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International Journal of Electronic Governance

ISSN online: 1742-7517 - ISSN print: 1742-7509
https://www.inderscience.com/ijeg

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DOI: 10.1504/IJEG.2023.10054532

Article History:

Received:	28 January 2022
Last revised:	27 April 2022
Accepted:	19 June 2022
Published online:	05 April 2023

eTHOS: a web-based tax morale system

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Abstract: In this paper, an innovative web-based cross-platform information system, named eTHOS, is introduced allowing citizens to either report various complaints, in real-time, about tax evasion incidents, or to highlight good tax behavior practices. This is achieved through the creation of interactive maps that highlight geospatial financial factors for the general public. The main purpose of the system is to capture specific information which will be used in order to understand the various tax morale approaches that lead citizens to file a report (complaint or suggestions for reward) based on their interaction with businesses. Furthermore, the new proposed system aims to gain an operational role as the first citizen oriented digital tool against tax evasion. The contribution of eTHOS to the economy could be important, since it could lead to the containment of tax evasion and the decrease of the VAT Gaps.

Keywords: eTHOS; tax morale; tax evasion; web-based systems; ICT; information and communication technologies.

Reference to this paper should be made as follows: Fotiadis, K., Kiourt, C. and Chatzoglou, P. (2023) 'eTHOS: a web-based tax morale system', *Int. J. Electronic Governance*, Vol. 15, No. 1, pp.74–86.

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1 Introduction

In the entrance of the national headquarters of Internal Revenue Service (IRS) in Washington, the following phrase of Oliver Wendell Holmes is displayed "Taxes are the price we pay for a civilised society". Tax collection is a process of vital importance for a state, making tax evasion a serious crime against the country and one of the most serious forms of social injustice (Ministry of Finance, 2011). Recently, the Commission published the data for the VAT Gap of 2017[1] of the EU24 countries, where it is reported that Greece has 7.34 billion euros less revenues than the expected (EU24 average: 4.93 billion euros) (EC 2020).

Historically, all tax administrations ask citizens (sometimes offering specific incentives) to report (even anonymously) tax evasion incidents or, at least, to provide specific information, which will allow them to deal with the various tax evasion phenomena. More specifically, tax authorities, such as IAPR (Greece), HMRC (Great Britain), IRS (USA), or ATO (Australia), ask from their citizens to complete an online (static) complaint form for the incident of tax evasion (or unjustified wealth). Indicatively, in US, the well-known I.R.S agency uses the form 3949-A, which consists of 3 sections, with questions about the individuals or the business that is being reported, the alleged violation of the income tax law, and (optionally) the profile of those who report the incident.[2]

It is a fact that as the Governor of the Independent Authority for Public Revenue (IAPR) has mentioned, for Greeks tax evasion seems to be a 'national sport'. Further, despite most of the tax administrations encourage citizens to fill out an online (static) complaint form, Greek citizens continue to avoid reporting the tax evasion phenomena

they are encountered within their daily transactions, or to report for the wrong reasons. IAPR (2017) mentioned that there have been only 5487 complaints from which 2033 were officially filled, assessed and forwarded to the tax authorities (regional offices). Although the profiles of the complainants are not available to the public (General Data Protection Regulation-GDPR), senior auditors revealed that complainants main motivations were their personal gain, retaliation (former spouses), family disputes (heirs) and professional disputes (former business associates). (The 'snitches' of IAPR – Who provide evidence for tax evasion-Sofokleousin). Needless to say, tax authorities would prefer these complaints to be the result of citizens' tax conscience (culture) or tax morale (Horodnic, 2018; Luttmer and Singhal, 2014).

The present study aims to contribute to the combat against tax evasion through the design and development of a web-based application which will allow citizens not only file a complaint (report a tax evasion incident) or praise a law-abiding firm, but also to have an overview of what other citizens have been complaining about.

It is suggested that information and communication technologies (ICT) can contribute toward social development and the improvement of the indexes of social justice. The pilot system is named eTHOS, a name that comes from the Greek word 'ήθος' (morality), which, in turn, comes from the word 'έθος' (habit). According to Aristotle, the two words are semantically connected with a cause-effect relation. As he clearly suggests in "Nicomachean Ethics", the great Greek philosopher believed that virtues are divided into intellectual virtues, such as prudence, wisdom, intelligence, agility etc. and moral virtues, such as justice, valor, generosity etc. (Floros, 2007).

eTHOS has been developed as a cross-platform web-application that can be exploited from almost all Operation Systems (OS) through web-browsers. Its main aim is to collect important data (of real life tax evasion incidents) regarding the reasons that lead a citizen to report a tax evasion incident or to reward a business for being law-abiding. The activation (or not) of users' tax morale factors is revealed through their answers in targeted questions during the registration of their complaint in eTHOS.

Citizens' lack of tax conscience (lack of a will to report those who evade taxes), may be changed through the use of eTHOS. The contribution of this system is important and is differentiated from other similar systems, since it does not only record tax evasion incidents but, also, attempts to capture information about the main reasons why citizens decide to complaint. At the same time, another new feature of this application is the calculation of an index that refers to the level of tax 'morality' of each region, based on the tax evasion phenomena that take place (or not). The index of tax credibility (morality) of a region is the main 'road map' for those citizens who want to deal with the specific regions in any way. For example, such a 'map' would be very valuable to potential investors who seek a safe and cooperative environment with high tax and business morale. Furthermore, eTHOS depicts (on a map) with the view of the heatmaps, the regions with the highest tax evasion, presents the total amount for which receipts were not issued and calculates the VAT and the (lost) income tax of these transactions. Finally, through the eTHOS system, a valuable database is created, which can be exploited from the first Tax Morale Observatory, a think tank or a reflection group for combating the tax evasion.

This paper is structured as follows. Section 2 provides the literature review of tax morale and related works, while Section 3 introduces the new system, by highlighting its features and capabilities. Section 4 provides an analysis of the outcomes of this research,

and highlights its social and scientific impacts. The last section provides some conclusions and highlights the future challenges.

2 Literature review

2.1 Tax morale (TM)

The first appearance of the term 'tax morale' in the international literature is dated back in the 1960s and 1970s by representatives of the "Cologne school of tax psychology", which was framed by German scholars focused around Günter Schmölders. He defined the concept of tax morale as taxpayers' attitude with regard to the fulfillment or omission of tax duties, which is engrained in citizens' tax mentality and conscience, a fact that constitutes the base of tax duties and the recognition of the sovereignty of the state. Luttmer and Singhal (2014, p.150) define tax morale broadly as "an umbrella term capturing non-pecuniary motivations for tax compliance, as well as factors that fall outside the standard expected utility framework." According to the majority of the tax related literature, tax morale (TM) is citizens' intrinsic motivation to pay taxes in a developed democratic society (Frey, 2003; Torgler, 2004, 2005; Alm and Torgler, 2006; Torgler and Schneider, 2007; Cummings et al., 2009). Moreover, tax morale refers to citizens' inner obligation to pay their taxes (Frey and Feld, 2002; Braithwaite and Ahmed, 2005), which is activated by a number of factors related to taxpayers' values and broader social goals. Similar is the approach of Torgler and Murphy (2004), who mention that the moral values and principles that lead citizens to pay their taxes can be understood through their tax morale.

Many researchers, who have studied the effects of tax morale on tax compliance, have classified the determinants of tax morale in various groups (Horodnic, 2018; Randlane, 2016; Lago Peñas and Lago Peñas, 2010). Many of them compared these factors among different countries (Torgler, 2004, 2005; Cummings et al., 2009; Tekeli, 2011; OECD, 2013), while some other just presented the factors that appear in the country they studied (Fotiadis and Chatzoglou, 2021; Bitzenis and Vlachos, 2018; Drogalas et al., 2018. Some of the most important tax morale factors (with a positive relationship) are the factors which related to trust in the quality of governance such as trust in the principle of reciprocity (Horodnic, 2018; Bitzenis and Vlachos, 2018; Fotiadis and Chatzoglou, 2021) and trust in tax authorities and tax officials (Randlane, 2016; Kaplanoglou and Rapanos, 2015; Horodnic, 2018; Fotiadis and Chatzoglou, 2021). Indicatively, it is worth mentioning the tax morale research in the country of Switzerland. Particularly, Alm and Torgler (2006) using Swiss survey data found that a higher direct democracy leads to a higher tax morale. In the same line, Feld and Frey (2002) analyse how tax authorities treat taxpayers in Switzerland, and find that tax authorities of cantons with more direct participation rights, compared to cantons with less direct democracy. It is understood that the possibility of using direct democracy instruments such as referendums (for tax issues) leads citizens to have higher tax morale.

The tax morale related literature suggests that the most common question used by tax morale researchers in order to measure tax morale (as an dependent variable) is question Q180: Cheating on taxes if you have a chance taxes in WVS-7 Master Questionnaire 2017–2020. Many researchers have performed their statistical analyses of tax morale determinant factors through Multivariate tests procedure (Alasfour et al., 2016), Ordered

probit model (Tekeli, 2011) and structural equations modelling (SEM) (Brink and Porcano, 2016; Fotiadis and Chatzoglou, 2021).

2.2 Related works

In the existing literature there are no other studies referring to a similar system (for reporting tax evasion phenomena), with the exception of the papers of Russo (2013, 2018). Special interest has the case of Italy which is described in Russo's (2013) paper, where a web-based application[3] is presented, which can be used from Italian citizens who would like to anonymously report tax evasion incidences that they faced or, on the contrary, they can reward a professional for being honest. Its main objective was the measurement of tax morale using data from the mostly anonymous (voluntary) complaints, and compares it with the official percentage of tax evasion estimated by the Italian statistical bureau. The information that each user of the 'evasori.info' platform enters, refers to the type of the business that does not issue a receipt, the amount of the transaction, the time, position and the region of Italy where the incident takes place.

The proposed pilot eTHOS application is differentiated from other systems in many aspects, since it attempts to actively engage citizens into reporting incidents (tax evasion or businesses rewards) through the use of innovative ICT through a safe and user-friendly environment which provides them all the necessary mechanism that protect them from being exposed. Furthermore, eTHOS incorporates a number of questions, before the report of the actual incident, in an attempt to understand what motivates citizens-users of the system (e.g., tax conscience, economic patriotism, tax justice, reasons for retaliation, personal reasons), and thus to uncover the main reason each report is filled. These questions seek to reveal the reasons that lead the exhausted Greek taxpayers to report tax evasion episodes. The choice of factors is not random as it emerges from the Greek tax morale literature, especially during the period of economic crisis (Fotiadis and Chatzoglou, 2021; Bitzenis and Vlachos, 2015, 2018; Drogalas et al., 2018). Particularly, Fotiadis and Chatzoglou (2021) investigated a significant number of tax morale factors in a country like Greece (with 'exhausted' taxpayers due to the high taxation), where a great deal of the governmental decisions have been made by the creditors and not by the elected politicians (because of the memoranda 2010–2018).

The geospatial view of the location from where the tax evasion incident is reported (e.g., store, office) may act as a disincentive for the users that declare continuously (and falsely) tax evasion incidents for a specific professional or business. In addition, the information concerned the VAT or the income tax losses by the non-issue of receipts may motivates citizens to complaint. Besides, the non-reciprocity of the taxes, because of the tax evasion, is a powerful tax morale factor (Luttmer and Singhal, 2014; Horodnic, 2018). In addition to the above, eTHOS provides a back-end system to experts, to allow the management of the reports as well as the detailed analysis of the reposts and the monitoring of the geospatial factors that provide the financial profile of the each region, or profession or type of business. Finally, as it will be analysed later, an important innovation of the eTHOS system is the opportunity it provides to the users to assess (in a range from –5 to + 5) the positive or negative influence of the complaint or the reward (of the transaction) on their morale (and their conscience), thus creating an assessment index.

3 The system

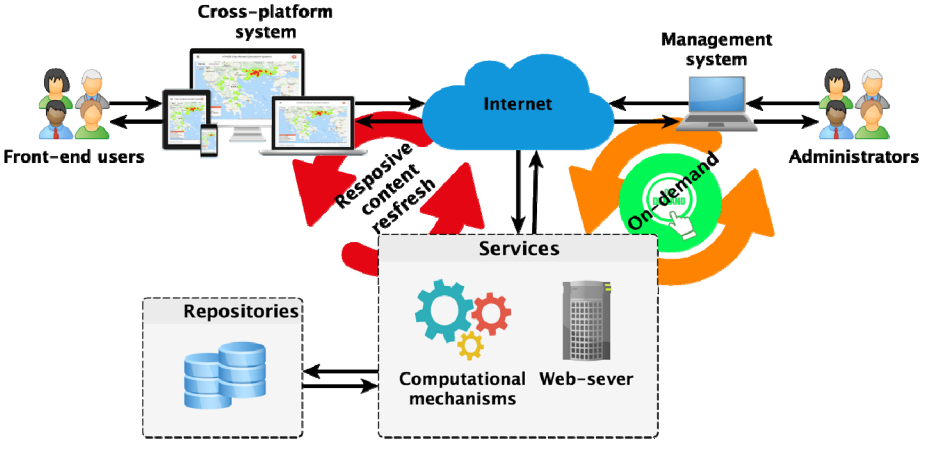
eTHOS[4] is a web-based integrated system developed with HTML5 technologies to support various operating systems (OS) through browser services. It provides a responsive graphical user interface (GUI) in order to be auto-adjustable based on the device's characteristics, such as screen size/analysis, hardware resources etc. For this reason the system can be considered as cross-platform since it can be accessed from mobile devices as well as from all computer OS. The entire system is supported by an SQL database, which manages/stores the records (complaints, rewards, evaluations, user comments etc.) and some of the system's features. The main architecture of the system is depicted in Figure 1, where it is clearly highlighted that the system is divided into two levels, which are:

- The first level, front-end system, focuses on the general public (end-users) and provides users with geospatial tax moral information, as well as enables them to add new records (complains, or suggestions for rewards for honest businesses). The information about a geographical area (e.g., a city, municipality etc.) is provided through a dynamic Geographical Information Systems (GIS), which is automatically updated and filtered, based on the selected area of interest from a user. The system supports automatic location identification, through the GPS of the mobile devices, focusing on more accurate and precise data collection and information provision. In addition to that, users can mark their location manually.
- The second level, back-end system, focuses on expert users on the domain of tax morale, who can be considered as the administrators of the eTHOS system. This level provides detailed analyses of the records and the end-user related information based on geographical areas. Also, this level can be considered as the monitoring tool of the entire systems and, especially, of the collected data, in order to ensure the quality of the information and services of eTHOS.

Both levels are based on Client-Based Services (CBS), which are supported through Server-Side Services (SSS). SSS focus on the computational analysis of the data, which require high computational resources and cannot be easily supported through CBSs. On the other hand, CBS manages users' requests through the GUIs and by establishing real-time interconnections with the SSS. The collaborative aspect of these approaches focus on providing personalised information to users based on their interests, through user-friendly interfaces.

As geospatial tax morale information we mean that through the reports of the users and after a data process we present the reported data in a way that highlights geographically the tax morale of each area through some indicators and some additional information. Such information might be useful to tourists who prefer to trade with tax-compliant traders or tax auditors who want to target areas with tax-evading traders.

Figure 1 The main architecture of eTHOS (see online version for colours)



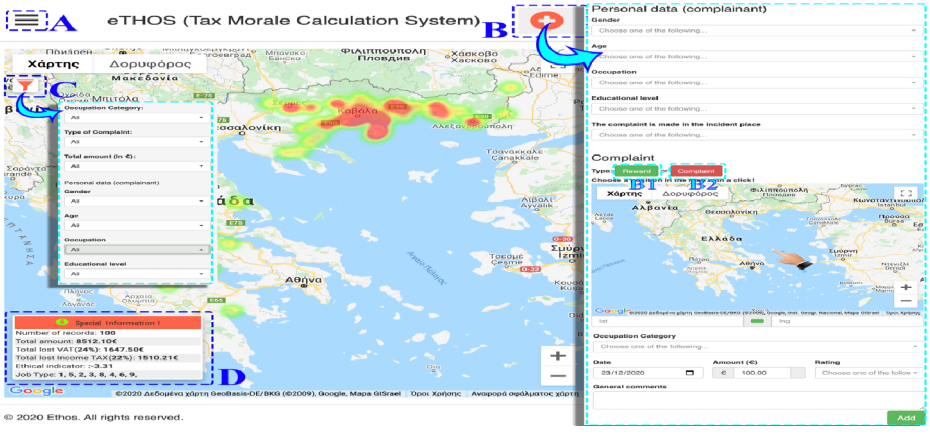
A simple view of the front-end of the eTHOS system is depicted in Figure 2, which focuses on the presentation of its four main features, which are:

- *Interactive map*: The left image of Figure 2 presents the spatial information of the records (complaints/rewards) through heat-maps, highlighting the number of the records from green to red. Intense green coloured areas present areas with low number of records, while the intense red coloured areas present high number of records (complaints). Areas without heat-maps have no records.
- *Information personalisation*: The interactive map provides a tool for filtering the records to get personalised content based on the interest of the user. This tool is highlighted with the letter 'C' in Figure 2. The filtering of the information is based on the complaints/rewards of the users of the front-end.
- *Specific information (real-time dynamically updated)*: The information of the eTHOS system is dynamically updated based on the field of view of the map and the personal choices of the user (personalised content feature). This information appears in a small window over the map (highlighted area with the letter 'D' in Figure 2). One of the highlighted points provides information about the 'Job Type' field, which presents the complaints that refer to a specific job type, e.g., restaurants, coffee etc. For visualization reasons, each job type is not presented with its full name, but with their IDs. Every change (interaction) in the features of the eTHOS system automatically updates the information of this window. For example, in Figure 2 the interactive map presents information only for the area that appears, e.g., Greece. Any interaction with the map, such as map drag, zoom-in or zoom-out, use of information filters will update the appeared information (heat-maps and content of special information window).
- *The records entry sub-system*: This sub-system automatically gets the location of the device and suggests it to the user. Besides the location of the user, this sub-system allows users to add additional information, in order to highlight more features about the targeted areas/business. In addition to that, users may also reward the areas/businesses instead of providing only complains. Both complains and

suggestions for rewards and all other provided information will help other users to better analyse the specific geographical areas based on their interests. From a research point of view, these features will help to develop various quality factors for assessing the tax morale level of different geographical areas, based on more accurate information provided by end-users.

The 'Ethical Indicator' (EI) in the 'Special information' window represents the financial credibility of the geospatial area presented in the map field. This indicator, which is the average value of the reported incidents, is calculated based on the number of reports (complains and rewards) and the rating value provided by the end-users. Rating value ranges from –5 to + 5, with an incremental step of 1. The negative rating values presents the dissatisfaction and the positive rating values the satisfaction of the end-users' by the served bussiness.

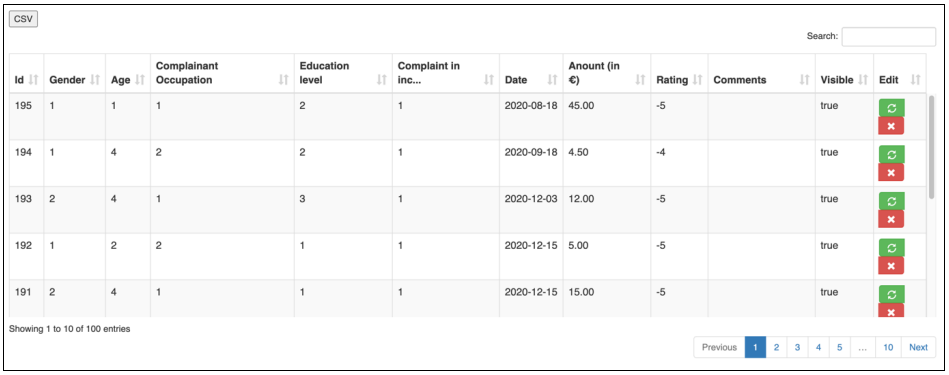
Figure 2 Front-end view of the eTHOS system (see online version for colours)



At this point, it should be highlighted that eTHOS protects the businesses from being exposed in the interactive map, by disabling the full zoom option, which would highlight/correlate specific complaints/reward with specific businesses, thus avoiding issues, such as targeting specific businesses negatively or positively.

Figure 3 depicts a simple view of the back-end of the eTHOS system, which focus only on expert users who will be responsible for managing and analysing the data (complains and reward records). Every record can be edited and also deleted, using the green and red buttons in the last column of each table (Figure 3). These two features are provided for managing the fake or malicious records. As fake records are considered those entered by a business owner (or any other user of the system) who may add multiple records to affect the overall image of a specific geographical area, for competitiveness reasons, or to harm a specific competitor. In future versions, this is expected to be managed automatically through machine learning approaches. The back-end also enables users to download data for further analysis and, especially, for data mining purposes, to develop more accurate geographical area quality factors and prediction models for future tax evasion trends.

Figure 3 Back-end view of the ethos for the administrators (see online version for colours)


CSV

Search:

Id	Gender	Age	Complainant Occupation	Education level	Complaint in inc...	Date	Anount (in €)	Rating	Comments	Visible	Edit
195	1	1	1	2	1	2020-08-18	45.00	-5		true	
194	1	4	2	2	1	2020-09-18	4.50	-4		true	
193	2	4	1	3	1	2020-12-03	12.00	-5		true	
192	1	2	2	1	1	2020-12-15	5.00	-5		true	
191	2	4	1	1	1	2020-12-15	15.00	-5		true	

Showing 1 to 10 of 100 entries

Previous 1 2 3 4 5 ... 10 Next

4 Discussion

The main value from the long term operational use of the web-based eTHOS system is firstly related to the possible reduction of tax evasion incidents. Undoubtedly, eTHOS could contribute to the increase of the estimated revenues by decreasing the VAT Gap (E.C 2020). It is true that the use of this system could discourage the potential strategical tax evaders giving them the sense that each consumer is, at the same time, a potential auditor as well. Besides, citizens' attitude towards the laws is closely related with their civic duty (Andriani, 2016; Molero and Pujol, 2012; Russo, 2013) and is positively related with their tax morale (Horodnic, 2018, σελ. 877). Thus, citizens' attitude towards compliance with the laws naturally leads to their demand for compliance with the law from the other citizens as well. Furthermore, a citizen's duty is linked to his obligation to obey the law but, also, turns the citizen to a potential auditor who is aware of the social consequences of tax evasion. The use of eTHOS, could not only enhance citizens' sense of duty, but also satisfy their need for the administration of justice delivery (obviously tax justice), not as judgers, neither as tax auditors, but as citizens. If delivering justice is considered as one of modern citizens' duty (Luttmer and Singhal, 2014), through complaining against those who do not issue the appropriate receipts (since citizens pay their taxes-VAT to the state), then the use of eTHOS is the first digital tool against tax evasion available to the public. Furthermore, the intention for using this system reflects a vote of trust towards tax authorities' attempt to combat tax evasion, thus creating a relationship of trust between citizens and tax authorities. Many researchers have highlighted that the lack of citizens' trust towards the tax authorities and tax officials (Horodnic, 2018; Randlane, 2016; Kaplanoglou and Rapanos, 2015) contributes to the decrease of tax morale.

As far as the research value of the use of eTHOS from the public is concerned, the collection of real valuable data regarding the demographic characteristics of the users, in relation to their motives for using it (patriotism, tax conscience, reciprocity, retaliation, etc.), would contribute to the extraction of important conclusions about the real level of tax evasion in Greece, but also, to the development of proposals to I.A.P.R and the Ministry of Finance.

One of the innovations of the proposed system concerns the possibility to calculate the 'Ethical Indicator' (EI) of a region. The importance of this index is high, since

regions with a low credibility index (indicates high levels of tax evasion related complaints) are less attractive regions to potential investors, tourists and consumers. In this case, it is claimed that the negative tax behaviour of the businesses of a region can create an unattractive image, which can lead to the loss of important opportunities for the development of the region. Therefore, a high level of tax morale of the business people of a region may lead to a high E.I score, which, in turn, may attract new investments.

At the same time, except for the possibility of reporting tax evasion incidents, the users of eTHOS have the opportunity to reward professionals or businesses who with consistency and conscience issues the appropriate receipts according to the tax law. It must be mentioned that Russo (2013) first introduced the idea of the reward of the professionals who smoothly issue receipts (blame signala onesti).

Many researchers, such as Terpsiadou and Economides (2009), claim that tax applications (e-taxation services) should be ease of use, useful and reliable, while Sharma and Yurcik (2004) showed that taxpayers' tendency to submit their tax statement by electronic means (through the internet) depends on the ease of use, usability and safety of these means. The proposed pilot system is based on responsive HTML5 technologies and SQL relational databases, which highlight it as user-friendly system that can support huge number of requests simultaneously. Thus, users, regardless of their familiarisation with the technology, can easily meet the needs of the proposed system, which follows the rules of systems development for inexperienced users.

5 Conclusions, future directions and limitations

The introduction of ICT in the public sector is a challenge for the tax administration, as it penetrates into many aspects of the daily economic life (IAPR, 2019). It is clear that the proposed eTHOS system can contribute to both research and operational level and decrease the levels of tax evasion. Besides, until today, the reporting of tax evasion incidents (complaint) by citizens is done through the completion of a simple complaint form (a handwritten process) on the site of the tax authority (IAPR-Greece, HMRC-Great Britain, IRS -USA, ATO- Australia). On the other hand, the automation of such processes through ICT, with the utilisation of AI technologies would increase the impact of the information in various fields, such as the analysis of tax-morale.

The present study demonstrates that a usable, web-based reporting system, on the one hand, is expected to increase the collection of the estimated revenues by providing specialized information to the auditors of the Ministry of Finance and, also, enhances the level of tax morale of the general public. At the same time, eTHOS is innovative, giving users the opportunity to assess tax evasion episodes but, also, to reward the tax compliant professionals and businessman. In addition, eTHOS introduces the credibility index of a region with geospatial information. For citizens with tax conscience who find it annoying and offensive not to receive a receipt in their daily transactions, the index of (tax) credibility of a region would be a useful information for choosing holiday destination, shopping and investment. Therefore, one can easily conclude that the overall delinquent behaviour of professionals of a region can lead to a negative (positive) overall picture by driving away (attracting) tourists and investors.

A number of future additions would improve the functionality of eTHOS and give it higher added value. In particular, with respect to the GDPR, through a unique number of complaint, complainants could search for the course of their complaint (in the same way

they would search for the course of an online purchase). As far as the insert of fake information is concerned, it is planned future versions to incorporate specific machine learning techniques which will assist the system to search and identify fake records. Those data analytics techniques teach computers to do what comes naturally to humans: learn from experience. For example, repeated fake complaints in a specific business owner will be recorded and studied in terms of reporting frequency (day, time, month), in terms of product type, price and tax.

Such suspicious complaints could activate a security protocol where the complaints to a specific business owner should be made exclusively with the tax registration number (T.R.N) On the other hand, the automation of such processes through ICT, with the utilisation of AI technologies would increase the impact of the information to various fields such as the analysis of tax-morale, in the other hand, the anonymous complaints will be made through tax authorities.

The above action would prevent the world economy from corruption and bureaucracy, thus cultivating tax conscience and morale. In addition, with the appropriate addons and infrastructures, eTHOS could integrate other markets as well, beyond the Greek borders and even from the whole world. It should be understood that because no endeavour is easy, public officials must put an effort to familiarise citizens with the system providing them with instructions and (online) education, thus enhancing their perceived self-efficiency (Hsu and Chiu, 2004; O'Cass and Fenech, 2003). Furthermore, it is planned to add machine learning features for the online (client-based) data mining, as well as extended machine learning server-side data analysis algorithms to provide more accurate representations of the data and their information.

Finally, an operational limitation of eTHOS is the necessity of internet connection during the process of reporting the tax evasion incidence, which cannot be considered as an important issue, since nowadays almost all mobile devices are equipped with internet connection, and there are many free internet access points in the residential areas. The aforementioned issue is planned to be addressed with a new addons that will enable the asynchronous data (user reports) transfer to the servers.

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