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Problems and prospects of using artificial: Intelligence technology in the field of public administration of taxation: the experience of Iran

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ABSTRACT

The Islamic Republic of Iran's tax system, influenced by its historical dependence on direct oil and gas revenues, is not considered developed in terms of its administrative capacity and technological infrastructure. This long-standing dependence has reduced the need for innovation in tax revenue collection and management and as a result, digital transformation, including the use of artificial intelligence (AI) technology, has faced structural, technological, and institutional challenges. This research, using an analytical-comparative approach, examines the problems and prospects of AI application in Iran's general tax administration, especially in the key oil and gas sector. The data is extracted based on official reports, budget documents and statistical information on the performance of industrial and economic sectors. The findings show that despite the implementation of the "Comprehensive Tax System" plan and progress in digitizing processes, serious shortcomings, including the continuation of paper processes, lack of database integration, limited transparency in tax revenue allocation and the lack of indigenous AI infrastructure, have prevented the full use of technological capacities. At the same time, opportunities such as the use of AI in tracking oil production (satellite imagery and pipeline sensors), automated analysis of financial statements, budget planning based on oil price fluctuation forecasts and provision of chatbot-based tax advisory services have been identified. The paper concludes that a successful transition to a smart tax system in Iran requires the simultaneous implementation of four axes: deepening digital transformation, structurally combating corruption, developing indigenous technological capacities, and legally requiring financial transparency. These changes can create a multi-fold capacity to increase efficiency, reduce tax evasion and enhance public trust.

Introduction

The Islamic Republic of Iran faces a unique fiscal paradox: despite its vast hydrocarbon wealth, its tax system remains critically underdeveloped, overshadowed by direct revenues from oil and gas. Iran's dependence on oil has consistently been a central factor influencing its economy and political stance. This reliance, while profitable, has exposed Iran to unpredictable global oil price dynamics, economic sanctions and regional unrest. In addition, it has limited Iran's fiscal flexibility, reduced its labour potential and diminished the prospects for a diversified economy capable of sustainable growth. Iran's situation illustrates a phenomenon called primary product dependence, which is associated with economies that rely on the export of raw commodities such as oil as their primary source of income. However, as the nation pursues economic reforms to diversify its budget and enhance the role of taxation, a significant challenge emerges. Although there are sanctions from the USA for Iran, Iran sells oil and gas in limited countries like China. Most oil and gas projects are done by private companies which are doing tender. Each company gets the project with the best price for doing the project. So, paying the taxation of this project will do every year (almost 25 % of profit of the project). This taxation is accounted for by the company and they will do it with paper, not with a specific system which shows all of the details of the project. And companies can choose the taxation spend for what: cultural, educational, healthcare or for developing the city. It is significant that usually they will pay it to villagers and municipalities of regions and they will make decisions about what they want to do with this money for people in that region. Undoubtedly with existing problems in many regions and cities in Iran that they are rich from resources, it's obvious they faced the rate of unemployment and air pollution and sea pollution and lack of appropriate infrastructure in these cities. For example, most of the areas that have oil and gas resources and oil and gas companies are there, those areas receive pollution fees. Why? Because these cities are very small and bear a lot of pollution. When the municipalities of each region collect taxes from oil and gas revenues, it is expected that these regions will have solved their problems, but unfortunately it is easy to see that they do not have proper roads, most of the schools and hospitals in these areas were built by donors. If we want to look deeper, we can easily see that there are many problems from the beginning. For example, there is no accurate information about the project process and the amount of money spent on the project and the actual amount of profit earned from the profit of that project in the system, everything is written in paper and paper contracts that can be changed. And on the other hand, what is the tax that reaches the municipalities and villages used for? And why is there no accurate information about the amount of these revenues and expenses in a transparent manner. When you look at these cities and the surrounding areas, people face poverty and problems with basic living conditions and urban infrastructure. This article examines the potential of artificial intelligence (AI) to modernize Iran's public administration of taxation, particularly in harnessing revenues from its core oil and gas sector. It investigates the promising prospects of AI, from tracking production to combating fraud, while also confronting the profound difficulties that threaten its adoption, including technological isolation, infrastructural deficits, and deep-seated institutional corruption.

Souguir et al (2025) in article of Behind the Screens: Digital Transformation and Tax Policy stated this study investigates the impact of digital transformation on corporate tax avoidance in the banking industry, focusing on banks in the Middle East and North Africa (MENA). This study employs regression analysis on a sample of 123 banks in the MENA region, covering the period from 2011 to 2022. The results indicate a negative relationship between digital transformation and tax avoidance, with conventional banks showing a stronger inclination to adopt these trends compared to Islamic banks. Digital transformation is identified as an effective mechanism that enhances transparency and mitigates tax avoidance activities (1).

Adelekan et al (2024) in article of evolving tax compliance in the digital era: a comparative analysis of ai-driven models and blockchain technology in u.s. tax administration stated this paper

highlights the potential benefits of these technologies in increasing efficiency, accuracy, and transparency in tax administration, aligned with the U.S. government's goals of ensuring fiscal integrity and public trust. The study is structured around four key objectives: to assess the current integration of AI and blockchain in tax administration, to assess their effectiveness in increasing tax compliance, to identify implementation challenges, and to develop strategic recommendations. Using a comprehensive literature review approach, the study combines findings from various sources to provide a deep understanding of the role and impact of these technologies in modern tax systems. The results show that AI and blockchain significantly improve tax compliance and administrative efficiency, but also raise challenges such as data privacy concerns and the need for robust regulatory frameworks. In conclusion, the study emphasizes the transformative potential of AI and blockchain in tax administration and recommends continued research and development, along with education and stakeholder engagement. These efforts are crucial to overcoming operational challenges and fully exploiting the benefits of these technologies in modernizing tax systems. The paper concludes with strategic recommendations for policymakers, tax authorities and researchers, emphasizing the importance of a balanced approach that fosters technological innovation while maintaining compliance and adherence to fundamental principles (2).

Gekhaeva et al (2023) in article of Global Digital Transformation Trends: Financial-Economic Sector stated new fintech companies have emerged both within large banking ecosystems and as stand-alone start-ups providing financial services on their own. The digital transformation of the financial sector is based on the integration of distributed ledger systems, cloud technologies, big data analysis and AI. As a result of the use of digital technologies, new business models are being built. For example, the Open Banking system, which is based on API (Application Programming Interface) technologies and is designed to exchange information necessary for the development of financial products and services, has become widespread. Such a system allows non-financial organizations to offer financial products and services personalized to the needs of a particular client (3).

There are two theoretical arguments about the benefits and costs of digital transformation. According to information processing theory (4), banks can increasingly use advanced technologies to reduce their tax burden and identify tax reduction opportunities. This can increase tax avoidance, especially when banks face a strict tax environment (5 & 6). On the other hand, according to agency theory (7), implementing advanced strategies can enable banks to increase their information transparency and thereby improve their internal control systems and corporate governance (8) and reduce agency costs. In this sense, banks that are committed to digital transformation are less likely to engage in tax avoidance practices (9).

In recent decades, the digitalization of tax systems around the world has accelerated. Many countries, including South Korea, Russia and Australia have been able to reduce tax evasion and significantly improve the efficiency of their tax collection systems by using artificial intelligence technologies. These achievements have provided a valuable model for countries like Iran that are looking for new solutions to strengthen sustainable revenues.

Iran's taxation system has specifics determined by geographical, economic and political factors. It consists in the insignificance of tax revenues compared to direct revenues from oil and gas. In the context of the ongoing economic reforms in Iran aimed at increasing the importance of tax revenues in the country's budget, it is important to continue searching for tools to ensure the possibility of increasing tax revenues from the oil and gas industry.

A review of scientific sources and official documents shows that no comprehensive study has been published that simultaneously addresses the two topics of "tax revenues of the oil and gas industry" and "application of artificial intelligence in the general tax management of Iran." This research gap justifies the necessity of conducting the present study.

In this regard, the problem of efficient use of tax revenues, including oil and gas, through the

use of digital tools in general and artificial intelligence in particular, is becoming relevant for the Iranian tax system.

The purpose of this article is to analyze the barriers and opportunities for applying artificial intelligence technology in Iran's public tax administration, especially in the oil and gas sector, and to present a proposed framework for its successful implementation. The main questions are: (1) what are the most important institutional, technological and structural barriers? (2) What opportunities can pave the way for the effective use of AI in Iran's tax system? The structure of the article is as follows: the first section reviews the literature and global experiences; the second section examines the current status and challenges of Iran's tax system; the third section presents perspectives and implementation suggestions.

The prospects for introducing artificial intelligence technology into the work of Iran's tax and other government agencies are:

- Oil production tracking (satellite imagery, pipeline sensors, and sales data to identify questionable transactions);
- Prevention and suppression of tax offenses through the "machine" analysis of accounting statements;
- Budget planning through automatic analysis of oil price changes;
- "feedback" with the public to ensure the publicity of spending

Tax revenues from oil and gas;

- Implementation of chatbots for tax consulting, assistance in filling

Out tax reports and documentation.

The most obvious difficulties of introducing artificial intelligence technology in the field of taxation in Iran are:

- Political and economic isolation of Iran;
- Technological unavailability. The first preparatory step for the introduction of artificial intelligence should be the organization of electronic document management and the work of the Iranian National Tax Administration with big data. Today, the functioning of Iran's tax authorities is based primarily on paper document management;

Also in our opinion, the issues of corruption in the Iranian tax authorities deserve a separate study which are fundamentally important in the search for criteria for the effectiveness of using digital instruments of Iranian taxation.

1-1. Statement of the Problem

The Iranian taxation system operates within a unique and challenging context defined by its heavy historical reliance on direct hydrocarbon revenues, which has traditionally diminished the strategic importance of tax collection. However, in the face of ongoing economic reforms and international pressure, the Iranian government is actively seeking to increase the share of tax revenues in the national budget, particularly from the lucrative yet complex oil and gas sector. This strategic shift unveils a core problem: the existing administrative and technological infrastructure of Iran's tax authorities is fundamentally ill-equipped to efficiently maximize, track and manage tax revenues, especially from the oil and gas industry. This overarching problem manifests through several critical, interconnected challenges:

1. Structural Reliance on Hydrocarbons: The primary problem is a systemic one. The nation's fiscal architecture has long been built on oil and gas income, making the tax system a secondary, underdeveloped revenue stream. This legacy has resulted in a lack of investment, innovation, and political will to modernize tax administration. To understand better, I will explain an example: The Iranian National Tax Administration (INTA) proposes a $100 million project to create a modern, digital system for tracking corporate taxes. They argue it will increase revenue by $500 million

over five years. So why bother? The government's likely response: "That's a good return. However, this month alone, our oil exports brought in $5 billion. The $100 million is better spent on other immediate needs, and the potential $500 million in tax revenue, while nice, is not urgent for our survival." However, the project gets shelved. In conclusion: The tax administration remains outdated because the opportunity cost of modernizing it seems too high compared to the effortless revenue from oil. On the other hand, in a country without oil, like Germany or South Korea, the government must innovate to find every dollar of tax revenue to fund schools, roads and hospitals. They are forced to develop advanced tools like AI to detect fraud and improve efficiency. The "tax collection muscle" is exercised constantly and becomes strong. But, In Iran: The need to exercise that muscle was never there. The oil wealth paid for everything. Therefore, the skills, processes, and technologies for efficient tax collection never developed. The system atrophied. Moving from paper files to a simple database is a huge leap, let alone implementing AI. In The part of the problem of political will, implementing a strong and transparent tax system means that powerful corporations and wealthy individuals must pay their debts. This creates political opposition. In a country that relies on taxes, the government has a strong incentive to fight this battle because it needs the money. But when we look at Iran: For decades, the government could have avoided these difficult political battles. It could have used oil money to subsidize food, fuel, and services for the people, buying them political peace without having to collect taxes from them or confront powerful elites. There was no pressing need to create a strong, independent tax authority that could challenge these groups.

2. Obsolescence of technology and information deficits: a look at the weaknesses and shortcomings of the country's tax system shows that the transformation of the tax system has always been a very important issue for public and private sector activists. The need to implement this transformation in the country's top documents and programs has also been considered many times, so that from the third to the sixth development plan, the importance and necessity of implementing this plan has been emphasized. In the year of the 2019 comprehensive tax system plan, it was shown that the Comprehensive Tax System Plan of the country is undoubtedly one of the National Super projects and at the same time one of the largest ICT-based projects in the history of the country which according to the project managers plays a fundamental role in achieving the goals of the resilient economy and reducing the reliance of government revenues on the sale of national capital. A plan that, as it progresses, faces serious challenges and the need for the cooperation of several institutions to implement and fully realize it. The outputs of this master plan are very diverse, and from facilitating and accelerating the process of reaching the taxpayer case, eliminating the communication of tax agents with the taxpayer, fighting corruption, creating transparency and so on ... To achieve Tax Justice, increase national income and identify tax evaders and prevent money laundering and so on ..... It includes. With this introduction, serious opposition can be found in the establishment of a database of tax information and the implementation of a comprehensive tax system.

The history and development of Iran's Comprehensive Tax Information Plan. Initial studies began in the 1990s, with a legal mandate established in 2000. Progress stalled until 2004, when the government commissioned the Canadian firm Deloitte to conduct studies due to a lack of domestic expertise.

This led to a master plan consisting of 37 projects organized into 5 main axes. The core of the plan is the implementation of four major integrated systems:

Taxpayer Database: A central database containing over 1.347 billion data records linked to taxpayer files. This has significantly reduced paperwork and helped identify 2 million taxpayers previously unknown to the system and 22,000 cases of tax evasion through data sharing with 22 other ministries and banks.

Electronic Tax Services System: A fully electronic system for registration, filing returns (4.5

million e-filed last year), payments, and complaints. Plans to add mobile services are underway.

Internal Process Management System: A system intended to electronicize all internal organizational processes and external communications with taxpayers.

Risk Management System: An electronic, risk-based system for selecting taxpayers for audit and verifying their declared tax information.

In essence, the plan represents a large-scale digital transformation of Iran's tax administration, moving from paper-based to a fully electronic, integrated and data-driven system.

The question arises as to whether it is clear what impact this software system has had on tax revenues when it has been implemented in a limited manner?

The implementation of the tax plan (even if incomplete) has led to significant results most notably that since 2015, Iran's tax revenues have surpassed its oil revenues for the first time in history.

Key achievements of the plan include:

- Identifying approximately 700,000 previously unknown taxpayers who had no tax files.
- Uncovering 6,248 entities fraudulently using others' commercial cards; only 1,350 were legitimate cardholders, resulting in 5,000 billion tomans in collected taxes and fines.
- Detecting over 3,000 fake "paper companies", mostly established before 2008.
- Discovering major cases of tax evasion, including seven companies with 76 billion tomans in evasion from car imports and 3,049 individuals identified via bank accounts, from whom 6,300 billion tomans was demanded.
- Collecting 3,300 billion tomans in taxes from individuals who had never paid before and 990 billion tomans from just 77 people.

In total, over 1.34 billion tax records have been registered in the system, which are now actively being used.

While the Iran National Tax Administration (INTA) does not regularly publish exact figures, the shift to digital filing is considered overwhelmingly complete. Based on government mandates, official statements targeting over 90% digital compliance and analysis from international bodies like the IMF, it is estimated that well over 90% of tax returns, particularly from the formal sector, are filed electronically (INTA, 2021; IMF Country Report, 2023). The remaining paper-based filings are likely concentrated within the smallest segments of the informal economy.

3. Inefficiency and Revenue Leakage in Key Sectors: There is a specific problem of inefficiency and potential non-compliance within the high-value oil and gas sector. The current system lacks the sophisticated tools needed to accurately track production, monitor transactions, and audit complex corporate structures, leading to substantial risks of tax evasion and under-reporting.

4. The Corruption and Governance Challenge: An entrenched institutional problem is the issue of corruption within the tax authorities themselves. This creates a dual obstacle: it directly facilitates revenue leakage and also erodes the trust necessary for public and political buy-in for new technologies. The effectiveness of any digital tool, including AI, is contingent on a governance structure that seeks to be transparent and accountable.

5. Geopolitical and Isolation Constraints: An external problem is Iran's political and economic isolation, which creates barriers to accessing cutting-edge international technology, software, and expertise. This isolation exacerbates the technological gap and limits opportunities for knowledge transfer and collaboration. Therefore, the central research problem is to investigate how Iran can overcome these profound structural, technological, and institutional barriers to harness AI technology effectively. The study seeks to understand whether AI can be a viable tool for transforming Iran's tax administration—enhancing revenue collection from the oil and gas sector, improving transparency, and combating corruption—despite the unique and significant challenges it faces. The prospects of AI (e.g., for tracking, forecasting and citizen engagement) are clear, but the path to their realization is fraught with problems that are specific to the Iranian context.

1-2. Literature Review

1-2-1. The global trend of tax system digitization and artificial intelligence

Over the past two decades, the digital transformation of the world's tax systems has accelerated. Countries such as Australia, South Korea and Russia have used AI algorithms and integrated data systems to increase financial transparency, reduce vulnerability to corruption and significantly increase tax revenues. Among them, the use of AI in identifying tax evasion patterns, analyzing revenue forecasts and even assessing taxpayer risk has yielded very notable results (2).

1-2-2. The experience of oil-dependent countries in using AI in taxation

Some countries with a similar structure to Iran, dependent on oil revenues, have taken serious steps towards digitalizing the tax system. For example, Saudi Arabia launched the "Fatura" system in 2021, enabling online registration, tracking, and analysis of commercial transactions. The United Arab Emirates has also made tax revenue forecasts more accurate by integrating customs and banking data. These experiences show that even oil-dependent economies need to diversify revenues and reduce dependence on raw materials by improving the efficiency of the tax system (10).

1-3. Research gap in Iran

Despite Iran's efforts to implement the "Comprehensive Tax System" project, evidence shows that the use of new technologies such as artificial intelligence is still very limited. Even after the launch of this system, most processes continue to be based on unstructured data and paper-based interactions. Also, the lack of specialized skills in tax data mining and the absence of a clear policy framework for the use of AI have caused its potential capacities to remain practically unused. (11)

1-4. Digitalization of Tax Administration: Best-Practice Framework for Improving E-Services to Taxpayers

According to a report by the Inter-American Development Bank and the Center for Global Tax Policy at the Vienna University of Economics and Business, the digitization of tax administrations in Latin America and the Caribbean has enormous and untapped potential to improve taxpayer services. The report assesses the current level of digitization, examines the necessary legal frameworks, and identifies areas for improvement, providing a framework based on best tax administration practices and principles of good governance. The model proposed in the report for improving e-services for taxpayers highlights the differences in countries' levels of digital development:

- Less digitally advanced countries should first provide the infrastructure to connect taxpayers to the Internet and begin the process of digitizing tax documents (such as tax returns and supporting documents). These basic steps are a prerequisite for entering more complex stages of digitization.
- More digitally advanced countries should move towards automated tax filing and strengthen data sharing between government agencies to increase both transparency and efficiency.
- The framework suggests that in all countries, improving digital services for taxpayers can lead to improved tax compliance, increased public trust, and improved tax governance. Segmenting actions according to the level of digital maturity will avoid wasting resources and make the transition to smart taxation more feasible. (12).

1. Methodology

The methodology of this research is analytical-applied and aims to assess the capacities and challenges of applying artificial intelligence technology in tax management in the Iranian oil and gas sector. The research approach is mixed and simultaneously uses quantitative analysis of

financial and tax data (including income and tax tables of petrochemical companies in 1401 and budget information) and qualitative analysis in the institutional context and policy-making of the country. The spatial data includes three comprehensive maps of oil and gas transmission lines and facilities, whose coordinates (UTM) were extracted with Google Earth Pro software and layered and classified in AutoCAD and GIS environments. Then, this data was merged with the financial information of each project (implementation cost, percentage of progress, potential income, and taxes) and used as input to change detection algorithms and machine learning-based income forecasting models.

The analysis process consisted of five main steps: first collecting and organizing data, then layering and integrating financial and spatial information, running AI-based analytics (to measure physical progress and estimate taxable revenue), calculating the gap between potential and realized revenue and finally visualizing the results in the form of a management dashboard. This dashboard allows senior managers and decision-makers to view the status of projects, make periodic comparisons and assess tax revenue capacity. Research limitations include the lack of access to complete tax data, technological limitations due to sanctions, and the lack of a standard procedure for integrating financial and spatial data across government agencies.

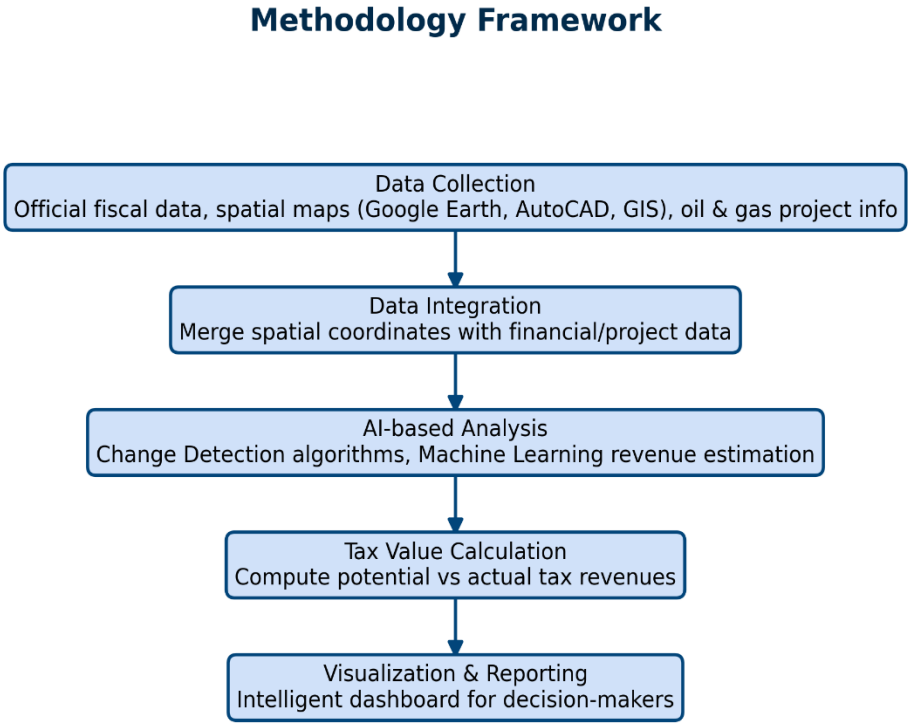

Figure 1. Methodological framework

2. Finding

A review of the financial data of petrochemical companies in 1401 shows that the total tax paid by this sector amounted to 11,000 billion tomans. An analysis of each company's relative share of the total tax paid indicates a high concentration in a few large units. Persian Gulf Holding Company with a tax payment of 1,409 billion tomans, occupies the first place, accounting for 31.1 percent of the total tax paid by the petrochemical industry. After that, Bu Ali, Pars, Shabandar and

several other large petrochemical companies have recorded the largest share.

Comparing the percentage of tax paid with net profit and income shows that some companies, despite significant income and profit, have a small share in the tax paid or have not paid any tax in the year under review. This indicates the existence of significant differences in the system for calculating the tax base or benefiting from special exemptions.

The results obtained which are presented in the attached table and chart, provide clear evidence of inequality in the distribution of the tax burden among petrochemical units and highlight the need to review the tax policies of this sector.

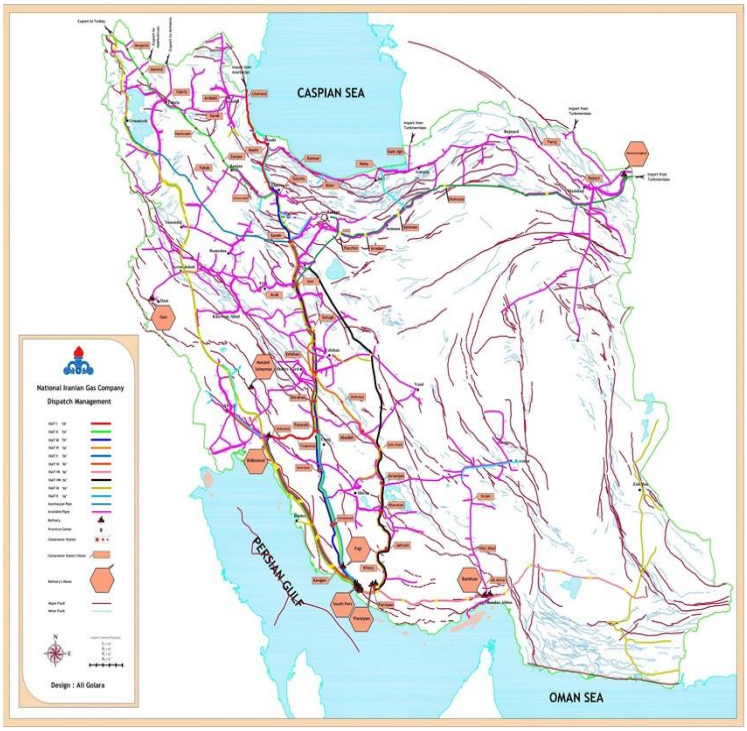

Figure 2. Iran's National Gas Pipeline Network and Dispatching Management

This map shows the main Iranian gas transmission network, managed by the National Iranian Gas Company (NIGC). The map includes the main pipelines (IGAT I-XII), regional distribution lines, booster stations, metering stations and import/export connection points. Strategic nodes such as South Pars, Assaluyeh, and border links with Turkey and Turkmenistan are highlighted, indicating the main infrastructure supporting the country's energy supply and industrial activities, including the petrochemical sector.

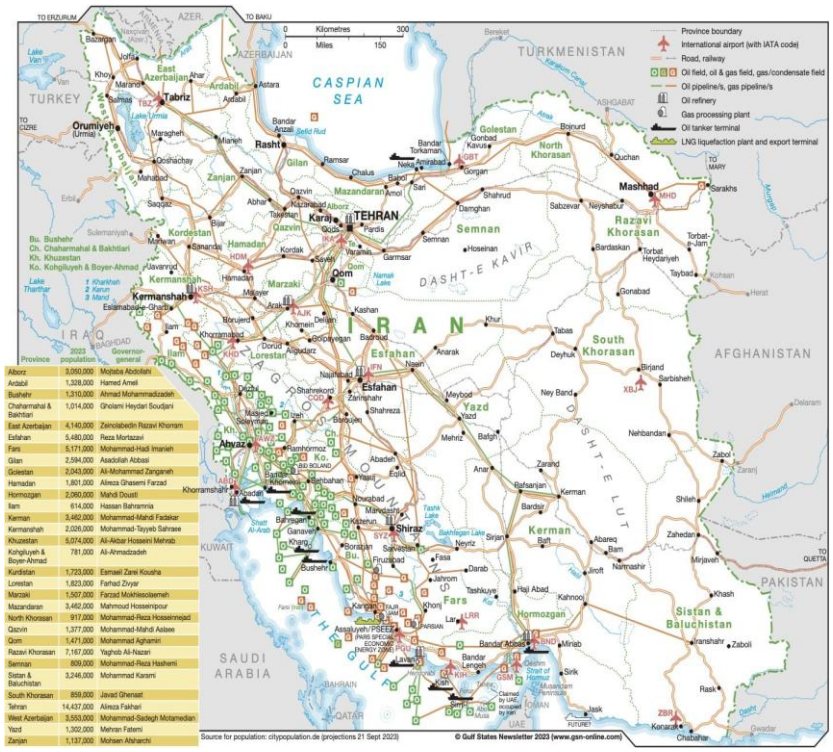

Figure 2. Oil and Gas Resources, Processing Facilities and Transport Infrastructure in Iran

This map shows the spatial distribution of Iran's oil fields, gas fields and gas/condensate fields alongside associated infrastructure. Key features include oil and gas pipelines, gas processing plants, oil refineries, LNG liquefaction plants, and export/import terminals. The overlay of road and railway networks highlights connectivity between energy production sites and domestic as well as international markets. Provincial boundaries and major cities are marked, providing context for the geographic integration of Iran's hydrocarbon resources with its national transportation system.

Figure 3. Oil and Gas Infrastructure of Iran with Provincial Population Data and Nuclear-Related Sites

This map presents Iran's oil and gas resource locations, pipelines, and processing facilities,

integrated with provincial population figures and selected nuclear-related sites. Energy infrastructure elements include oil and gas fields, gas/condensate fields, oil refineries, gas processing plants, and LNG terminals, interconnected by road and railway networks. Population data for each province highlights the human resource distribution relevant to industrial development and energy sector activities. Insets detail nuclear-related facilities such as enrichment plants, research centers, and nuclear power plants, adding a strategic dimension to the map's economic and geographic context.

Table 1. Summary of research findings on the problems and prospects of applying artificial intelligence technology in Iran's public tax administration

Area of Finding	Explanation	Quantitative data/evidence	Analytical point
Growth of Total National Tax Revenues	Increase in total tax revenues in the 1401 budget law compared to 1400	From 526.7 to 532.1 trillion Tomans (66% growth compared to 1402 performance)	The potential for revenue growth exists, but it is unevenly distributed across sectors.
Tax on Imports	Highest growth rate among tax items	387% growth compared to the previous year (from 17 to 79.6 trillion Tomans)	The focus on imports as a temporary and volatile source of revenue is not sustainable.
Value Added Tax (VAT)	Distribution of VAT revenue between the government, municipalities and the health sector	Total collection of 2866 trillion Rials in 11 months of 1402, of which 1206 trillion Rials were allocated to municipalities and villages	There is potential to make consumption transparent and create a tangible link between taxes and public services with the help of AI tools.
Implementation of Comprehensive Tax Plan	Creation of a centralized database with 1.34 billion records	Identified 700,000 new taxpayers, discovered 6,248 cases of misuse of commercial cards, identified 3,049 individuals with suspicious bank accounts	This digital transformation is an important part of the infrastructure necessary for the application of AI, but it is not fully covered.
Petrochemical and Oil and Gas Sector	High revenue share and high risk of tax evasion	Some companies with a share of more than 30% of this sector's taxes; map colors indicate geographical dispersion and payment levels	The lack of advanced production and transaction monitoring tools is a good opportunity to use AI to detect violations and optimize collection.
Key Challenges of AI Implementation	Political, technological and institutional obstacles	Structural dependence on oil revenue, organizational corruption, sanctions, lack of skills and modern technology	Although the capabilities of AI (production tracking, risk analysis, revenue forecasting and interaction with people) are obvious, the path to implementation faces numerous obstacles.

This table combines quantitative data (tax statistics for 2021 and 2022, VAT report and results of the comprehensive tax plan) and qualitative analyses derived from a survey of key sectors of the Iranian economy, particularly the oil, gas, and petrochemical industries. The rows indicate the main areas of findings, including income changes, gaps and opportunities, infrastructure improvements, and barriers to implementing new technologies such as artificial intelligence in the Iranian tax system.

Table 2. Comparison before and after the implementation of the comprehensive tax plan in Iran

Indicator	Before the implementation of the comprehensive tax plan	After the implementation of the comprehensive tax plan	Change/Impact	Connecting with AI

Number of unidentified taxpayers	High (estimated hundreds of thousands)	Significant reduction (identification of 700 thousand new taxpayers)	Identifying hidden taxpayers	AI can make detection faster and more accurate
Method of recording and archiving information	Paper-based, decentralized	Centralized database with 1.34 billion records	Digitalization and data integration	AI requires clean, structured data
Discovering tax evasion	Relying on manual and limited reporting	Discovery of 6,248 commercial card abuses, 3,049 suspicious bank accounts	Targeted data-driven discovery	AI can create fraud detection algorithms
Tax share of the budget	Second priority after oil	Overtaking oil revenue in years	Increasing revenue diversification	AI can predict and monitor revenue
Level of transparency and public trust	Low, lack of public access to details	Relaxation with electronic systems	Improving transparency	AI and intelligent dashboards can enhance public reporting

This table shows key developments in Iran's tax system before and after the implementation of the comprehensive tax plan. Indicators include identifying new taxpayers, digitizing processes, detecting tax evasion, changing the tax share in the budget and improving transparency. The "Connecting with AI" column explains how each infrastructure change can pave the way for the use of AI technologies, from fraud detection algorithms to predictive systems and smart reporting dashboards that can improve the efficiency, transparency and speed of tax collection.

Table 3. Share and geographical location of petrochemical companies in taxes in 2022

Petrochemical Company Name	Province / city of activity	Share of total petrochemical sector taxes (%)	Amount of tax paid (billion Tomans)	Payment level (based on map color code)
Fars	Bushehr (Asaluyeh)	18.4	1409	Deep red
Shabandar	Khuzestan (Bandar Imam)	10.6	813	Dirty red
Buali	Khuzestan (Mahshahr)	9.9	756	Orange
Pars	Bushehr (Asaluyeh)	8.9	679	Orange
Shapdis	Khuzestan (Mahshahr)	8.7	663	Orange

The present table shows the share and geographical location of the five largest Iranian petrochemical companies based on the amount of tax paid in 1401. The financial data is extracted from the official tax report and includes annual income, the amount of tax paid, and each company's share of the total tax in the petrochemical sector. The geographical location of the companies is determined based on the province and city of operation. The color scheme of the payment level is based on the codes used in the tax map; such that the color bold red indicates very high tax payments (more than 1000 billion tomans) and the color orange indicates high payments (500 to 1000 billion tomans). As an example of the link between financial indicators, spatial information and artificial intelligence tools, this data provides the ability to analyze geographic patterns of tax payments and identify concentration points or revenue gaps in the petrochemical sector.

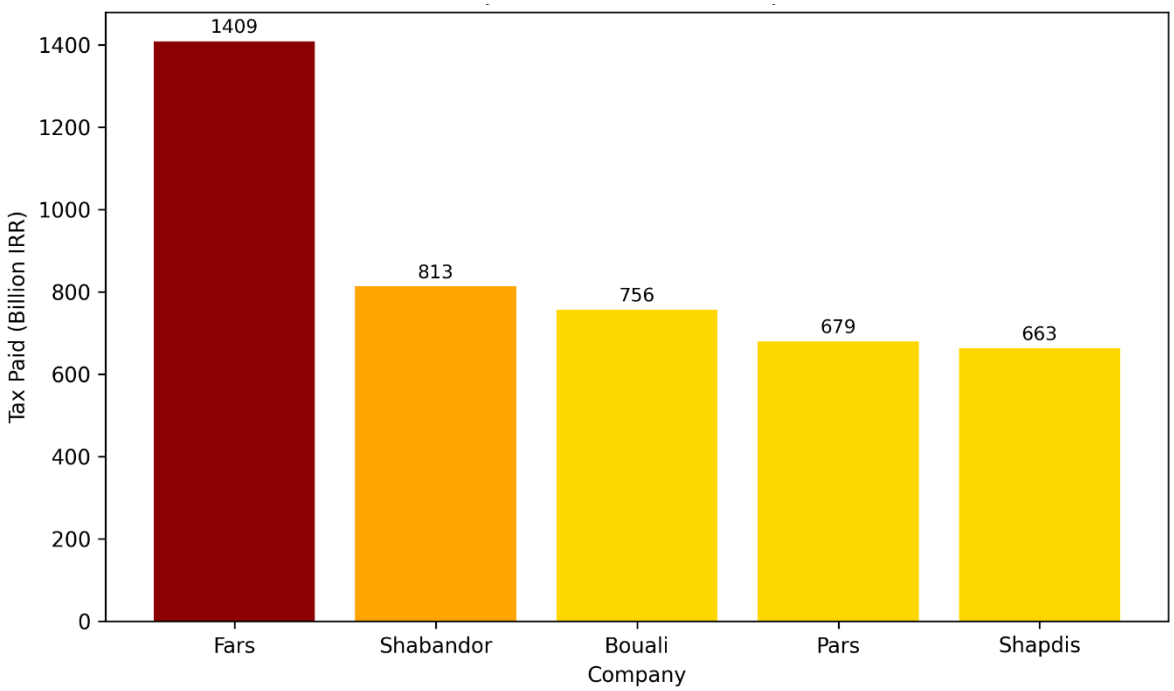

Figure 4. Top Petrochemical Companies by Tax Payments – Fiscal Year 2022

This bar chart shows the tax share of Iran's top petrochemical companies for fiscal year 2022. The data is based on official financial records and is expressed in billions of Tomans. The chart highlights the concentration of tax payments among a small number of high-earning companies and underscores the need for greater attention to AI-based policies and oversight in this sector.

The analysis of the results of this study shows that the structure of tax payments in the Iranian petrochemical sector is accompanied by a significant concentration on a few large companies. On the one hand, this concentration is considered an advantage for monitoring and intelligentizing tax processes, because the bulk of revenue and tax data is obtained from specific and stable units and can facilitate modeling and training machine learning models. On the other hand, such patterns carry the risk of over-reliance on a small number of economic units and may leave blind spots in tax monitoring and assessment.

The study of spatial layers shows that the geographical distribution of petrochemical companies and the amount of tax they pay is directly related to the country's oil and gas infrastructure clusters. Bushehr and Khuzestan provinces, especially in the Assaluyeh and Mahshahr regions, have allocated the largest share of taxes in this sector, which is a reflection of the concentration of energy production, processing, and transportation infrastructure in these areas. These results highlight the importance of using spatial analytics and GIS systems in combination with financial data for the optimal and targeted management of tax resources.

From a policy perspective, the findings of this study can serve as a basis for reviewing the system of tax incentives and exemptions, improving mechanisms for detecting and preventing tax evasion, and developing smart monitoring systems in the country's industrial and revenue centers. Also, due to the shortcomings in the coverage and harmonization of financial and spatial data, the need to complete digital infrastructure and promote data exchange between government institutions and the private sector is essential as one of the prerequisites for the success of artificial intelligence in this area.

3. Discussion

Taxation is an important tool for governments to achieve macro-economic and social goals. By redistributing income in society, taxation has made it possible to establish economic and social justice and provides a tool for development (13). On the other hand, tax evasion reduces government revenue, promotes the underground economy, reduces the government's ability to guide the economy, and prevents development and welfare programs from succeeding (14); therefore, tax systems in all countries are continuously working to develop their capabilities, identify tax sources, calculate and collect taxes correctly, combat the underground economy, and prevent tax evasion. Based on the recommendations of international institutions, using information technology to collect financial information from economic actors and interact with them, calculate and collect taxes, is one of the key tools of tax systems in this direction; for example, OECD (15 & 16). In Iran, in order to combat tax evasion and reduce tax collection costs, fundamental changes were made to the tax system in the form of a comprehensive tax transformation plan in the implementation of the Third Development Plan. Initial studies were conducted between 2005 and 2009 and its implementation began in 2010. The focus of the changes is the creation of integrated tax software and databases. In such a way that all interactions and information exchange between the tax organization and the beneficiaries of the systems are carried out (17). Over the past ten years, with the electronicization of some tax processes (such as receiving tax returns and registering taxpayers), part of this plan has been implemented and part (including completing databases) is still under implementation (18).

In Iran, the implementation of the comprehensive tax reform plan led to the electronic implementation of some processes and services, including the registration and identification of new taxpayers, the electronic receipt of tax returns, and some audit processes. The findings of this study showed that the implementation of this plan, even in its current incomplete form, has led to the identification of hundreds of thousands of new taxpayers, the discovery of shell companies, and significant cases of tax evasion. These results indicate the high potential for using technological tools such as artificial intelligence to complete the remaining loops of the plan, increase the accuracy and speed of detecting violations and increase the share of taxes in the national budget.

A review of tax data for 1401 in the petrochemical sector, which accounts for a significant share of the country's tax revenues, showed that the bulk of the industry's tax burden is concentrated on the shoulders of a limited number of large companies. While this concentration creates an advantage in collecting accurate data, it also carries the risk of over-reliance on a few limited sources. Geographical analysis of the location of these companies showed that a large portion of petrochemical tax revenue belongs to provinces with energy infrastructure and access to export routes, which reinforces the need to use AI-based spatial models to monitor payment patterns and identify tax gaps or pressures. From a policy perspective, the findings indicate that the use of AI can strengthen the country’s tax system in three dimensions:

1. Increasing transparency and preventing corruption through the analysis of financial and banking big data and their connection with registration and commercial information.

2. Improving revenue forecasting and budget planning, especially in strategic industries such as oil and gas and petrochemicals, where global price fluctuations and production changes can have a significant impact on the budget.

3. More precise targeting of support or regulatory policies through spatial-tax analysis and identifying regions or sectors that are unbalanced in terms of revenue or regulation.

However, barriers such as limited access to advanced technologies, a shortage of skilled tax data mining personnel and institutional resistance to structural change remain serious challenges to the full implementation of this vision. Overcoming these barriers will require political will, targeted investment in digital infrastructure and enhanced international engagement for knowledge

and technology transfer.

4. Conclusion

The findings of this study showed that the implementation of the comprehensive tax plan, although not fully implemented, has been able to play a role in identifying new taxpayers, reducing face-to-face interactions, and discovering important cases of tax evasion. A case study of the petrochemical sector in 1401 also indicates that a small segment of companies provides a major share of tax revenues, which is both an opportunity and a threat to the tax system.

With the ability to process big data, analyze spatial-financial patterns, and predict trends, artificial intelligence can become one of the most effective tools to complete the remaining loops of tax digitization, promote transparency, and improve tax collection efficiency in Iran. However, obstacles such as historical dependence on oil revenues, lack of technological infrastructure, limited access to new technologies due to sanctions and organizational resistance have made the path to full realization of these capacities difficult.

To overcome these challenges, a combination of smart IT policies, training and recruiting skilled manpower and reviewing legal and regulatory frameworks seems essential. Drawing on international experiences, especially from countries that have been successful in transitioning to a digital tax system, can make Iran's policymaking path shorter and more efficient.

Ultimately, transitioning to an efficient and transparent tax system based on artificial intelligence is not merely an economic necessity, but a strategic imperative to increase fiscal justice, reduce dependence on oil and achieve sustainable development in Iran.

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