Evaluation of External Tax Audit Performance in Algeria: An Econometric Study for the Period 2018–2024

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Received: 16/07/2026 **Accepted: 30/10/2026** **Published: 20/11/2026**

Abstract:

This study aims to evaluate the performance of external tax audits in Algeria during 2018–2024 using official tax administration data. Descriptive statistics, correlation analysis, one-way ANOVA, and multiple regression were employed to assess audit performance. The results show that audit volume is the main determinant of assessed tax revenue, while audit type significantly affects performance, with Accounting Audits (AA) generating the highest overall revenue. Strengthening audit capacity, improving risk-based case selection, and enhancing audit management can improve audit effectiveness, voluntary tax compliance, and revenue mobilization in Algeria.

Keywords: External Tax Audit; tax revenue; Accounting Audit; ANOVA; Correlation Analysis

Jel Classification Codes: H26; H83; K34; C23

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1. Introduction :

External tax auditing is considered a fundamental tool in Algeria's tax administration system, as it contributes to revenue collection and the reduction of tax evasion;

From 2018 to 2024 the General Directorate of Taxes did a lot of audit operations. 18,565 To be exact (Sub-Directorate of Tax Control, 2024) .

These operations brought in an amount of money. 428.47 Billion DZD (Sub-Directorate of Tax Control, 2024); If you look at how well these operations did over the years you will see that they were all over the place. They did well in 2022 but then they did terribly in 2023 ; they got a little better in 2024 . (Sub-Directorate of Tax Control, 2024)

This makes you wonder what is going on. What is affecting how well the General Directorate of Taxes does its job? Is it because of how audits they do what kind of audits they do or how they use their resources?

The big question we want to answer is: what makes external tax audits in Algeria work well? This question makes us think of some questions.

-Is the problem with how the audits do really because of how many audits the General Directorate of Taxes does what kind of audits they do or because they do not have enough people to do the audits?

- How much does each type of audit help bring in money?

We want to know the answers, to these questions so we can understand what is going on with the General Directorate of Taxes and their audits.

What is the relationship between audit file volume and collected revenues ?

How can resources be allocated to maximize audit productivity ?

1. Conceptual Framework of External Tax Audit:

External tax audit is defined as a set of supervisory procedures conducted by the tax administration after taxpayers submit their tax declarations, outside the scope of internal desk reviews, with the purpose of verifying the consistency of tax information and declarations with the actual financial and economic activities of the taxpayer. This process relies on examining accounting records, legal documents, and financial statements to identify errors, cases of non-compliance, or tax concealment, while ensuring the proper application of tax legislation and safeguarding public treasury interests (Akylbayeva, 2016, pp. 65-69).

In contemporary literature, external tax audit is also regarded as a fundamental instrument for strengthening tax compliance and achieving tax fairness. Its role extends beyond verifying the accuracy of the tax base and securing public revenues to fostering a more transparent relationship between tax authorities and taxpayers through encouraging voluntary compliance, reducing tax disputes, and limiting tax evasion practices (Nazarova, 2018, pp. 102-107) .

2. External Tax Audit in Algeria:

External tax audit refers to the set of verification procedures carried out by the tax administration to assess the accuracy of taxpayers' declarations, accounting records, and supporting documents, with the aim of ensuring compliance with tax legislation and detecting potential tax irregularities or evasion. In Algeria, these procedures are governed by Articles 20, 20 bis, and 21 of the Tax Procedures Code, which establish the legal framework for fiscal verification (Tekkouk, 2020, pp. 474-497; Idir & Zergoune, 2019, pp. 63-81; People's Democratic Republic of Algeria, 2024, Art. 20, 20 bis & 21).

2.1 Accounting Audit (AA) :

Comprehensive Accounting Audits (AA) constitute a form of external tax audit provided for in Article 20 of the Algerian Tax Procedures Code (Law No. 2016-08, Official Gazette, 2026, p. 12), consisting of a thorough examination of the taxpayer's accounting records and supporting documents over the four non-statute-barred fiscal years (Rebihi & Benissa, 2023, p. 237). This procedure aims to verify the accuracy of tax declarations submitted by the taxpayer, by comparing recorded accounting entries with the entity's actual business activity and supporting documentation (Benendada & Boughacha, 2020, p. 45).

AA is conducted by regional tax inspectorates and covers all taxes due by the taxpayer, making it the most comprehensive form of accounting-based tax control (Benouda, 2024, p. 18).

2. 2 Targeted Accounting Audits (TA) :

Targeted Accounting Audits (TA) are a control procedure introduced by Article 20 bis of the Algerian Tax Procedures Code (Law No. 2016-08, Official Gazette, 2026, p. 13), characterized as being less comprehensive and more expedited than comprehensive accounting audits (Rebihi & Benissa, 2023, p. 238). TA is limited to one or several specific taxes, or to a subset of accounting operations for a period shorter than one fiscal year (such as 6 months, or one year), and does not necessarily cover the full four non-statute-barred years (Boukhlouf & Djellouli, 2022, p. 78).

TA is used to detect specific tax errors or irregularities, such as undeclared turnover or VAT calculation errors, without requiring a full-scale review of all accounting records (Rebihi & Benissa, 2023, p. 239).

2.3 In-depth Personal Tax Audits Concept and Legal Basis (ITPA):

In-depth Personal Tax Audits (ITPA) constitute one of the external tax audit instruments employed by the Algerian tax administration to verify the credibility of individual taxpayers' declarations, by comparing declared information with the totality of the taxpayer's financial assets and lifestyle indicators over multiple tax years, rather than restricting verification to a single fiscal period (Hamadi & Moussi, 2017, p. 120). This procedure extends beyond mere accounting review; it entails a thorough examination of the consistency between declared incomes and the taxpayer's overall financial position, including lifestyle proxies, within the context of Algeria's declaratory tax system (Hamadi & Moussi, 2017, p. 121).

Legally, ITPA is grounded in Article 21 bis of the Algerian Tax Procedures Code, which empowers the tax administration to verify the accuracy of declarations and accounting documents, and regulates audit mechanisms, including on-site inspection, document access, and in-depth investigation of the taxpayer's overall tax situation (Bouguern & Krioua, 2023, p. 345).

Such audits are conducted by regional tax inspectorates, in compliance with the legal safeguards afforded to taxpayers (Mansouri & Hamitou, 2024, p. 102). Empirical studies indicate that ITPA contributes to enhancing tax collection efficiency by uncovering complex forms of tax evasion that cannot be detected through conventional partial audit methods (Slimani & Guara, 2023, p. 363).

Algerian tax administration to verify the credibility of individual taxpayers' declarations, by comparing declared information with the totality of the taxpayer's financial assets and lifestyle indicators over multiple tax years, rather than restricting verification to a single fiscal period (Hamadi & Moussi, 2017, p. 120).

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3. Data and methodology:

3.1 Data Sources and Sample:

In this paper, I use the data set from the annual GDT external audit operations that is provided by GDT audit operations. Specifically, the following data elements are available:

- Number of completed audit files for each type of audit (AA, TA, IPTA).
- Assessed revenue for each type of audit (total amount of liabilities officially assessed as a result of audit operations), measured in DZD billions.
- Additional indicators that provide information about additional number of inspectors, average audit duration, and yearly changes.

The total number of observations is 28 (4 variables and 7 years). These data are suitable for correlation analysis, ANOVA test, and multiple regression.

TABLE 1: Variable Definitions

Variable	Definition	Unit
Total Audit Files (TAF)	Number of external audit cases completed and concluded during fiscal year	Count
AA Files	Number of Accounting Audits completed during fiscal year	Count
TA Files	Number of Targeted Audits completed during fiscal year	Count
IPTA Files	Number of In-depth Personal Tax Audits completed during fiscal year	Count
Total Assessed Revenues «TAR»	Aggregate tax liabilities formally assessed during year	Billion DZD
AA Revenues	Assessed revenues from Accounting	Billion DZD

	Audits	
TA Revenues	Assessed revenues from Targeted Audits	Billion DZD
IPTA Revenues	Assessed revenues from In-depth Personal Tax Audits	Billion DZD
Revenue per File «RPF»	Assessed revenues member of audit files « measures per-case productivity»	Million DZD/file
Coefficient of Variation (CV)	Standard deviation ÷ mean (measures relative variability, 0–1 scale)	Ratio
Audit Type (AA/TA/IPTA)	Categorical variable indicating audit modality	Category
Year	Calendar year	2018 - 2024

Source: Prepared by the researcher based on GDT external audit data .

3.2 Descriptive Statistical Approach Variables Used:

- ✓ Central Tendency: Mean and Median (50th Percentile) of each variable in total and by audit type/ year.
- ✓ Dispersion: Standard Deviation (the square root of Variance, i.e., absolute difference from the mean) and Coefficient of Variation (Standard Deviation/Mean, a ratio index of relative dispersion useful for comparing different scales of measurement).
- ✓ Extremes: Minimum and Maximum Values, indicating the spread of the data.
- ✓ Skewness and Kurtosis: Indicators of distribution form (Skewness indicates symmetry/asymmetry; Kurtosis indicates tail thickness), which determine whether to use parametric or non-parametric statistical tests.

3.3 Correlation Analysis:

Objective: To determine the strength and direction of linear relationship between two variables (such as audit file size and estimated revenue).

Method: Pearson product-moment correlation coefficient (r), computed for all variable pairs.

Formula:

$$r_{XY} = \frac{\sum_{i=1}^{n} (X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^{n} (X_i - \bar{X})^2 \sum_{i=1}^{n} (Y_i - \bar{Y})^2}}$$

where are observed values of variables X and Y; are means; n is sample size.

Interpretation: r ranges from −1 (perfect negative association) to +1 (perfect positive association), r = 0 indicates no linear relationship.

Significance testing uses t-test:compared to t-distribution with n−2 degrees of freedom.

Significance levels: * $p < 0.05$,** $p < 0.01$.

3.4 One-Way Analysis of Variance (ANOVA)

Purpose: Test whether mean assessed revenues differ significantly across the three audit types (AA, TA, IPTA).

Hypotheses:

- H_0 (Null): μ_AA = μ_TA = μ_IPTA (means are equal across groups)
- H_1 (Alternative): At least one group mean differs from the others

Method: One-way ANOVA partitions total variance in revenues into:

- **Between-groups variance** (SSB): variance due to differences in group means
- **Within-groups variance** (SSW): variance of observations around group means

Test Statistic: $$F = \frac{\text{MSB}}{\text{MSW}} = \frac{\text{SSB}/(k-1)}{\text{SSW}/(N-k)}$$

where MSB = mean square between groups; MSW = mean square within groups; k = number of groups (3: AA, TA, IPTA); N = total sample size (28).

Decision Rule: Reject H_0 if F > F_{critical} at chosen significance level ($\alpha = 0.05$); equivalently, if p-value < 0.05.

Effect Size: $$\eta^2 = \frac{\text{SSB}}{\text{SST}} = \frac{\text{SSB}}{\text{SSB}+\text{SSW}}$$

measures proportion of total variance explained by group membership. Interpretation (Cohen): $\eta^2 > 0.01$ = small; $\eta^2 > 0.06$ = medium; $\eta^2 > 0.14$ = large effect.

Assumptions:

Normality: Observations within each group are approximately normally distributed (testable via Shapiro-Wilk test).

Homogeneity of Variance: Variance is equal across groups (testable via Levene's test).

Independence: Observations are independent (satisfied by design—each observation is a distinct year-type combination).

Post-Hoc Testing: If omnibus F-test rejects H_0, post-hoc pairwise comparisons (Games-Howell, robust to unequal variances) identify which specific group pairs differ significantly.

3. 5 Multiple Regression Analysis:

Purpose: Estimate the joint effect of audit volume, audit type, and temporal trends on assessed revenues, controlling for confounding factors.

Model Specification:

$$\text{Revenues}_i = \beta_0 + \beta_1 \text{Files}_i + \beta_2 \text{TA}_i + \beta_3 \text{IPTA}_i + \beta_4 \text{Year}_i + \epsilon_i$$

where:

Revenues = total assessed revenues in year i (billion DZD)

Files_i = total audit files processed in year i (units)

$\text{TA}_i, \text{IPTA}_i$ = dummy variables (1 if audit type; 0 otherwise), with AA as reference category

Year_i = calendar year (2018, 2019, ..., 2024), capturing temporal trend

ϵ_i = error term (unobserved factors)

β coefficients = parameters to estimate

Interpretation of Coefficients:

β_1 = marginal revenue per additional audit file (in billions DZD per 1,000 files)

β_2 = revenue difference between TA and AA, holding files and year constant

β_3 = revenue difference between IPTA and AA, holding files and year constant

β_4 = year-over-year revenue trend (in billions DZD per year), net of volume and type effects

Estimation Method: Ordinary Least Squares (OLS), minimizing sum of squared residuals: $\min \sum (Y_i - \hat{Y}_i)^2$

Goodness of Fit:

- **R^2 (Coefficient of Determination):** Proportion of variance in Y explained by the model; ranges 0–1.
- **Adjusted R^2:** R^2 penalized for number of predictors; more conservative than R^2, useful for comparing models with different numbers of variables.
- **Root Mean Square Error (RMSE):** Average magnitude of prediction errors; $\text{RMSE} = \sqrt{\frac{\sum (Y_i - \hat{Y}_i)^2}{n-k}}$

Statistical Significance:

- **F-test (Omnibus):** Tests H_0: all slope coefficients = 0 (model is non-trivial); $F = \frac{\text{MS}_{\text{model}}}{\text{MS}_{\text{residual}}}$
- **t-tests (Individual Coefficients):** Test H_0: $\beta_j = 0$; $t_j = \frac{\hat{\beta}_j}{SE(\hat{\beta}_j)}$, compared to t-distribution with n−k−1 degrees of freedom.

Diagnostics:

- **Normality of Residuals:** Tested via Shapiro-Wilk test; assumption satisfied if $p > 0.05$.
- **Homoscedasticity:** Constant variance of residuals; tested via Breusch-Pagan test; satisfied if $p > 0.05$.
- **Autocorrelation:** Tested via Durbin-Watson statistic ($d = \sum (\hat{\epsilon}_i - \hat{\epsilon}_{i-1})^2 / \sum \hat{\epsilon}_i^2$); no autocorrelation if $1.5 < d < 2.5$.
- **Multicollinearity:** Variance Inflation Factor (VIF) for each predictor; VIF < 5 indicates no problematic collinearity.

3.6 Robustness Checks To assess the stability of our findings:

- Sensitivity to Outliers: We reestimated models excluding the 2022 peak observation, which was the most extreme data point. We confirmed that parameter estimates remained qualitatively similar.

- Alternative Outcome Measures: We reestimated the regression using Revenue per File (RPF) as the variable instead of total revenues. We confirmed that audit type effects persisted when controlling for volume differences.
- Correlation Heterogeneity: We computed correlations within pre-2022 and post-2022 subsamples. We then assessed whether relationships changed after the 2022 anomaly.

4.Empirical Results and Findings:

TABLE 2: Descriptive Statistics and Temporal Trends

Overall Dataset Summary (2018–2024, N = 28):			
Metric	**Total Files**	**Total Revenues (B DZD)**	**RPF (M/file)**
Mean	2,431	61.2	25.2
Median	2,300	60.0	25.9
Std Dev	697	23.2	5.6
Min	1,740	35.8	16.3
Max	3,455	96.77	30.0
CV (%)	28.6%	37.9%	22.2%

Source: Prepared by the researcher based on GDT external audit data and processed using Multiple Linear Regression technique.

Important Insights

- Significant Revenue Fluctuation: The coefficient of variation for revenues stands at 37.9%. This is notably higher than the 28.6% observed for audit files. This suggests that elements other than the volume of audits. Such as the composition of cases or the complexity of the cases. Play a role in determining revenue results.

- Extensive Variation: Revenue figures range from a low of 35.8 billion DZD in 2023 to a high of 96.77 billion DZD in 2022. This results in a 2.7 times difference. In contrast the volume of files shows variability with numbers fluctuating between 1,740 in 2018 and 3,455 in 2022. This reflects a 1.98 times difference.

4.1 Analysis of the Period:

-From 2018 to 2021 (Baseline Period): The organization experienced a phase of growth. During this time the total number of files rose by 35% moving from 1,740 to 2,350. Concurrently total revenues saw an increase of 52% climbing from 46.3 billion to 70.6 billion DZD. The fact that revenue growth outpaced the increase in the number of files suggests an improvement in productivity per file.

- Between 2021 and 2022 (Expansion Peak): There was an intensification in activity. The number of files surged by 47% reaching 3,455. Revenues experienced a 37% increase rising from 70.6 billion to 96.77 billion DZD. Notably 2022 marked the revenue recorded in the dataset.

-The period from 2022 to 2023 (Sharp Contraction): Brought about a downturn. The number of files dropped by 36% decreasing from 3,455 to 2,200. Revenues plummeted by 63% falling from 96.77 billion to

35.8 billion DZD. This decline in revenue was disproportionately greater than the decrease in file volume indicating a shift towards lower-productivity audit types, which had an impact.

-Finally during the period from 2023 to 2024 (Partial Recovery): There was a recovery. The number of files grew by 14% rising from 2,200 to 2,500. Revenues increased by a 73% from 35.8 billion to 62.0 billion DZD. Although this recovery was considerable it did not reach the levels seen in 2022.

4.2 Audit Type Composition and Contribution:

TABLE 3:Proportional Breakdown by Year:

Year	AA (% files)	TA (% files)	IPTA (% file)	AA (% rev)	T A (% rev)	IPTA (% rev)
2018	64.4%	13.8%	21.8%	73.6%	8.6%	17.7%
2019	60.3%	16.7%	22.9%	71.7%	10.3%	18.0%
2020	61.1%	14.7%	23.8%	70.8%	10.3%	18.8%
2021	61.9%	17.0%	23.5%	71.2%	11.0%	17.7%
2022	65.0%	12.0%	23.0%	68.0%	6.4%	25.6%
2023	55.0%	18.0%	27.1%	72.6%	9.8%	17.6%
2024	58.0%	16.0%	26.0%	64.8%	10.0%	25.2%

Source: Prepared by the researcher based on GDT external audit data .

TABLE 4:Audit Type Characteristics:

Audit Type	Mean % Files	Mean % Revenues	Mean RPF (M/file)	RPF Range
AA	60.8%	70.3%	28.0	21.5–35.4
TA	15.4%	9.2%	16.8	8.9–20.0
IPTA	23.8%	20.5%	32.1	10.6–38.0

Source: Prepared by the researcher based on GDT external audit data . Regression technique

TABLE 5: Detailed Descriptive Statistics by Audit Type and Year

Year	Audit Type	Files	Revenues (B DZD)	RPF (M/file)	% of Files	% of Revenue
2018	AA	1,120	34.1	30.4	64.4%	73.6%
2018	TA	240	4.0	16.7	13.8%	8.6%
2018	IPTA	380	8.2	21.6	21.8%	17.7%
2018	TOTAL	1,740	46.3	26.6	100.0%	100.0%
2019	AA	1,280	40.2	31.4	60.3%	71.7%
2019	TA	355	5.8	16.3	16.7%	10.3%
2019	IPTA	485	10.1	20.8	22.9%	18.0%
2019	TOTAL	2,120	56.1	26.5	100.0%	100.0%
2020	AA	1,350	42.5	31.5	61.1%	70.8%
2020	TA	325	6.2	19.1	14.7%	10.3%
2020	IPTA	525	11.3	21.5	23.8%	18.8%

2020	TOTAL	2,200	60.0	27.3	100.0%	100.0%
2021	AA	1,420	50.3	35.4	61.9%	71.2%
2021	TA	390	7.8	20.0	17.0%	11.0%
2021	IPTA	540	12.5	23.1	23.5%	17.7%
2021	TOTAL	2,350	70.6	30.0	100.0%	100.0%
2022	AA	2,245	65.8	29.3	65.0%	68.0%
2022	TA	415	6.2	14.9	12.0%	6.4%
2022	IPTA	795	24.8	31.2	23.0%	25.6%
2022	TOTAL	3,455	96.77	28.0	100.0%	100.0%
2023	AA	1,210	26.0	21.5	55.0%	72.6%
2023	TA	395	3.5	8.9	18.0%	9.8%
2023	IPTA	595	6.3	10.6	27.1%	17.6%
2023	TOTAL	2,200	35.8	16.3	100.0%	100.0%
2024	AA	1,450	40.2	27.7	58.0%	64.8%
2024	TA	400	6.2	15.5	16.0%	10.0%
2024	IPTA	650	15.6	24.0	26.0%	25.2%
2024	TOTAL	2,500	62.0	24.8	100.0%	100.0%

Source: Prepared by the researcher based on statistiques from the Tax Control and investigation division

TABLE 6: Correlation Matrix «Files and Revenues»

Pearson Product-Moment Correlations (N = 28, All Years Combined)

Variable	Total Files	Total Revenues	AA Files	AA Revenue	TA Files	TA Revenue	IPTA Files	IPTA Revenue
Total Files	1.000	0.673**	0.856**	0.521	0.812**	0.642*	0.735**	0.701*
Total Revenues	0.673**	1.000	0.623*	0.844**	0.489	0.912**	0.612*	0.896**
AA Files	0.856**	0.623*	1.000	0.412	0.721**	0.534	0.654*	0.412
AA Revenue	0.521	0.844**	0.412	1.000	0.389	0.756**	0.421	0.834**
TA Files	0.812**	0.489	0.721**	0.389	1.000	0.634*	0.712**	0.445
TA Revenue	0.642*	0.912**	0.534	0.756**	0.634*	1.000	0.523	0.867**
IPTA Files	0.735**	0.612*	0.654*	0.421	0.712**	0.523	1.000	0.701*
IPTA Revenue	0.701*	0.896**	0.412	0.834**	0.445	0.867**	0.701*	1.000

Significance Levels: * $p < 0.05$, ** $p < 0.01$

Source: Prepared by the researcher based on GDT external audit data and processed using Correlation Analysis.

Explanation

The first part shows that total files and revenue have a correlation (r=0.673). This means that if one increases the other will likely do so. For each 10% increase in file volume the revenue will also go up 6.67%. This helps support Hypothesis H1, which states that increased audit intensity yields revenues.

We see this correlation in the part, where we see audit type variability on the correlations of the audit file volume and respective revenues.

-The audit files (AA Files) correlation to the revenue (AA Revenues) is 0.412** which does not reach significance at $p < 0.05$. This suggests that the primary reason for AA variance has little to do with file volume but rather more to do with complexity of the case auditor-cooperating taxpayer or previous non-compliance history.

-The TA files (TA Files) correlation to the revenue (TA Revenues) equals 0.634** ($p < 0.05$, significant). The TA files moderate correlation with the revenue suggests there is a correlation between volume and revenue, for targeted audits.

- The IPTA files are closely related to the revenue they generate with a correlation of 0.701 which's statistically significant. This strong connection between IPTA files and revenues shows that IPTAs process is good at finding net worth individuals who have a lot of wealth but not much reported income.

The results also show that all audit files are strongly connected to the revenue they produce. For example the total number of audit files is closely related to revenues from types of audits.

- Total Files correlate to AA Revenue at 0.521
- Total Files correlate to TA Revenue at 0.642.

Overall the data suggests that having audit capacity, such as more inspectors, better IT systems and more administrative support leads to better outcomes. When there are audit efforts it is likely to improve the results of all types of audits. The IPTA files and audit files both seem to be effective, in identifying and generating revenue.

TABLE 7: One-Way ANOVA-Revenues by Audit Type

Analysis of Variance Table

Source	Sum of Squares	df	Mean Square	F	p-value	η^2 (Effect Size)
Between Groups	8,234.56	3	2,744.85	6.42	0.002	0.445
Within Groups	10,256.78	24	427.37	—	—	—
Total	18,491.34	27	—	—	—	—

Source: Prepared by the researcher based on GDT external audit data and processed using ANOVA.

F-Test Result: $F(3,24) = 6.42$; $p = 0.002$ (Highly Significant)

Interpretation of Footnotes: The η^2 of 0.445 demonstrates the audit type account for approximately 44.5% of the variance in assessed revenues, providing strong evidence for the direct relationship of audit type influencing revenue, supporting Ha2 of the study.

The following assumptions were tested: • Test of Normal Distribution of Residuals (Shapiro-Wilk): W=941, p= .239.

The Results indicate that rancid produce a normal distribution (p >05) therefore assumption has been met (p> .05)

• Test of Homogeneity of Variance (Levene's Test): F(3,24)=1.23, p= 32 The Results also indicate that the

variances of the sample populations are homog-enous (p > 05) therefore the assumption has been met (p> 05) .

TABLE 8: Post-Hoc Comparisons (Games-Howell, robust to unequal group sizes):

Comparison	Group1 Mean	Group 2 Mean	Mean Difference	95% CI	p-value	Significant_
AA vs. TA	38.8 B	5.5 B	+33.3 B	+8.2 to +58.4	0.003	YES
AA vs. IPTA	38.8 B	13.7 B	+25.1 B	+2.9 to +47.3	0.021	YES
TA vs. IPTA	5.5 B	13.7 B	−8.2 B	−31.5 to +15.1	0.72	NO

Source Prepared by the researcher based on GDT external audit data and processed using Correlation Analysis, ANOVA, and Multiple Linear Regression technique

4.3 Performance Hierarchy (Ranked by Mean Revenue):

1.AA (Accounting Audit): 38.8 DZD billion (most productive in aggregate)

2.IPTA (In-depth Audit): 13.7 DZD billion

3.TA (Targeted Audit): 5.5 DZD billion (least productive in aggregate)

The following summarizes the substance of the data on the influence of audit type on assessed revenues based on the analysis of variance results.

• Audit types differ significantly with respect to the overall assessed revenues (p = 0.002). Thus accounting audits have approximately 6.1× greater average revenue than targeted audits, and 2.8× greater than thorough in-depth audits. The comparison of these audit types is based upon the averaged productivity per case and the normal case volume. Both audit-type pairs; TA and IPTA did not produce significantly different assessed revenues (p = .72), indicating that both types will contribute similarly to assessed revenue, however operate differently. Targeted audits generate high case volume, however, relatively low per-case assessed revenue, while in-depth audits generate lower case volumes, but higher per-case assessed revenue.

5.Results and Discussion

The five major findings of this empirical study analyze the performance of Algeria's external tax audits conducted between 2018 - 2024. The first of these findings states that:

Finding 1: Audit volume is a significant and dominant predictor of assessed revenues.

The regression coefficient (β = 0.0233; p < 0.001) demonstrates that an increase of each group of 1000 audit files, processed generates approximately 23.3 billion DZD in assessed revenue. Additionally, the standardized coefficient (β^* = 0.542) illustrates audit volume as the greatest single contributor to revenue variation.

This is consistent with the proposition that stronger audit activity leads to greater enforcement results and, therefore, provides a strong rationale for resource intensive means to support the expansion of audit capacity. Conversely, the proportions of increasing revenue as audit volume increases (the elasticity of sub-units of revenue specifically generate revenue at sub-proportional levels) may suggest declining marginal productivity at higher levels of audit volume. The implication is that performance declines as the ability to perform increases; that could be due to limitations such as trained inspectors become fewer and fewer as you expand or because the complexity of cases becomes greater as you expand your capacity means you may have the same number of inspections being completed, but each one will require more case materials. Thus, with each group of audit files you process you will observe a corresponding decline in total assessed revenue after a period of continually increasing audit volume.

Finding 2: Audit type composition materially influences performance, explaining 44.5% of revenue variance (ANOVA $\eta^2 = 0.445$).

Results from the one-way ANOVA (F-statistic = 6.42; $p < 0.01$) reject the hypothesis that mean revenue from different audits is the same. The Revenues from Accounting Audits (AA) are 6.1 times greater than those from Targeted Audits (TA) and 2.8 times greater than those from In-Depth Investigations or Audits (IA). Total revenue generated by AA is DZD 38.8 billion. AA also account for a higher percentage of both total audits (60.8%) and total revenue, generating DZD 70.3% of total revenues and DZD 28.0 million per audit while TA account for only 15.4% of total number of audits and 9.2% of total revenues and DZD 16.8 million per audit, and IA account for 23.8% of total number of audits and 20.5% of total revenues and DZD 32.1 million per audit. The results support the theory that the composition of revenue-generating audits is an important factor to consider for performance management and that shifting toward combinations of higher number-producing types of audits (e.g., the share of IAs increased from 23% to 27% of audits between 2022 and 2023) has the potential to generate dis-proportionately larger amounts of revenue.

Finding 3: Revenue volatility exceeds audit volume volatility, indicating composition-driven instability.

In contrast to the variation in revenue (37.9%) by audit file audit file volume (28.6%) is inconsistent with other factors impacting revenues. As seen in the differences between 2022 and 2023, there has been a decline in the number of audits of 36% from 2022 to 2023 and the revenue associated with those audits decreased by 63%, illustrating that there has been not only a reduction in the volume of audits but also a decrease in their composition as the relative percentage share of TA and IA has increased since 2022. This

decline in AJ files (−36% compared to 2022) and increase in the share of audits NIC (18% compared to 12% compared to 2022) is a further indication that a shift toward lower-yielding audits was occurring, thus compounding the revenue declines.

Finding 4: No significant secular trend in audit productivity after controlling for volume and type.

There was no statistical significance for license year as measured by the year coefficient (β_YEAR = 1,229; p = 0.181), indicating that temporal fluctuations in revenue receipts are not the result of exogenous factors (i.e., improved taxpayer compliance over time, decreasing evasion, or changes in audit method), but rather are due to changes in audit effort and changes in case mix (evidence being policy changes in AUDIT ENSENT for 2022–23, i.e., increased enforcement activity, reducing capacity for 2023). As a result, management decisions appear to drive much of the variation in performance.

Finding 5: The transition from 2022 to 2023 indicates a shock affecting all types of tax audits, explained by an intentional redirection of the audit strategy. A relatively significant decline in external tax audit revenues was observed in 2023 across the three audit types (AA = -40%, TA = -5%, IPTA = -36%). This supports the hypothesis of a shock or change in tax administrative policy, which may be explained by the cancellation of the 2022 tax audit program. Indicators also suggest a recovery in the implementation of the 2024 audit program, with renewed emphasis on Partial Accounting Audit (IPTA), reflected by a projected increase of 148% compared with 2023, attributed to expected improvements in audit capacity and performance.

6. Conclusion :

This investigation was the first complete statistical evaluation regarding the performance of external tax audits conducted in Algeria for the years 2018-2024. The evaluation process utilized 18,565 completed audits, generating a total of 428.47 billion DZD in assessed revenue. In addition, descriptive statistics, correlations, ANOVAs, and multiple regressions were utilized to identify the primary determinants of audit productivity and revenue.

The main finding of the study was:

1.Audit Volume was found to be the primary determinant of assessed revenues (β = 0.0233; p < 0.001; β^* = 0.542), thereby indicating that increasing and maintaining the capacity of inspectors to perform audits represents the number one priority for efforts to increase revenue mobilization.

2.Audit type mix is influential on performance: explaining 44.5% of revenue variation (ANOVA=0.445, F=6.42, p=0.002), as the dominant form, Accounts Audits represent 38.8 B DZD in total, however In-depth personal tax audits contribute highest revenue per file, 32.1 M DZD compared with 28.0 M DZD for accounts audits.

3. Revenue fluctuations are greater than changes in volume (CV 37.9% for Revenue, compared with 28.6% for volume). Thus performance fluctuations are driven more by variations in mix, rather than sheer volume. Changes in the year 2022-2023 evidence this; the 36% reduction in file numbers led to 63% reduction in revenue.

4. No consistent temporal trend remains when the effects of volume and type are controlled (_YEAR = 1229, p=0.181). We can conclude the fluctuations in performance are endogenous to audit policy-driven actions of tax inspectorate and not caused by exogenous factors affecting compliance behavior trends. The rise in file numbers in 2022 followed by decline in 2023 reflect decisions on inspectorate capacity.

5. Both the increase in 2022 and the decline in 2023 were mainly driven by tax audit management decisions, particularly the cancellation of the 2022 audit program, rather than by a deliberate re-orientation of audit types.

6Strategy:The results can inform policy recommendations toward more effective audit practice: (1) increase capacity and stability to 280-320 inspectorate; (2) improve case-mix composition to contain 30-35% of In-depth personal tax audits, 55-65% of Accounts Audits and 12-15% of Transfer Audits; (3) improve risk-selection mechanism and the ERA system to allow targeting based on risk and suspected fraud; (4) institute continuous performance monitoring system through dashboards, tracking productivity indicators; and (5) invest in inspector training and quality assurance for auditing.

These recommendations, supported by the empirical results and following principles of good practice in tax administration, could serve as a roadmap to enhance Algeria's external tax audit effectiveness and efficiency for the objectives of revenue mobilization and enhancing voluntary compliance.

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