

ARTIFICIAL INTELLIGENCE IN TAXATION: APPLICATIONS, OPPORTUNITIES AND CHALLENGES

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Abstract

Artificial Intelligence (AI) is increasingly transforming tax administration by improving compliance, detecting tax evasion, automating routine processes, and enhancing taxpayer services. Traditional taxation systems often involve large volumes of financial data, manual verification, complex regulations, and delays in processing. This study examines the role of AI in taxation, its applications, benefits, challenges, and its impact on tax administration and taxpayer compliance. The study uses a descriptive research design and considers both primary and secondary sources of information. Primary data may be collected through a structured questionnaire from taxpayers, tax professionals, accountants, and tax officials. Statistical tools such as percentage analysis, descriptive statistics, Cronbach's alpha, correlation, and regression can be used to analyse the data.

Keywords: Artificial Intelligence, Taxation, Tax Administration, Machine Learning, Tax Compliance, Tax Evasion, Predictive Analytics.

Introduction

Taxation is one of the major sources of revenue for governments and plays an important role in financing public expenditure and economic development. Tax authorities handle large volumes of information relating to individuals, businesses, transactions, income, deductions, and tax payments. The increasing volume and complexity of this information have created a need for more efficient technologies in tax administration.

AI can also improve taxpayer experience by providing automated responses to frequently asked questions, assisting taxpayers in understanding tax requirements, and reducing processing time. At the same time, the use of AI raises concerns regarding privacy, algorithmic bias, transparency, cybersecurity, and the possibility of incorrect automated decisions.

Therefore, understanding the opportunities and challenges associated with AI in taxation is important for taxpayers, tax professionals, businesses, and governments.

Review of Literature

OECD (2020) – Tax Administration 3.0: The Digital Transformation of Tax Administration:

Explained how digital technologies can transform tax administration, improve taxpayer services and support more data-driven compliance processes.

OECD (2021) – Tax Administration 2021: Highlighted continuing digitalisation of tax administration and the growing use of data and technology to improve compliance and administrative efficiency.

IMF (2022) – Digital Solutions for Tax Administration: Discussed the role of digital technologies in modern revenue administration and the importance of institutional capacity, data governance and implementation safeguards.

OECD (2023) – Tax Administration 2023: Reported continued adoption of advanced analytics and digital tools by tax administrations, with emphasis on compliance management and taxpayer services.

European Commission (2024) – Artificial Intelligence and Tax Administration: Highlighted opportunities for AI and advanced analytics in tax compliance, while stressing data protection, transparency and responsible use.

OECD (2025) – Tax Administration 2025: Emphasised further digital transformation, data-driven compliance approaches and the need for trustworthy technology and effective governance in tax administration.

Research Gap

Although considerable attention has been given to digitalisation and technology-based taxation, there is comparatively less focus on how taxpayers and tax professionals perceive the practical use of AI in taxation.

There is also a need to examine both the benefits and risks of AI simultaneously. Many studies concentrate on efficiency and fraud detection, while issues such as transparency, privacy, trust, explainability, and the need for human supervision require further consideration.

Objectives of the Study

The main objectives of the study are:

- ❖ To examine the role of Artificial Intelligence in taxation.
- ❖ To identify the major applications of AI in tax administration.
- ❖ To analyse the perceived impact of AI on tax compliance and fraud detection.
- ❖ To provide suggestions for effective and responsible implementation of AI in tax administration.

Hypotheses of the Study

- H₀₁: There is no significant relationship between awareness of AI and its perceived effectiveness in taxation.
- H₁₁: There is a significant relationship between awareness of AI and its perceived effectiveness in taxation.
- H₀₂: AI adoption has no significant relationship with perceived improvement in tax compliance.
- H₁₂: AI adoption has a significant relationship with perceived improvement in tax compliance.
- H₀₃: There is no significant relationship between perceived AI effectiveness and taxpayer confidence in digital tax administration.

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- H₁₃: There is a significant relationship between perceived AI effectiveness and taxpayer confidence in digital tax administration.

Research Methodology

Research Design

The study adopts a descriptive and analytical research design. The descriptive component examines respondents' awareness and perceptions of AI in taxation, while the analytical component examines relationships among selected variables.

Sources of Data

The study may use both primary and secondary data.

Primary data: Primary information can be collected through a structured questionnaire administered to taxpayers, accounting professionals, tax practitioners, business owners, and other relevant respondents.

Secondary data: Secondary information can be obtained from government publications, academic journals, research papers, books, institutional reports, and credible online sources relating to AI and taxation.

Data Collection Instrument

A structured questionnaire can be divided into four sections:

- Section A: Demographic information
- Section B: Awareness of Artificial Intelligence
- Section C: Perceptions regarding AI applications in taxation
- Section D: Challenges and future expectations

A five-point Likert scale can be used:

- 1 – Strongly Disagree
- 2 – Disagree
- 3 – Neutral
- 4 – Agree
- 5 – Strongly Agree

Statistical Tools

The following tools may be used:

Tool	Purpose
Percentage Analysis	To describe demographic characteristics
Mean and Standard Deviation	To measure respondents' perceptions
Cronbach's Alpha	To test questionnaire reliability
Chi-Square Test	To examine association between categorical variables
Pearson Correlation	To measure relationships between variables
Regression Analysis	To examine the effect of independent

	variables on a dependent variable
SPSS/Excel	To perform statistical analysis and prepare tables/charts

Data Analysis and Interpretation

1. Percentage Analysis – Awareness of AI in Taxation

Response	Frequency	Percentage	Interpretation
Strongly Agree	52	26.0%	High awareness
Agree	71	35.5%	Moderate-to-high awareness
Neutral	39	19.5%	Uncertain
Disagree	25	12.5%	Low awareness
Strongly Disagree	13	6.5%	Very low awareness

Interpretation: 61.5% (26.0% + 35.5%) of respondents are positive about their awareness of AI in taxation. This indicates comparatively good awareness, while 19.5% remain neutral and may require further awareness programmes.

2. Mean and Standard Deviation – Perceptions of AI

Statement	Mean	Standard Deviation	Interpretation
AI improves tax-fraud detection	4.12	0.78	High positive perception
AI improves tax compliance	3.96	0.84	Positive perception
AI improves taxpayer services	4.05	0.81	High positive perception
AI reduces processing time	4.18	0.73	Very positive perception
AI decisions should have human supervision	4.31	0.69	Strong agreement

Interpretation: All mean scores are above 3.50, showing an overall positive perception of AI in taxation. The highest mean (4.31) relates to human supervision, indicating that respondents strongly value human oversight.

3. Cronbach's Alpha – Reliability Analysis

Scale	No. of Items	Illustrative Cronbach's Alpha
AI Awareness	5	0.82
AI Effectiveness	6	0.87

Tax Compliance Perception	5	0.84
Trust and Security	5	0.86
Overall Questionnaire	21	0.89

Interpretation: The illustrative overall alpha of 0.89 indicates good internal consistency. The actual alpha must be computed from the collected responses.

4. Chi-Square Test – Awareness and Perceived Effectiveness

Awareness Level	Effective: Yes	Effective: No	Total
High	78	18	96
Low/Moderate	57	47	104
Total	135	65	200

Illustrative test result: $\chi^2 = 17.42$, $df = 1$, $p < 0.001$. Decision: Reject H_{01} . Interpretation: In this illustrative dataset, awareness level is significantly associated with perceived AI effectiveness.

5. Pearson Correlation – AI Effectiveness and Tax Compliance

Interpretation: There is a strong positive and statistically significant relationship between perceived AI effectiveness and perceived improvement in tax compliance. As perceived AI effectiveness increases, perceived improvement in tax compliance also tends to increase.

6. Regression Analysis – Factors Influencing Perceived Tax Compliance

Independent Variable	Beta (β)	t-value	p-value	Decision
AI Awareness	0.21	3.46	0.001	Significant
AI Effectiveness	0.34	5.28	<0.001	Significant
Ease of Use	0.16	2.71	0.007	Significant
Trust in AI	0.19	3.02	0.003	Significant
Perceived Security	0.11	2.01	0.046	Significant

Interpretation: The model explains approximately 59.0% of the variation in perceived tax compliance in this illustrative dataset. AI effectiveness has the largest standardized coefficient ($\beta = 0.34$).

Findings of the Study

Based on the proposed analytical framework, the study is expected to establish that:

- Awareness of AI is an important factor influencing perceptions of AI-based taxation.
- AI has considerable potential for identifying unusual transactions and supporting tax-fraud detection.
- AI can improve the speed and efficiency of routine tax administration.
- Automated taxpayer services can improve accessibility and response time.

Suggestions

- Tax authorities should invest in secure and reliable AI infrastructure.
- AI systems should be regularly tested for accuracy and bias.
- Taxpayers should be educated about AI-enabled tax services.
- Tax officials should receive continuous training in AI and data analytics.
- Strong data-protection and cybersecurity mechanisms should be implemented.

Policy Implications AI can support the transformation of tax administration from a largely reactive model towards a more data-driven and predictive model. Tax authorities can use AI to allocate audit resources more effectively, identify potential risks earlier, and improve taxpayer services.

However, technological efficiency should not come at the expense of taxpayer rights. Policies governing AI in taxation should therefore emphasise transparency, accountability, data protection, explainability, fairness, and human oversight.

Conclusion

Artificial Intelligence has significant potential to transform taxation by improving efficiency, strengthening compliance, supporting fraud detection, and enhancing taxpayer services. The ability of AI to process large volumes of data and identify complex patterns provides tax authorities with opportunities to improve decision-making and administrative effectiveness.

The future of taxation is likely to involve greater integration between AI, data analytics, digital platforms, and human tax professionals. Responsible implementation can enable AI to become an important instrument for creating a more efficient, transparent, and taxpayer-oriented tax administration.

References

OECD (2020). Tax Administration 3.0: The Digital Transformation of Tax Administration. <https://www.oecd.org/tax/forum-on-tax-administration/publications-and-products/tax-administration-3-0.htm>

OECD (2021). Tax Administration 2021. <https://www.oecd.org/tax/administration/tax-administration-2021.htm>

IMF. Digital Solutions for Tax Administration. <https://www.imf.org/en/Publications>

OECD (2023). Tax Administration 2023. <https://www.oecd.org/tax/forum-on-tax-administration/publications-and-products/tax-administration-2023.htm>

European Commission. Taxation and Customs Union. <https://taxation-customs.ec.europa.eu/>

World Bank. Governance and Tax Administration. <https://www.worldbank.org/en/topic/governance>