptions on AI integration in PA
Q4. Please state your support for the development of AI in PA depending the use case (a) healthcare, (b) climate change, (c) job finding, (d) public services to citizens, (e) taxation, (f) corruption, (g) transport.
(v) Taxpayers' perceptions on future challenges when integrating AI in PA
Q5. Please state your possible concerns about future challenges when integrating AI in PA in the future a) transparency in decision making, (b) accuracy of results, (c) AI applications and capacity of public servants, (d) bias and discrimination, (e) human dignity, (f) privacy (g) job maintaining.
(vi) Taxpayers' perceptions on future decision making when integrating AI in PA
Q6. After the development of AI in PA, I can trust decision-making (a) by human exclusively, (b) by computer but after human control, (c) by computer (automated decision making)
(vii) Taxpayers' trust in e services provided by PA and TA
Q7. Please state your trust in the use of e services provided by (a) PA, (b) TA.
(viii) Taxpayers' needs and e services in TA
Q8. When I use of e services in TA a) all my needs are met, b) most of my needs are satisfied, (c) my needs are not usually met and physical access is required
(ix) Taxpayers' attitude when using e services in TA
Q9. When using e services in TA (a) language is simple and understandable, (b) personal data are kept with safety, (c) personal data are not processed for another purpose, (d) benefits of e services are understood, (e) no more than the necessary information is required (f) the electronic environment is taxpayer-friendly.
(x) Taxpayers' attitude towards risks and data in TA
Q10. Please state your possible concerns about future risks when integrating AI in TA in the future (a) information leaks, b) data transmission to third parties, (c) fully automated decision making in the future for crucial issues, (d) exclusion of citizens due to lack of access to electronic services.
(xi) Taxpayers' attitude towards digital ethics and AI integration in TA
Q11. Please state your possible concerns about digital ethics when integrating AI in TA in the future (a) transparency and explainability, (b) safety, (c) accountability, d) fairness and nondiscrimination, (e) human control over AI applications, (f) efficiency, (g) human rights protection.
(xii) Taxpayers' attitude towards areas of AI integration in TA
Q12.I would prefer the development of AI (a) when processing complex tax issues, (b) for submitting my tax returns, (c) for simple usual instructions of tax interest, (d) for simple information, (e) for no reason.
(xiii) Taxpayers' attitude towards anticorruption strategy
Q13. In your opinion, anti-corruption strategy in Greece is (a) indifferent, (b) in the wrong direction, (c) in the right direction
(xiv) Taxpayers' attitude towards electronic services and corruption
Q.14.A The use of electronic services in PA (a) contributed drastically to the reduction of corruption, (b) contributed to reducing corruption but not drastically, (c) did not result in any substantial change in the reduction of corruption
Q.14.B The use of electronic services in TA (a) contributed drastically to the reduction of corruption, (b) contributed to reducing corruption but not drastically, (c) did not result in any substantial change in the reduction of corruption

Table 2. Cont'd.

(xv) Taxpayers' perceptions on effective anti-corruption policies
Q.15 Please state your opinion about the effectiveness of the following anti-corruption policies (a) reliable AI, (b) greater social participation, (c) stricter legislative framework, (d) broader transparency, (e) broader use of Code of Ethics, (f) effective legislation for the protection of whistle-blowers.

Table 3. Demographics.

Variable		Number	Percentage
Gender	Male	350	36.30
	Female	613	63.50
	Prefer not to answer	2	0.20
Age	18-30	128	13.30
	31-40	158	16.40
	41-50	431	44.70
	51-65	227	23.50
	65+	21	2.20
Marital Status	Single	305	31.60
	Married	562	58.20
	Divorced	85	8.80
	Prefer not to answer	13	1.30
Education	Undergraduate degree	259	26.80
	Bachelor degree	316	32.70
	Master degree	339	35.10
	PhD	51	5.30
Occupation	Public employee	525	54.40
	Private employee	214	22.20
	Self employed	106	11.00
	Unemployed	92	9.5
	Retired	28	2.9

particular, concerns regarding the possibility of ensuring privacy and confidentiality, the preservation of jobs and respect for human dignity in general are expressed as more important reservations. The risk of lack of transparency during decision-making, the accuracy of results, bias and discrimination, but also the possibility of (proper) management of AI by administrative staff are some of the challenges that taxpayers assess as particularly important when integrating AI into PA (Table 8).

Trust in automated decision-making in the PA, but after human review

The strong acceptance of the application of AI in areas of operation of the PA, as analyzed above, is combined with the strong acceptance and trust of the taxpayers in automated decision-making after human control. However, the strengthened opinion of taxpayers that in the future, during the operation of the PA, they can trust decision-making exclusively by a computer is also interesting (Table 9).

Greater trust in the use of electronic services of PA in general compared to trust in the use of electronic services of the TA

A comparative overview of Table 10 leads to the conclusion that taxpayers express a high percentage of acceptance and trust in the electronic services provided

Table 4. Taxpayers' digital maturity.

I usually use Internet for			
Information seeking	Not at all	2	0.20%
	A little	18	1.90%
	Moderate	52	5.40%
	A lot	263	27.30%
	Very much	630	65.30%
Navigation in social media	Not at all	63	6.50%
	A little	114	11.80%
	Moderate	220	22.80%
	A lot	242	25.10%
	Very much	326	33.80%
Buying products	Not at all	58	6.00%
	A little	184	19.10%
	Moderate	283	29.30%
	A lot	261	27.00%
	Very much	179	18.50%
e Transactions with public administration, banks etc.	Not at all	23	2.40%
	A little	60	6.20%
	Moderate	154	16.00%
	A lot	306	31.70%
	Very much	422	43.70%

Table 5. Taxpayers' attitude towards trust in institutions in Greece.

How much do you trust			
Public administration	Not at all	59	6.10%
	A little	163	16.90%
	Moderate	466	48.30%
	A lot	227	23.50%
	Very much	50	5.20%
Tax administration	Not at all	45	4.70%
	A little	159	16.50%
	Moderate	424	43.90%
	A lot	259	26.80%
	Very much	78	8.10%
Private organizations	Not at all	71	7.40%
	A little	242	25.10%
	Moderate	475	49.20%
	A lot	153	15.90%
	Very much	24	2.50%
Public organizations	Not at all	62	6.40%
	A little	236	24.50%
	Moderate	479	49.60%
	A lot	161	16.70%

Table 5. Cont'd

	Very much	27	2.80%
Media	Not at all	422	43.70%
	A little	319	33.10%
	Moderate	192	19.90%
	A lot	24	2.50%
	Very much	8	0.80%

Table 6. Taxpayers' familiarity with AI.

Are you familiar with the term artificial intelligence	Yes, and I can explain the content well	441	45.70%
	Yes, but I have doubts about the content	509	52.70%
	No	15	1.60%

both by PA and TA, however expressing a higher preference for the electronic services of the PA in general. This is combined with the participants' statements that the majority of taxpayers' needs (and not all) are met to date through the use of the TA's electronic services (Table 11).

Taxpayers' insights are positive regarding the quality of the TA's electronic services

In the question: "Which of the following responds best when electronic services of the TA are used?" 11.8%, answered 'My needs are not usually met and physical access is required, 76.2%, answered 'Most of my needs are satisfied' and 12.0%, answered that 'All my needs are met' (Table 11). A network of questions regarding the participants' satisfaction with the use of the electronic services of the TA demonstrates the positive opinion and therefore the satisfaction of public opinion with the quality of the services provided. In general, taxpayers express a positive attitude towards e services provided by TA, since they believe that electronic environment is taxpayer-friendly, the language is simple and understandable, no more information is requested than is necessary for the fulfillment of tax obligations, confidence is expressed that personal data is kept securely and is not processed for other purpose and in the end the benefits of electronic services to each individual taxpayer-user are understandable (Table 12).

Challenges and risks when using data by the TA

Taxpayers estimate as a major risk that critical decisions in the future may be taken, within the framework of the operation of the TA, automatically and without human participation. Also, they express their strong concern regarding the possibility of excluding taxpayers due to not having access to electronic services, the risk of data transmission to other Organizations (not included in TA), while they consider that the data is not kept securely and can be maliciously leaked (Table 13).

Data security, protection of human rights, fairness and non-discrimination, transparency and explainability: Guiding principles for the development of digital ethics rules in the integration of AI in the TA

Digital maturity of the participants as well as the acceptance of the potential contribution of AI to the functioning of the TA does not imply the unconditional acceptance of the integration of AI into the TA. Even taking into account what was previously discussed (Table 14), taxpayers support the need to adopt rules of digital ethics such as data security, the observance of rules of transparency and explainability (e.g. when applying algorithms), the protection of human rights, the avoidance of discrimination and the application impartial criteria, efficiency, accountability and finally the possibility of human control in the applications (Table 14).

Application of AI when processing complex tax issues as well as for common simple instructions of tax interest

The expectation of integrating AI into the operation of the TA is, as above discussed, strong. This is also confirmed by taxpayers' attitude towards the integration of AI for processing of complex taxation issues as well as for usual simple instructions of tax interest. The contribution of AI is also expected in other popular fields of action of the TA, such as the submission of tax returns (Table 15).

Table 7. Taxpayers' attitude on the development of AI in PA per use case.

Please state your support for the development of AI in PA depending the use case			
	Not at all	45	4.70%
	A little	115	11.90%
Healthcare	Moderate	224	23.20%
	A lot	396	41.00%
	Very much	185	19.20%
	Not at all	51	5.30%
	A little	137	14.20%
Climate change	Moderate	274	28.40%
	A lot	362	37.50%
	Very much	141	14.60%
	Not at all	49	5.10%
	A little	100	10.40%
Job finding	Moderate	249	25.80%
	A lot	388	40.20%
	Very much	179	18.50%
	Not at all	32	3.30%
	A little	86	8.90%
Citizen services	Moderate	201	20.80%
	A lot	411	42.60%
	Very much	235	24.40%
	Not at all	45	4.70%
	A little	104	10.80%
Taxation	Moderate	251	26.00%
	A lot	379	39.30%
	Very much	186	19.30%
	Not at all	69	7.20%
	A little	140	14.50%
Corruption	Moderate	256	26.50%
	A lot	292	30.30%
	Very much	208	21.60%
	Not at all	35	3.60%
	A little	92	9.50%
Road traffic and transport	Moderate	214	22.20%
	A lot	389	40.30%
	Very much	235	24.40%

Indifferent policies and measures to deal with corruption

A direct consequence of the above finding is the general opinion of taxpayers regarding the effectiveness of the existing anti-corruption policies. The dynamics of taking anti-corruption measures today is characterized as indifferent (44.2%), while a significant percentage of participants (32%) also state that taking measures is in the wrong direction (Table 16). Close to this conclusion, it is taxpayers' opinion that the use of electronic services both in TA and PA has contributed to reducing corruption in Greece, but not drastically (Table 17).

More effective anti-corruption measures

Adopting an adequate framework for the protection of

Table 8. Taxpayers' attitude on possible concerns about AI in PA in the future.

Please state your possible concerns about future challenges when integrating AI in PA in the future			
Transparency in decision making	Not at all	61	6.30%
	A little	149	15.40%
	Moderate	240	24.90%
	A lot	321	33.30%
	Very much	194	20.10%
Accuracy of results	Not at all	74	7.70%
	A little	152	15.80%
	Moderate	247	25.60%
	A lot	329	34.10%
	Very much	163	16.90%
AI applications and capacity of public servants	Not at all	32	3.30%
	A little	92	9.50%
	Moderate	253	26.20%
	A lot	378	39.20%
	Very much	210	21.80%
Bias	Not at all	71	7.40%
	A little	134	13.90%
	Moderate	269	27.90%
	A lot	293	30.40%
	Very much	198	20.50%
Human dignity	Not at all	50	5.20%
	A little	110	11.40%
	Moderate	237	24.60%
	A lot	293	30.40%
	Very much	275	28.50%
Privacy and confidentiality	Not at all	50	5.20%
	A little	89	9.20%
	Moderate	209	21.70%
	A lot	304	31.50%
	Very much	313	32.40%
Maintaining jobs	Not at all	58	6.00%
	A little	98	10.20%
	Moderate	244	25.30%
	A lot	268	27.80%
	Very much	297	30.80%

Table 9. Taxpayers' attitude on automated decision making in PA.

In the future, during the operation of PA, I can trust decision-making	By computer (automated decision making)	111	11.50%
	By computer but over a human control	778	80.60%
	By human (exclusively)	76	7.90%

Table 10. Taxpayers' attitude on trust and use of e services in TA and PA.

I trust the use of e services in my transactions with TA	Not at all	14	1.50%
	A little	36	3.70%
	Moderate	252	26.10%
	A lot	409	42.40%
	Very much	254	26.30%
I trust the use of e services in my transactions with PA	Not at all	9	0.90%
	A little	42	4.40%
	Moderate	196	20.30%
	A lot	423	43.80%
	Very much	295	30.60%

Table 11. Taxpayers' attitude when e services of TA are used.

Which of the following responds best when e-services of TA are used?	My needs are not usually met and physical access is required	114	11.80%
	Most of my needs are satisfied	735	76.20%
	All my needs are met	116	12.00%

Table 12. Taxpayers' attitude when using e services in TA.

When using e services in TA			
Language is simple and understandable	Agree	704	73.00%
	Disagree	261	27.00%
Personal details are kept with security	Agree	574	59.50%
	Disagree	391	40.50%
Personal details are not processed for another purpose	Agree	577	59.80%
	Disagree	388	40.20%
Benefits of e services are understood	Agree	868	89.90%
	Disagree	97	10.10%
No more than the necessary information is required	Agree	694	71.90%
	Disagree	271	28.10%
Electronic environment is taxpayer-friendly	Agree	664	68.80%
	Disagree	301	31.20%

public interest whistleblowers and ensuring greater transparency and availability of open data (Table 18). From the grid of questions that follows, it is found that the adoption of a modern and effective framework for the protection of witnesses of public interest is declared as the most effective measure against corruption (45.8%). This is followed by taking measures to ensure greater transparency and availability of open data (43%), the tightening of the existing legislative framework in general (41.2%), the expansion of social participation (38.1%), the expansion of Codes of Conduct (34.2%) and finally the use of digital media and AI (25.1%).

DISCUSSION AND FUTURE RECOMMENDATIONS

The results of our wide scale survey have important implications for government stakeholders (TA and

Table 13. Taxpayers' attitude on future risks about AI in TA in the future.

Please state your possible concerns about future risks when integrating AI in TA in the future			
Information leaks	Agree	612	63.40%
	Disagree	353	36.60%
Data transmission to third parties	Agree	688	71.30%
	Disagree	277	28.70%
Making automated and without human involvement critical decisions in the future	Agree	721	74.70%
	Disagree	244	25.30%
Exclusion of citizens due to lack of access to electronic services	Agree	757	78.40%
	Disagree	208	21.60%

Government) as they consider how they use and develop public policies in relation to AI in taxation but also in public policy issues. Taxpayers in general express their trust in automated decision making but after human review, indicating their reservations about making automated and without human involvement in critical decisions in the future (Table 9).

Perceptions of bias and discrimination in TA

AI has the potential to reduce human biases that influence human decision making. However, eliminating bias is not a simple case even for AI. AI learns from data, much of which has been generated from human activity. Creating models free from that bias remains a significant technical challenge, even for TA. For example, the case of "toeslagenaffaire," or the child care benefits scandal in TA of Netherlands should be taken into account. More specific in 2019 it was revealed that the Dutch tax authorities had used a self-learning algorithm to create risk profiles in an effort to spot child care benefits fraud. Authorities penalized families over a mere suspicion of fraud based on the system's risk indicators. Tens of thousands of families, often with lower incomes or belonging to ethnic minorities were pushed into poverty because of exorbitant debts to the tax agency (Beebe, 2023). In order to avoid bias and discrimination issues, an administrative regulatory body is strongly recommended to be designed. In particular, an AI Ethics National Agency could be established, responsible for ensuring that AI implementation and research in AI related technologies made use by PA (and TA) are carried out in an ethical manner in accordance with national and international law.

Explainability, transparency and auditability

Data processing activities and automated decisions must make sense for taxpayers. 0The purpose and interests of data processing must be clearly understood by the individual in terms of understanding risks, as well as social, ethical and societal consequences (Tranberg et al., 2018). In some cases, in TA, such as black box models for AI in taxation, it may be impossible to understand how a recommendation or decision was derived, even for tax fraud or tax evasion purposes. TA in United States, for example made use a risk assessment tool for tax fraud, called COMPAS. However, as argued (Faundez –Ugalde et al*.,* 2020), the use of this assessment tool has been criticized after *State v. Loomis* case. It is within the scope of establishing the above-mentioned AI Ethics National Agency for setting standards for AI explainability, transparency and auditability. Since the explainability and risk assessment of AI use cases may be complex, requiring an understanding of the different governance objective and topics, different AI Development Teams could be established for different government areas (among which taxation), supported by experienced public officials, technical experts, and legal and risk professionals.

Balanced pilot cases in TA

TA will need to select carefully how and where launch pilots for taxation purposes. Although taxpayers in Greece express their willingness for AI assistance to be implemented into for complex tax issues, TA should identify simple use cases that will deliver the greatest benefit from experimentation, balancing at first the difficulty of implementation with the benefits, including the potential impact for taxpayers.

Taxpayers' participation

TA and Government should also consider how to involve taxpayers in these pilots. Italy, for example, is improving the delivery of services to taxpayers making use of "Citizen Voice System" to determine how well the services,

Table 14. Taxpayers' attitude on digital ethics and AI in TA in the future.

Please state your possible concerns about digital ethics when integrating AI in TA in the future			
Transparency and explainability	Not at all	7	0.70%
	A little	24	2.50%
	Moderate	41	4.20%
	A lot	236	24.50%
	Very much	657	68.10%
Security	Not at all	11	1.10%
	A little	20	2.10%
	Moderate	33	3.40%
	A lot	168	17.40%
	Very much	733	76.00%
Accountability	Not at all	13	1.30%
	A little	21	2.20%
	Moderate	49	5.10%
	A lot	240	24.90%
	Very much	642	66.50%
Fairness and non-discrimination	Not at all	11	1.10%
	A little	24	2.50%
	Moderate	44	4.60%
	A lot	194	20.10%
	Very much	692	71.70%
Human control over AI applications	Not at all	11	1.10%
	A little	31	3.20%
	Moderate	90	9.30%
	A lot	266	27.60%
	Very much	567	58.80%
Efficiency	Not at all	9	0.90%
	A little	18	1.90%
	Moderate	45	4.70%
	A lot	216	22.40%
	Very much	677	70.20%
Human rights protection	Not at all	10	1.00%
	A little	23	2.40%
	Moderate	39	4.00%
	A lot	169	17.50%
	Very much	724	75.00%

Table 15. Taxpayers' attitude towards AI integration in TA.

I would prefer the integration of AI in the TA	For simple information	107	11.10%
	For simple usual instructions of tax interest	274	28.40%
	For submitting my tax returns	212	22.00%
	When processing complex tax issues	321	33.30%
	For no reason	51	5.30%

Table 16. Taxpayers' perceptions on corruption strategy in Greece.

Corruption strategy in Greece	Is in right direction	229	23.70%
	Is in wrong direction	309	32.00%
	Is indifferent	427	44.20%

Table 17. Taxpayers' perceptions on e services and corruption strategy in Greece.

The use of e services in P.A.	Did not result in any substantial change in the reduction of corruption	216	22.40%
	Contributed to reducing corruption but not drastically	599	62.10%
	Contributed drastically to the reduction of corruption	150	15.50%
The use of e services in T.A.	Did not result in any substantial change in the reduction of corruption	194	20.10%
	Contributed to reducing corruption but not drastically	601	62.30%
	Contributed drastically to the reduction of corruption	170	17.60%

Table 18. Taxpayers' perceptions on effective anti-corruption policies.

Please state your opinion about the effectiveness of the following anti-corruption policies			
Reliable AI	Not at all	34	3.50%
	A little	81	8.40%
	Moderate	251	26.00%
	A lot	357	37.00%
	Very Much	242	25.10%
Greater social participation	Not at all	11	1.10%
	A little	61	6.30%
	Moderate	182	18.90%
	A lot	343	35.50%
	Very Much	368	38.10%
Stricter legislative framework	Not at all	22	2.30%
	A little	68	7.00%
	Moderate	194	20.10%
	A lot	283	29.30%
	Very Much	398	41.20%
Broader transparency	Not at all	12	1.20%
	A little	40	4.10%
	Moderate	150	15.50%
	A lot	348	36.10%
	Very Much	415	43.00%
Broader use of code of ethics	Not at all	24	2.50%
	A little	61	6.30%
	Moderate	215	22.30%
	A lot	335	34.70%
	Very Much	330	34.20%
Effective protection of whistleblowers	Not at all	17	1.80%
	A little	44	4.60%
	Moderate	161	16.70%
	A lot	301	31.20%
	Very Much	442	45.80%

rules and accountability frameworks in place will reassure taxpayers' trust and confidence that AI is being used responsibly and ethically.

Build AI capabilities inside TA

As TA adopts AI, tax officials need to be re-educated and get prepared for wider AI implementation by building internal capabilities. Tax officials should be supported and empowered to navigate new career pathways through lifelong learning and more tailored AI career guidance. The Greek government should prepare for the substantial workforce conditions through policy measures. Identifying the right mix of current and future skills will be critical to enabling TA officials to scale up future AI-related efforts.

Conclusion

The capture of public opinion and taxpayer's perceptions on high impact issues such as AI implementation and tax reforms, efficiency and corruption is, understandably, critical to planning government policies and making decisions of wider interest. Despite the systematic efforts to build trust between taxpayers and TA, or citizens and PA in Greece, significant problems continue to exist, causing low returns in areas of transparency, efficiency and tax compliance. Since, trust is hard to earn and easy to lose specially in a country where, following the 2008 financial crisis, Greek citizens faced hardship as they set about repairing the damage done to Greek economy and to public finance, it is evident that a careful assessment of public opinion on matters of AI, transparency, efficiency and good governance is needed.

Limitations

The main limitations of this work are the following. First of all, the focus of the analyses is represented by a descriptive analysis. Consequently, it is suggested that further research should be developed to investigate qualitative elements of the research filed. Moreover, there is no previous research examining both PA and TA taxpayers' attitude in digital ethics in other OECD countries, so it would be useful to repeat the analyses in the future, after new research results.

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