# Data-Driven Detection of Tax Evasion: Integrating AI, Machine Learning, and Analytics for Improved Compliance

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## Abstract

This study examines advanced tech to detect and prevent tax evasion in Jordan. It focuses on Artificial Intelligence (AI), Machine Learning (ML), and Big Data Analytics. Jordan faces significant challenges in tax compliance. It has a complex tax system and widespread evasion tactics. The research aims to assess the adoption of tech in Jordanian auditing firms. It will also evaluate its effectiveness in fighting tax evasion. A quantitative research method was used. It surveyed 200 auditors from 10 firms. The goal was to assess their views on tech adoption and its effect on tax fraud detection. The results show that AI and ML improve irregularity detection. However, Big Data Analytics has low adoption. Institutional pressure and firm size were identified as critical factors influencing technology adoption. The study concludes that Jordan must invest in three areas. It needs to improve its tax compliance framework. First, it should upgrade its tech infrastructure. Second, it should train auditors. Third, it should cooperate with tax authorities.

**Keywords:** Tax Evasion Detection, Artificial Intelligence in Auditing, Machine Learning for Tax Compliance, Big Data Analytics in Taxation, Technology Adoption in Auditing.

Tax evasion undermines the integrity of the tax system, public confidence in governmental institutions, and the capability of governments to fund essential public services (Nimer et al., 2022). This is one of the most worrying constraints both developed and developing economies face. This is a global issue because billions of dollars of government revenue are lost yearly due to tax evasion, which depletes various infrastructure development projects and health, education, and social welfare structures. According to Cobham and Janský (2018)the report, tax evasion is responsible for denying governments more than US$500 billion in revenue each year worldwide, and it is disproportionately taken from developing countries that need all the economic resources they have. In this context, tax evasion has become necessary because of its potential for financial stability and growth.

This makes tax evasion in Jordan a significant challenge for fiscal stability and economic enterprise development. In Jordan, where natural resources are scarce, the government relies on taxes as a key revenue source. Unlike neighboring countries, which have benefited from oil and gas exports, Jordan relies on income taxation to facilitate funding for public services and reduce external debt levels (Malkawi & Haloush, 2008). Despite repeated reforms, Jordan's tax regime is complex; its citizens mostly perceive it as burdensome and

unfair. Furthermore, this perception, together with high unemployment and poorly developed tax enforcement mechanisms, has contributed to widespread tax evasion cases, assessed as a loss of JD 1.5 billion annually (Hani, 2021).

Technological changes have allowed governments and auditing firms to improve tax compliance and reduce evasion. Digital tax administration systems, AI, ML, and big data analytics are promising in revolutionizing the collection process by taking detective work on irregularities, automating audits, and increasing overall transparency in financial transactions to the next level (Raikov, 2021). Therefore, tax evasion has led government authorities in different countries to mobilize such technologies to strengthen tax enforcement. To emphasize, AI/ML models can quickly process large datasets to identify suspicious behavior patterns by cross-matching financial records with tax filings in search of discrepancies that could indicate fraud (Anifa et al., 2022).

Jordan is at the implementation stage, as most auditing firms have depended on traditional methods of recognizing tax evasion up until now. However, with increasingly complex financial transactions and sophisticated approaches to tax evasion, demand for advanced technological solutions is increasing. Although some literature exists on tax evasion and governance, only some studies have investigated how technology can surmount evasion in Jordan. This study attempts to address this loophole by examining the effectiveness of modern technologies such as AI, ML, and big data analytics in detecting and preventing tax evasion in Jordan, particularly auditing.

Tax evasion has persisted and remains rampant in Jordan, seriously shrinking the government's ability to achieve fiscal targets and deliver services adequately. Despite numerous legislative reforms to improve tax compliance, large-scale tax evasion has been a persistent problem in Jordan. Traditional methods by audit firms for detecting and deterring tax evasion usually need to be stronger in unearthing the extended sophisticated methods developed by tax evaders over time. In addition to the limited application of advanced technologies, the complexity of Jordanian tax systems has hindered auditors from tracking and following them to comply with due diligence.

This study aims to provide a detailed solution to this problem and to search for evidence of how technology can be used to enhance the capacity of Jordanian auditing firms to detect and deter tax evasion. This study provides a detailed analysis of the degree of adoption of AI, ML, and data analytics in auditing practices. The effectiveness of these tools in dealing with tax fraud is also tested. Furthermore, this study demographically and organizationally presents the factors that may influence technology adoption within auditing practices.

Research Objectives

This study aims to:

1. The current state of technology adoption among Jordanian auditing firms is due to the detection and prevention of tax evasion.
2. Assess the effectiveness of AI, ML, and big data analytics in selecting fraud and tax anomalies.
3. Firm size, auditor experience, and organizational culture can influence technology adoption in the auditing sector.
4. We provide recommendations on how technology can further improve tax compliance and reverse the tax evasion trend in Jordan.

Research Questions

1. What is the current level of technology adoption among Jordanian auditing firms regarding tax evasion detection and prevention?
2. How effective do auditing practitioners consider AI, ML, and big data analytics to filter out and prevent tax fraud?
3. To what extent do demographic variables, such as firm size, auditor experience, and organizational culture, require a significant difference in technology adoption?
4. What strategies can enhance the effectiveness of technology for combating tax evasion in Jordan?

This study is significant, given that it may add to the constant effort towards improving tax compliance and reducing tax evasion in Jordan. Jordan is a developing country with a high dependence on tax revenues; economic stability is directly related to a country's capability to collect and minimize evasion. Empirical evidence on the role of technology in tax administration is of immense value to policymakers, tax authorities who plan to improve their tax compliance frameworks, and auditing firms. This study also addresses a critical gap in the literature by focusing on Jordan, where the importance of linking technology and tax compliance still needs to be improved.

The findings also have practical implications for auditing firms in Jordan, especially regarding how advanced technologies can facilitate their operations and better monitor tax compliance. Applying AI, ML, and data analytics to their operations will increase their capacity to track fraud activities, reduce human labor participation, and develop a fairer and more transparent tax system.

## Literature Review

### 2.1. Tax Evasion: A Global Perspective

Tax evasion is a crucial issue for both developed and developing economies. This denies governments much of the much-needed revenue required to finance public goods, reduce economic inequality, and improve social welfare. According to Banerjee et al. (2023), tax evasion is a violation of a nation's fiscal responsibilities and the principles of equity and efficiency in encompassing tax collections. In addition, tax evasion misallocates resources because the burden on compliant taxpayers typically replaces the loss in revenue.

The theoretical foundations of tax evasion were established in the seminal work of Allingham and Sandmo (1972), who provided the theoretical underpinnings of tax evasion as far back as 1972, modeling tax compliance as a decision-making process in which individuals weigh the benefits of evasion against the probability and severity of penalties. Their model postulates higher penalties and a greater likelihood of deterring tax evasion. This latter framework has been extended to include, among other things, social norms and perceived fairness or trust in government (Slemrod, 2007). Notwithstanding this, tax evasion remains one of the most intractable challenges facing countries worldwide, with one estimate by Cobham and Janský (2018) putting the global loss to illicit activity at more than $ 500 billion annually.

These are further exacerbated in developing economies owing to the weak mechanisms of enforcement and corruption and the complexities inherent in such tax laws. Complications in taxation regimes in developing economies create ways for individuals and companies to exploit their loopholes through legislation. Malkawi and Haloush (2008) state that the conditions for tax evasion are graver when there is a submerged economy without robust surveillance in most developing countries, especially when the central state has weak auditing and reporting frameworks.

### 2.2. Technology in Tax Compliance: Global Trends

In fact, over the last ten years, technological advancements have been among the legitimate avenues to strengthen tax administration, reduce fraud, and improve compliance. The digital transformation of tax compliance was performed using AI, ML, and Big Data Analytics. According to Raikov (2021), through analyzing large volumes of data and cross-referencing financial information emanating from bank transactions and property ownership, AI and ML are increasingly being used to detect anomalies in filings made by subjects.

For example, AI systems flag inconsistencies or suspicious behaviors, such as large financial in-transfers that cannot be supported by declared income. Integrating blockchain technology within taxation systems has also proven to be one way financial transactions can be recorded

securely and tamper-proof on a platform. Blockchain ensures that every transaction is transparent and traceable; hence, it becomes more difficult for an individual or corporation to manipulate data or hide income liable to taxes (Larikaman et al., 2024).

This is attributed to the fact that countries like Estonia and the United Kingdom were pioneers of such technologies, hence managing to curtail tax fraud cases by a large margin. Estonia has an integrated e-government system that provides digital tax services and can monitor real-time financial transactions and audits. The success of these systems shows how technology can change global tax compliance efforts (Nembe & Idemudia, 2024).

2.3. Tax Evasion in Jordan: A Local Challenge

With limited natural resources and a heavy external debt burden, Jordan's economy relies on taxation as a critical revenue collection tool. It is estimated that tax avoidance and evasion cost Jordan around JD 1.5 billion annually, thus significantly impeding the government's ability to fund essential services such as health, education, and infrastructure development (Hani, 2021).

Several factors have contributed to the sickness of tax evasion in Jordan, including unwieldy machinery, frequent alterations in tax laws, and a lack of measures for proper enforcementt (Alasfour, 2019). Additionally, taxpayers generally perceive the tax system as unfair in terms of the burden on lower-income individuals. Therefore, many taxpayers find another way to pay by underreporting income or overstating deductions (Alshira'h & Abdul-Jabbar, 2019).

Although specific reform steps have been implemented in Jordan's tax system, the pace of technology adoption in tax administration may be faster than global benchmarks. Jordanian auditing firms still use traditional compliance monitoring methods, which only sometimes extend to detecting sophisticated forms of tax evasion. Therefore, auditing firms must immediately adopt AI, ML, and data analytics as part of their compliance strategy.

2.4. The Role of Technology in Detecting and Preventing Tax Evasion

AI, ML, and Big Data Analytics can help solve this enduring evasion problem in Jordan's tax compliance frameworks. As reported [illegible], an indebtedness detection mechanism aided by an AI mimetic auditing system can sieve massive data bombards to spot futures through real-time inspections, and manual audits may be impossible or convoluted. These algorithms can be retrained to detect suspicious behaviors, such as differences between reported earnings and spending or inexplicable money movements.

Big data analytics further enables the tax department to aggregate and analyze a multitude of information points from multiple sources—bank records, property ownership, and investment portfolios—to create complete taxpayer profiles. This intersection of big data and tax filings enables the authorities to identify fraudulent filings (Kitsios et al., 2023).

However, technology use in Jordan's audit sector is still in its infancy. This study attempts to fill this critical gap in the literature by assessing how Jordanian auditing firms can satisfactorily use AI, ML, and big data analytics to detect and prevent tax evasion.

## Theoretical Framework

Three leading theoretical perspectives were used for this research: the Tax Gap Theory, the Technology Acceptance Model, and the Institutional Theory. Later, it was applied to advanced technologies such as AI, Machine Learning, and Big Data analytics in Jordan to detect and fight tax evasion. In Jordan, each of these theories can explain the behavior of tax compliance and technology adoption within organizational behavior.

3.1. Tax Gap Theory

Tax Gap Theory critically explains the imperfection between the total amount of dues payable by taxpayers and the amount collected

by the government through underreporting, non-filing, or underpayment. Slemrod (2007) Has been among the most vocal proponents of this theory, emphasizing that tax evasion thrives whenever the perceived risk of detection remains minimal or when penalties for non-compliance are insufficient. This theory emphasizes that a more comprehensive tax gap translates into heavy fiscal pressure on government revenue, restricting state capabilities and capacities to finance such essential services and infrastructure development. The complexity of the tax system, frequent amendments to tax laws, and lack of effective enforcement mechanisms contribute to the tax gap in the Jordanian context. These models use machine learning based on previous tax data to identify evasion patterns and flag high-risk cases. With this technology, Jordan can reduce its tax gap, improve compliance, and strengthen its fiscal position.

3.2. Technology Acceptance Model (TAM)

In 1989, Davis (1989) the Technology Acceptance Model was postulated to provide a theoretical overview of the factors that enter the acceptance and use of new technologies. According to TAM, perceived usefulness and ease of use are the two significant variables driving technology adoption. Perceived usefulness is the degree to which a person believes that using adaptive technology improves job performance. In contrast, perceived ease of use is the degree to which a person believes using technology is free of effort.

Within this context, TAM assesses the drivers and hindrances in adopting AI, ML, and big data analytics by auditing firms in Jordan. The perceived usefulness of such technologies in detecting and preventing tax evasion becomes vital because auditors must be satisfied that AI and ML tools would remarkably enhance the efficiency and effectiveness of tax compliance efforts. Furthermore, these technologies' perceived ease of use is a crucial determinant of whether auditors integrate them into their daily practices. If auditors consider AI and ML diverse and challenging to apply, the adoption rate will remain very low despite its benefits.

Therefore, this study uses TAM to identify obstacles to adopting technologies in Jordan's auditing field. These low adoption rates could be due to some of the reasons for the lack of technical capability, fewer opportunities for training, and resistance to change. Organizational culture and resource availability for technological investment are essential in these tools' ease of use and usefulness. The study would, therefore, provide recommendations on how these factors can be improved to enhance the adoption of AI and ML in Jordanian auditing firms to fight against tax evasion effectively.

3.3. Institutional Theory

Institutional theory Scott (2005) offers a comprehensive explanation of how the regulations of these institutions, social norms, and cultural-cognitive templates act as inducements for organizations. Institutions set the game's rules, limiting what organizations can successfully do and how they might maneuver in a particular environment. Such pressures can be coercive, emanating from legal normative mandates grounded in professional standards or mimetics and founded on imitating best practices.

From a Jordanian perspective, Institutional Theory is especially significant in assessing how regulative and normative environments stimulate the process of technology diffusion among audit firms. On the other hand, government coercion can encourage firms to use AI and ML while auditing, as there are more regulations from different regulatory bodies to maintain higher accuracy and transparency in tax reporting. This could mean the Jordanian government can enact rules allowing AI-based real-time tax audits (e.g., ) and legally require companies to adopt these technologies.

Normative pressure also dictates adoption. Auditors will likely be susceptible to professional norms and standards entailed by international bodies, including IFAC and INTOSAI. For instance, if international auditing

standards begin to emphasize the application of superior technologies in fraud detection and compliance monitoring, Jordanian auditing firms will have no option but to adopt global norms to maintain competitiveness and credibility.

When leading firms imitate strategies, there is mimetic pressure. If the successful implementation of AI and ML reduces fraud and tax evasion, auditing firms in Jordan may try to emulate strategies elsewhere in audit firms worldwide. The institutional theory explains how such external pressures bear on some firms in Jordan more than others, based on the degree of institutional inertia vis-à-vis the perceived legitimacy of adopting such technologies.

This study provides insight into Jordan's regulatory and normative environment, through which institutional factors influence decisions on auditing firms adopting technology. These results will help inform policy recommendations that create a proper environment for the complete diffusion of AI, ML, and data analytics in Jordan's tax compliance.

3.4. Research Hypotheses

The hypotheses based on the theoretical framework mentioned above are as follows.

H1: In detecting tax evasion cases, Jordanian auditing firms are significantly and positively influenced by adopting advanced technologies, such as AI and ML.

This is based on the hypothesis of the Tax Gap Theory, which presumes that if there is heightened detection, primarily through technological change, the incentive to evade is reduced.

H2: Auditors perceive AI and ML technologies as effective in bringing about perceived usefulness and ease of use, which are critical in wide-scale adoption in auditing practice. The technology acceptance model informs this hypothesis by identifying perceived use and ease of use as the primary determinants of technology adoption.

H3: Institutional pressures through coercive, normative, and mimetic approaches significantly influence Jordanian auditing firms' institutionalization of AI and ML technologies.

This hypothesis is based on Institutional Theory, which states that regulatory factors and norms are essential in driving organizational behavior and technology adoption.

H4: This implies critical demographic differences, such as firm size, auditor experience, and education level, in the perception and adoption of AI and ML technologies among Jordanian auditors.

## Methodology

4.1. Research Design

This quantitative research design offers a better way to explore technology's contribution to detecting and preventing tax evasion in Jordan. Quantitative research is especially suitable for the present study because it can objectively measure and statistically analyze the level of reception and effectiveness of advanced technologies such as AI, ML, and big data analytics in the auditing sector. The quantitative approach identifies patterns, relationships, and trends in auditor perceptions and practices, providing empirical evidence supporting the research hypotheses.

This study focuses on auditing firms, which are essential in checking financial statements, auditing, and monitoring Jordan's tax law compliance. Auditors are best positioned to discover misrepresentations in financial record keeping that might be implemented to evade taxes. Hence, auditors are critical stakeholders in curbing tax-related fraud. It reviews the level and extent of auditing firms' adoption of new technologies and their effectiveness in providing actionable insights that are valuable for efforts to improve tax compliance in Jordan's audit sector.

A structured questionnaire was developed to obtain data from auditors and tax compliance officers. The same questions were asked standardized, making the responses more consistent and statistically analyzable. This structured questionnaire was used to obtain

various information, from demographic characteristics to specific perceptions of using technology in auditing practices.

4.2. Population and Sample

The target group for this study consists of auditing firms operating in Jordan. This specifically targeted auditors and tax compliance officers tasked with operating and assessing financial records to ensure that organizations conform to their respective tax laws. Indeed, this group was targeted because auditors are more likely to be conversant with the technical and practical aspects required of tax compliance, thus being ideal respondents for the study on adopting advanced technologies to detect and prevent tax evasion.

A sample of 200 auditors was selected from ten auditing firms based on their market size, industry reputation, and influence in Jordan's auditing sector. We decided to involve auditors of various firm sizes, both directly and indirectly, with the guarantee that the sample would be representative of the overall auditing landscape in Jordan. This diversity allows a comparison between large and small firms, particularly regarding resource availability, technological capacity, and tax compliance.

Therefore, random sampling is adopted in which every auditor within the population has an equal chance of being randomly selected. Random sampling reduces the selection bias and increases the generalizability of the findings to the entire population of auditors in Jordan. By adopting this approach, this study attempts to capture divergent opinions regarding adopting AI, ML, and big data technologies and their perceived effectiveness in preventing tax evasion.

4.3. Data Collection Instruments

The structured questionnaire used was in the main collection of detailed primary data from auditors only, divided into three main parts, each aimed at capturing a different dimension of the research objectives, as follows:

1. Demographics: The basic demographic set included age (in years), sex, educational background, and years of experience in the auditing arena. These demographic variables are imperative for understanding how differences in personal and professional characteristics affect the nature of the diffusion process. For instance, auditors with more experience in the field may view AI and ML technologies as more valuable than less experienced auditors. At the same time, educational background may shape auditors' comfort with new technologies.

2. Technology Adoption: This section assesses how auditing firms in Jordan have adopted advanced technologies such as AI, ML, and big data analytics. The questions examined the types of technologies currently adopted, the frequency with which they are used when performing auditing tasks, and the general level of diffusion of such technologies in a firm's daily operations. This section seeks to establish the level of technological adoption and the gap in technology utilization.

3. Perceptions of Technology's Impact: This question sought auditors' perceptions of the effectiveness of these technologies in detecting and preventing tax evasion. Participants rated several statements on a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree." These statements assessed auditors' perceptions of the usefulness of AI and ML in the anomaly detection process, whether this technology could be integrated easily into their current workflow, and the overall impact on their performance regarding tax laws.

Therefore, the Likert scale will help this study determine the intensity of auditors' opinions, providing a delicate touch on auditors' attitudes towards technology. The advantage is that the structured questionnaire allows data gathering to be quantified and analyzed using statistical methods.

4.4. Data Analysis

Data analysis was performed using a structured questionnaire with the assistance of the SPSS software. SPSS was designed to perform extensive quantitative data analysis. SPSS was preferred because it was intended to

seek a large dataset, perform complex statistical tests, and provide visual representations of the data. Analysis was done in two phases:

1. Descriptive Statistics: The computation of descriptive statistics, such as means, standard deviations, and frequency distributions, offered an overview of the participants' response trends. Thus, descriptive statistics enabled this study to summarize the data in a way that emphasized significant trends and patterns. For instance, descriptive statistics were used to determine the general level of technology adoption among auditing firms and to identify common perceptions of the effectiveness of AI and ML in tax compliance.

2. Inferential Statistics: In the second stage, inferential statistical tests were conducted to ascertain whether significant differences would exist due to demographic variables in perceptions related to technology adoption. The following tests were performed.

- T-tests: The t-tests compared the mean responses of two groups–male/female auditors and auditors from large/small firms–to examine whether these groups perceived the usefulness and ease of use of AI and ML technologies differently.
- Analysis of Variance (ANOVA): This test was used to compare the mean responses across several groups, such as auditors with different levels of experience or educational backgrounds. Using ANOVA, this study investigated whether demographic factors such as years of experience significantly affected technology adoption and perceived effectiveness of the technology.

The results of the inferential statistical tests support the research hypotheses by showing whether auditors' perceptions of technology adoption vary according to key demographic variables. Moreover, correlation analysis was conducted to determine the most likely relationship between the level of technology adopted and the perceived impact of these technologies on tax compliance.

In other words, the descriptive and inferential statistics provided an on-the-ground factual analysis, yielding invaluable insights into Jordanian auditing firm technology adoptions and perceived effectiveness in combating tax evasion.

## Results

Therefore, this study's results are essential for informing the current state of technology adoption among auditing firms in Jordan and the perceived impact of those technologies on tax compliance. This section presents the findings of the descriptive and inferential statistical analyses, followed by a detailed examination of each hypothesis, as outlined in the theoretical framework.

5.1. Descriptive Analysis

Demographic Characteristics of Respondents

The sample consisted of 200 auditors from 10 different auditing firms in Jordan. Table 1 presents the respondents' demographic profiles. Most auditors surveyed were male (60 %), whereas females comprised 40% of the sample. Regarding experience, 55% of the participants had more than ten years of auditing experience, 30% had 6 to 10 years of experience, and 15% had less than five years of experience. This distribution provides a good balance between the relatively seasoned and new auditors.

Table 1: Demographic Characteristics

| Demographic Characteristic | Frequency | Percentage |
|---|---|---|
| Gender | | |
| Male | 120 | 60% |
| Female | 80 | 40% |
| Years of Experience | | |
| 1-5 Years | 30 | 15% |
| 6-10 Years | 60 | 30% |
| 11+ Years | 110 | 55% |

Source: Authors' calculations

Technology Adoption

The response analysis indicates that Jordanian auditing firms' adoption of AI and ML technology is moderate, with an average level of

3.5 points on the Likert scale. As shown in Table 2, 70% of the respondents responded that their firms had adopted some form of AI technology, whereas 60% reported their firms' use of ML. However, only 30% of those responding to big data analytics were used in their firms' tax compliance work, suggesting that more advanced data analytics tools are less common.

Table 2: Technology Tool adopting

| Technology Tool | Percentage of Firms Adopting |
|---|---|
| Artificial Intelligence (AI) | 70% |
| Machine Learning (ML) | 60% |
| Big Data Analytics | 30% |

Source: Authors' calculations

Perceptions of Technology's Effectiveness

Specific questions were asked of the respondents to state their perceived effectiveness of AI and ML in detecting and preventing tax evasion using a Likert scale. The average of the statements on the efficacy of AI in fraud identification and ensuring that taxes are paid was 4.0 on the Likert scale, meaning that substantial agreement was witnessed across the board on this aspect. Simultaneously, this is paired with an average opinion on the effectiveness of ML in deterring tax evasion, checking in at 3.8-positive attitudes toward this technology in enhancing auditing practices.

Table 3: Perceptions of Technology's Effectiveness

| Statement | Mean | Standard Deviation | % of Agreement (Agree + Strongly Agree) |
|---|---|---|---|
| AI improves the detection of tax evasion. | 4 | 0.72 | 80% |
| AI helps in automating the identification of financial anomalies. | 3.9 | 0.68 | 78% |
| Machine learning is effective in predicting tax evasion patterns. | 3.8 | 0.75 | 75% |
| Big data analytics enhances overall tax compliance monitoring. | 3.5 | 0.82 | 65% |
| AI and ML reduce the time spent on manual auditing processes. | 4.1 | 0.67 | 82% |

Source: Authors' calculations

5.2. Inferential Statistical Analysis

Hypothesis Testing

This study tested these hypotheses to evaluate the research hypotheses of the proposed theoretical framework. The following is a detailed analysis of each hypothesis and the results obtained:

H1: The detection of tax evasion in Jordanian auditing firms will significantly improve using advanced technologies such as AI and ML.

The results of the t-tests conducted to test this hypothesis show the positive significance of the adoption of AI/ML technologies on their effectiveness in detecting tax evasion. From Table 4, the relationship between AI adoption and tax evasion detection presented a t-value of 4.35 and a p-value of 0.001 ($p < 0.05$); hence, it was significant. Again, the t-value for ML's impact on detecting tax evasion is 3.95, with a p-value of 0.002.

Table 4: Technology's Impact on Tax Evasion Detection

| Technology | t-value | p-value |
|---|---|---|
| AI | 4.35 | 0.001 |
| ML | 3.95 | 0.002 |

Source: Authors' calculations

These findings confirm H1, as the adoption of advanced technologies, such as AI and ML, significantly strengthens the detection capabilities of auditing firms in matters of tax evasion. AI and ML have allowed auditors to process large volumes of financial data in real time and point out irregularities that would not have been easily detected using traditional auditing methods.

H2: Auditors' perceptions of the usefulness and ease of use of AI and ML technologies determine how they will eventually apply them in auditing practices.

To test H2, the survey examined the association between perceived usefulness and perceived ease of use of AI/ML technologies and auditors' actual adoption of such technologies. The results of the correlation analysis shown in Table 5 reveal that perceived usefulness and technology adoption are positively and strongly related ($r = 0.65$; $p < 0.01$), and the relation of perceived ease of use with adoption is positive but moderate ($r = 0.55$; $p < 0.01$).

Table 5: Technology Acceptance

| Variable | Correlation with Technology Adoption |
|---|---|
| Perceived Usefulness | 0.65* |
| Perceived Ease of Use | 0.55* |

Source: Authors' calculations

In addition, auditors who believe that AI and ML are useful to add to and easily integrate into their workflows are more likely to adopt these technologies. Thus, H2 is supported. The findings also corroborate the Technology Acceptance Model prediction, further pointing out perceived usefulness and ease of use as imperative factors in adopting technology within the auditing industry.

H3: Institutional pressure (coercive, normative, and mimetic) significantly influences Jordanian auditing firms' adoption of AI and ML technology.

Testing H3: To test H3, ANOVA was conducted to analyze the influence of institutional pressures on the adoption of AI and ML technologies. The results of these tests are shown below and indicate a significant difference in the adoption of technology based on institutional pressure. Coercive pressures through aspects such as government regulations were the most influential drivers in adopting $F = 5.76$, $p = 0.002$, followed by normative pressures through professional standards ($F = 4.22$, $p = 0.01$). However, its effect on technology adoption was positive but weak due to mimetic pressures or the imitation of leading firms ($F = 3.10$, $p = 0.04$).

Table 6: Institutional Pressures

| Institutional Pressure | F-value | p-value |
|---|---|---|
| Coercive | 5.76 | 0.002 |
| Normative | 4.22 | 0.01 |
| Mimetic | 3.1 | 0.04 |

Source: Authors' calculations

These findings confirm the institutional pressure due to government mandates and global professional standards that play a vital role in shaping the adoption of AI and ML technologies in Jordan's audit sector, thereby supporting H3. These findings indicate that auditing firms are more motivated to adopt new technologies driven by or influenced by government mandates or international professional standards.

H4: There are significant demographic differences (e.g., firm size, auditor experience, and education level) in the perception and adoption of AI and ML technologies among auditors in Jordan.

Other ANOVA tests were performed to ascertain whether there was a significant difference in the perception and adoption of AI/ML technologies driven by demographic variables, such as firm size, auditor experience, and education level. The results indicate that firm size significantly impacted the adoption of AI technologies ($F = 6.12$, $p = 0.001$), with larger firms being more likely to adopt this technology than smaller ones. However, there were no significant differences in auditor experience or education level.

Table 7: Demographic Differences in Technology Perceptions

| Demographic Factor | F-value | p-value |
|---|---|---|
| Firm Size | 6.12 | 0.001 |
| Auditor Experience | 1.45 | 0.22 |
| Education Level | 1.88 | 0.18 |

Source: Authors' calculations

Partial support for H4 is found because while firm size varied significantly in technology adoption, auditor experience and level of education did not. This would mean that the more prominent firms, probably because they had more resources, would be well-placed to invest in newer technologies such as AI and ML.

These findings fully support the hypotheses proposed, as AI and ML significantly enhance the detection of tax evasion in Jordanian auditing firms. In addition, perceived usefulness and ease of use of technologies are critical to forming positive perceptions, while institutional pressures can also influence decisions on technology adoption. Firm size is a demographic factor significantly affecting the likelihood of adopting AI and ML technologies.

These results are relevant for Jordan's policymakers and auditing firms. This implies the need for further investment in advanced technologies and the creation of supportive institutional frameworks that would encourage wider diffusion.

## Discussion

This study provides valuable insights into advanced tech in Jordanian auditing firms. It covers AI, ML, and Big Data Analytics for detecting and preventing tax evasion. Our results show that auditing firms in Jordan moderately adopt AI and ML. They have positively affected the detection of irregularities in tax filings. Nevertheless, Big Data Analytics needs to be more utilized. This section compares these results with similar studies. The findings highlight both agreement and disagreement. It also considers the broader implications.

The study's findings match global trends in using AI and ML to detect financial anomalies. Like Raikov's (2021) research, which found that AI boosts fraud detection by automating financial data analysis, our study confirms that Jordanian auditors value AI and ML for spotting tax evasion. Raikov's study shows that AI can find flaws faster and more accurately than manual audits. In Jordan, the use of these technologies is a promising shift. It aims to modernize the auditing sector. The low use of Big Data Analytics shows challenges in using advanced tech in auditing.

Our study found limited use of Big Data Analytics. This matches findings from other developing economies. Kitsios et al. (2023) highlight that Big Data Analytics is underused while AI and ML are popular for quick fraud detection. This is especially true in areas where tech infrastructure is developing. Our study supports this. It suggests that Jordanian auditing firms may need more skills or resources to use such advanced systems fully. This gap shows the need for more investment in technology and training. Nembe and Idemudia (2024) also suggest this. They argue that better tech is critical to improving tax compliance in emerging economies.

Our findings support the Tax Gap Theory. It says that technology boosts the risk of detection and deters tax evasion. Slemrod (2007) found that AI and ML reduce fraud. Increased surveillance limits the chances of it. Our results show that Jordanian auditors see AI and ML as very effective. They reduce manual work and improve tax audit accuracy.

Nevertheless, the incomplete integration of these technologies into all firms' workflows suggests a barrier to their adoption. The perceived ease of use, a critical factor in the Technology Acceptance Model (Davis, 1989), maybe the cause. This aligns with Alshira'h and Abdul-Jabbar (2019). They found that the Jordanian tax system is complex and burdensome. New technologies simplify compliance and reduce evasion. Nevertheless, they need training and a culture shift to work.

Institutional pressure, per Institutional Theory (Scott, 2005), affects tech adoption. Our study found that coercive pressures, like government rules, affect Jordanian firms' adoption of AI and ML. This finding agrees with Cobham and Janský (2018). They showed that regulations can force firms to use tech to close

tax gaps. However, mimetic pressures to imitate early adopters' success in Jordan seem less impactful. This contrasts with Alasfour (2019). He argued that firms often copy top players to compete in many developing economies. The low influence of mimetic pressures in Jordan may reflect its early stage of tech adoption. There are a few successful examples to imitate.

Our research shows significant demographic differences in tech adoption, especially by firm size. Larger firms in Jordan are more likely to adopt AI and ML, a finding that is consistent with global trends. Nembe and Idemudia (2024) found that, in the UK and Estonia, larger, resource-rich firms were early adopters of AI and ML for tax compliance. Smaller firms face more significant financial and operational limits. These constraints hinder their ability to invest in such technologies. This raises questions about how to help smaller firms adopt these technologies. If not, the gap in detecting tax fraud may widen between large and small auditing firms.

In conclusion, our study adds to the growing literature on AI, ML, and Big Data. It shows their importance in improving tax compliance. Many small firms in Jordan underuse Big Data Analytics and adopt it at a gradual pace. So, there is much left to do to realize these technologies' full potential. Future research could find ways to boost adoption. It should train and build capacity in smaller firms and less advanced regions. Also, studying institutional pressures, especially mimetic forces, could help. It may show how to speed up tech adoption in the auditing sector.

## Conclusion

This study shows that advanced technologies are vital for detecting and preventing tax evasion in Jordan. These include Artificial Intelligence (AI), Machine Learning (ML), and Big Data Analytics. The research shows that AI and ML are moderately adopted. They are effective at spotting tax fraud. However, Big Data Analytics should be more used. The main findings show two factors that drive tech adoption in Jordanian auditing firms. They are regulatory mandates and the firms' sizes. Larger firms can adopt advanced tech due to more resources. Smaller firms face financial and operational challenges. Also, AI and ML can cut manual work and improve tax audit accuracy. This aligns with global trends in using tech for tax compliance.

Despite these findings, several limitations must be acknowledged. First, the study focuses on Jordanian auditing firms, which limits the findings' applicability to countries with different economies and regulations. Future studies could include firms from other developing countries, offering a comparative view. Second, the study looks at technology adoption.

Nevertheless, it must explore these technologies' specific, non-financial challenges. Future research could explore the barriers to broader adoption in smaller firms. These include organizational and cultural issues. Also, the study uses a self-reported survey. This may bias the responses about technology usage and its effectiveness.

Future research could examine the long-term impact of AI and ML on tax compliance in Jordan and other developing economies. Given the limited use of Big Data Analytics, further studies could explore its benefits and challenges in auditing. Researchers could also study whether government policies help smaller firms adopt advanced technologies. This would help close the gap between large and small auditing firms.

This study's practical implications are significant for policymakers and auditing firms. Policymakers must support advanced tech adoption with regulations and incentives. Governments could encourage smaller firms to invest in tech by offering tax incentives or grants. Moreover, auditing firms must train auditors to use AI, ML, and Big Data tools effectively. Collaboration between auditing firms and tax authorities is vital. It will help share data and improve tax compliance programs.

In conclusion, AI and ML can improve tax compliance and detect evasion in Jordan. But, we must do much more to realize their full potential. We must help smaller firms and promote Big Data Analytics. This will create a better, more transparent tax compliance system. Investing in tech and training can help Jordanian auditing firms. They can reduce tax evasion and boost fiscal stability and economic growth.

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