Assessing the Impact of Tax Administration Modernization on Tax Revenue Collection: An Empirical Study of a Sample of Tax Administrations in Batna

قياس الأثر بين عصرنة الإدارة الضريبية والتحصيل الجبائي– دراسة ميدانية لعينة من الإدارات الضريبية بولاية باتنة

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Received: 01/01/2025 **Accepted:** 20/03/2025 **Published:** 31/03/2025

Abstract:

This study aimed to assess the impact of tax administration modernization on tax revenue collection. To achieve this objective, a questionnaire was employed as the primary data collection tool, distributed to a sample of 165 tax officers, representing a response rate of 91.67%. This study was conducted using a descriptive-analytical approach, with the field data analyzed using the SPSS statistical software. The findings revealed a statistically significant impact of the various dimensions of tax administration modernization on tax revenue collection within the tax administrations of Batna Province. Based on these findings, the study proposed several recommendations to enhance this impact, including strengthening digital infrastructure, developing e-services tailored to taxpayers, adopting incentive-based systems to encourage tax compliance through motivational initiatives, fostering partnerships with economic sectors, and implementing comprehensive legislative reforms, among other measures.

Keywords: Modernization, Establishing New Structures, Streamlining Procedures, Integration of Information and Communication Technologies, Tax Revenue Collection.

JEL Classification Codes: H20, H21, H26, H83, O33, M15.

ملخص:

هدفت هذه الدراسة قياس الأثر بين عصرنة الإدارة الضريبية والتحصيل الجبائي، ولتحقيق ذلك تم إعتماد الإستبيان كأداة لجمع بيانات الدراسة والموزع على عينة مكونة من 165 عون جبائي بنسبة 91,67%، حيث تم إجراء هذه الدراسة بإستخدام المنهج الوصفي التحليلي ومعالجة بيانات الدراسة الميدانية بالإعتماد على برنامج التحليل الإحصائي *Spss*، وقد أظهرت النتائج الدراسة وجود أثر ذو دلالة إحصائية بين مختلف أبعاد عصرنة الإدارة الضريبية والتحصيل الجبائي للإدارات الضريبية بولاية باتنة، وقد قدمت الدراسة مجموعة من التوصيات التي تساهم في التحسين أكثر من هذه الأثر، أهمها: تعزيز البنية التحتية الرقمية، تطوير الخدمات الإلكترونية الموجهة للمكلفين بالضريبة، إعتماد نظام تحفيزي للإمتثال الضريبي من إطلاق مبادرات تحفيزية، تعزيز الشراكات مع القطاعات الاقتصادية، ضرورة إجراء إصلاحات تشريعية شاملة وغيرها.

كلمات مفتاحية: عصرنة، إستحداث هياكل جديدة، تبسيط الإجراءات.، إدخال تكنولوجيا المعلومات والإتصالات، تحصيل جبائي.

تصنيفات JEL: H20، H21، H26، H83، O33، M15.

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INTRODUCTION:

Tax administration is one of the most critical pillars of the financial and economic system of any nation. It serves as a vital nerve for securing the financial resources necessary to fund public expenditures and drive economic and social development. With the mounting challenges faced by tax systems, such as tax evasion and low compliance levels, there is an urgent need to modernize tax administration in line with technological advancements and rapid economic transformations. These modernization efforts aim to enhance administrative efficiency and promote greater transparency and fairness, ultimately improving tax collection and ensuring sustainable financial resources.

In this context, the concept of modernizing tax administration encompasses a range of fundamental measures and reforms, including the adoption of digital solutions, the development of centralized databases, the facilitation of online tax services, and the transition toward e-governance. These measures are designed not only to streamline internal administrative processes but also to foster trust between taxpayers and tax authorities, thereby reducing tax disputes and encouraging voluntary compliance.

In Algeria, recent years have witnessed the launch of several initiatives aimed at reforming and modernizing the tax system as part of a national digital transformation strategy. However, the effectiveness of these initiatives and their impact on improving tax collection remain a subject of debate, particularly given the significant disparities between regions in terms of the technical and administrative capacities of tax centers to implement these reforms. Against this backdrop, Batna province emerges as a fertile ground for studying this phenomenon due to its economic and social significance and the diverse nature of its tax centers in terms of size and administrative structure.

This study seeks to provide an in-depth understanding of the role of modernizing tax administration in improving tax collection by conducting a field analysis of a sample of tax centers in Batna province. It focuses on evaluating the tangible impact of modernization measures, such as the digitization of tax processes and the development of electronic services, on financial and tax performance indicators. Furthermore, the study aims to explore the challenges encountered in implementing these reforms at the local level, offering practical recommendations to overcome obstacles and maximize benefits.

By employing a comprehensive analytical methodology that combines field data with econometric modeling, this paper provides an integrated framework for understanding the relationship between tax modernization and the efficiency of tax collection. The study aspires to bridge the knowledge gap in both local and international literature on this topic, with a particular emphasis on the Algerian experience as a case study. It aims to enrich scientific discourse on the role of digital transformation in enhancing tax performance and to offer policymakers proactive and inclusive strategies capable of balancing economic development objectives with social justice imperatives.

Problem Statement

Despite the launch of numerous initiatives to modernize tax administration in Algeria, the extent to which these reforms have improved tax collection remains unclear, particularly given the substantial regional disparities in technical and administrative capabilities and responsiveness to these reforms. Batna province provides a suitable context for investigating this issue, given its diverse tax centers in terms of size and capacity, creating a fertile

environment for analyzing the relationship between modernization efforts and tax collection levels. Based on this premise, the main research question of this study can be formulated as follows: **To what extent does modernizing tax administration impact tax collection in the tax authorities of Batna province?**

Hypotheses

To address the main research question, the following hypotheses were formulated:

H01: There is a statistically significant impact of establishing new structures on tax collection in the tax authorities of Batna province.

H02: There is a statistically significant impact of simplifying procedures on tax collection in the tax authorities of Batna province.

H03: There is a statistically significant impact of introducing information and communication technologies on tax collection in the tax authorities of Batna province.

Study Objectives

This study aims to achieve the following objectives:

- To explore the concepts of modernization and tax collection in Algeria's tax administration;
- To determine the extent to which modernizing tax administration contributes to improving tax collection in Batna province;
- To measure the relationship between digitization and modernization in tax administrations in Constantine province.

Research Methodology

To achieve the study's objectives and address its main research question, the descriptive-analytical method will be adopted. The descriptive approach will be used to describe and analyze both the modernization of tax administration and tax collection by presenting the theoretical foundations of the study. The analytical method will be employed to examine the data collected to conduct an econometric study in Batna province.

Literature Review

A number of previous studies have explored the modernization of tax administration from different angles, focusing on its organizational, audit-related, and collection-related dimensions, with the overarching aim of evaluating its impact on the performance and efficiency of tax institutions.

- **Study by** (Harrach, 2012) examined tax administration modernization as a key variable within the broader context of tax reform, seeking to assess its influence on managerial effectiveness. Using descriptive, analytical, and historical methodologies, the study reviewed both national and international experiences, including the Algerian case. It concluded that Algeria's tax administration suffers from structural inflation and a lack of modern working tools, which hindered the success of modernization initiatives. The study also criticized the reliance on aggregate GDP rather than non-hydrocarbon GDP for measuring revenue performance, arguing that the latter offers a more accurate reflection of economic growth. The Jordanian model was highlighted as the most successful among the international cases reviewed.

- **Study by** (Wessaif , 2021) addressed tax administration modernization as a mechanism to support the effectiveness of tax auditing in Algeria. The study adopted a multifaceted methodology—including historical, analytical, inductive, and descriptive approaches—

supplemented by qualitative and quantitative analysis. A field survey was conducted in 2020, targeting 100 employees from the tax audit department in Ouargla Province. The findings confirmed the significant contribution of digital administration to enhancing audit functions, and the study recommended expanding modernization practices to other sectors through a comprehensive e-government strategy.

- **Study by** (Silini, 2021) investigated the effectiveness of modern tax collection mechanisms, particularly the Jibayatic system, in improving Algeria's public revenue. Utilizing descriptive, analytical, historical, and inferential approaches, the study presented key financial indicators at both the micro level (focusing on large enterprises as major tax contributors) and macro level (assessing the contribution of modern mechanisms to public revenue mobilization). A field study was also conducted with a sample of 100 employees from the Directorate of Large Enterprises. The results demonstrated that the use of advanced digital tools significantly contributed to revenue stability during the COVID-19 pandemic, reduced collection costs, and improved service quality.

Distinctive Contribution of the Current Study

In contrast to previous research, the current study offers several original contributions that distinguish it both methodologically and thematically:

- **Rigorous quantitative fieldwork and statistical analysis**: Unlike prior studies that relied primarily on qualitative assessments or descriptive analysis, this study employed a structured questionnaire distributed to a representative sample of 165 tax officers in Batna Province, achieving a high response rate (91.67%). The data were analyzed using the SPSS software, adding statistical depth and reliability to the findings.
- **Focused examination of the direct relationship between tax administration modernization and tax collection performance**: Whereas previous studies addressed broader aspects such as administrative efficiency or audit processes, this research placed tax collection as the central dependent variable, investigating its empirical linkage with the modernization process.

1. Theoretical Foundations of the Study

1.1 Modernization in Algerian Tax Administration

1.1.1 Concept and Objectives of Tax Administration Modernization

Tax administration modernization encompasses a set of fiscal strategies designed to enhance the existing system by refining tax rates and broadening the tax base. These efforts aim to create a more efficient and adaptable framework that curtails tax evasion and improves revenue collection (Laareba & Sahnoun, 2021, p. 511). This modernization responds to the demands of the modern era by integrating fiscal processes with technological innovations in other domains, while simultaneously promoting streamlined and user-friendly administrative operations (Qanas & Zain, 2021, p. 218). The core objectives of this transformation include: : (Chaouadi & Silini, 2022, pp. 20, 21)

- **Reducing Administrative Burden:** Simplifying tax-related procedures, including assessment, collection, auditing, and dispute resolution, to ease the operational workload of tax administration staff;
- **Adopting ICT in Tax Processes:** Utilizing information and communication technologies to facilitate tax payment processes, thereby removing the necessity for taxpayers' physical

presence. This approach includes identifying taxable assets, processing taxes electronically, and managing tax records digitally;

- Updating Tax Audit Mechanisms: Standardizing audit practices in line with international benchmarks to ensure objectivity and improve the quality of inspections, thereby enhancing the efficiency of tax collection;

- Formalizing Informal Economic Activities: Incorporating unregulated economic operations into the formal economy, making them taxable and contributing additional revenue to public funds;

- Simplifying Grievance and Dispute Processes: Providing taxpayers with accessible and efficient mechanisms for submitting complaints and resolving disputes;

- Curbing Tax Evasion and Fraud: Reducing unethical tax practices, such as evasion and fraud, to strengthen compliance and promote fiscal accountability;

1.1.2 Causes Behind the Modernization of Tax Administration

The modernization of the tax administration is driven by several pressing factors, which include: (Bouziane & Mohieddine, 2021, p. 297)

- Insufficient Human Resource Proficiency: A key driver behind the Ministry of Finance's push for modernization is the underrepresentation of highly educated professionals in the tax sector. This has resulted in an administration staffed by less qualified personnel, adversely impacting its operational efficiency and performance;

- Deficiencies in Administrative Resources and Infrastructure: The physical and operational condition of tax administration facilities is marked by inadequacy and deterioration. Many offices lack the necessary equipment to carry out their functions, and a significant number operate from rented spaces, which are neither state-owned nor fully equipped to support optimal administrative performance;

- Pervasive Administrative Corruption: Public institutions, and tax administrations in particular, are plagued by unethical practices that undermine adherence to professional and regulatory standards. These behaviors expose the administration to multifaceted risks, extending beyond mere skill gaps. The absence of ethical conduct and professional integrity among some employees perpetuates corrupt practices, such as the unauthorized disclosure of confidential taxpayer information, including details about business activities, income levels, and turnover. This not only violates trust but also hampers the administration's credibility and efficiency;

1.1.3 Content of the Tax Administration Modernization Program

1.1.3.1 Development of New Structures

- Directorate of Large Enterprises (DLE): The Directorate of Large Enterprises (DLE) is a key structure introduced in Algeria’s tax system under Article 32 of the 2002 Finance Law. Established as part of efforts to comprehensively modernize fiscal frameworks, the DLE officially began operations in January 2006. Its primary function is to manage tax files of major corporations with annual turnovers exceeding 100 million DZD, including petroleum firms and foreign companies without permanent establishments in Algeria, as defined under the corporate tax law (Dhaifallah & Al, 2018, p. 88).

- Tax Center: The Tax Center is a newly established entity under the fiscal reform program to modernize the tax administration. Governed by Articles 31 and 32 of the 2003 Finance Law, it

is responsible for managing taxpayers under the real regime. Its operations include determining taxable bases, tax collection, resolving disputes, and providing taxpayer services, such as information and guidance (Bouzianee & Mohieddine, 2021, p. 155).

- Proximity Tax Center: The Proximity Tax Center was created to handle taxpayers under the Unified Flat Tax (UFT). It started operations in 2006 alongside the Directorate of Large Enterprises. This center determines taxable assets, collects taxes, and resolves disputes for taxpayers within the flat-rate regime. By replacing traditional tax inspectorates and collection offices, the center aims to simplify and enhance taxpayer services, reduce administrative structures, and enable tax officials to perform their duties more effectively (Raki & Amari, p. 2020).

1.1.3.2 Simplification of Procedures

Public authorities have adopted a strategic plan to overcome barriers in the tax system, including complexity, limited tax bases, high tax burdens, and rampant tax evasion and fraud. This plan focuses on: (Ouchan & Belazouz, 2017, p. 69)

- Reducing Tax Burdens: Alleviating financial pressures on taxpayers.

- Introducing Rigorous Tax Recovery Measures: Developing efficient mechanisms to reclaim evaded taxes.

- Streamlining Tax Collection Processes: Simplifying procedures from identifying taxable bases to the final collection phase. Key legislative reforms include:

The Tax Compliance Program (2015 Supplementary Finance Law) aimed at broadening the tax base by taxing individual investments at a flat rate of 7%. This initiative seeks to generate additional revenue, encourage economic actors to transition into the formal sector, and fund investments;

- Promoting Productive Activities: Implementing tax reductions to incentivize economic productivity;

- Simplifying Fiscal Documentation Processes: Reducing paperwork requirements and improving access to fiscal documents for taxpayers;

- Enhancing Tax Audits: Introducing four audit types—document-based, comprehensive, targeted accounting, and in-depth fiscal reviews—to improve compliance and accountability;

- Combating Tax Evasion: Enforcing stricter penalties and fines to deter evasion.

1.1.3.3 Integration of Information and Communication Technology

The integration of information and communication technology (ICT) within the tax administration has emerged as a cornerstone of fiscal reform, particularly in light of current circumstances that necessitate alignment with global advancements, where technology plays a pivotal role in executing various activities. Efforts to modernize the tax administration focus on incorporating ICT to enhance the delivery of tax-related services. This approach simplifies processes, strengthens communication channels with the tax administration, and ensures seamless access to essential information;

To achieve greater transparency and minimize legal violations, whether by tax administration employees or taxpayers, the administration leverages cutting-edge technological tools. This strategy not only reduces operational expenses but also upholds the principle of resource efficiency. Furthermore, the digitization of the tax administration enhances the effectiveness of the tax system by combating administrative corruption, lowering costs, streamlining tax payment procedures for taxpayers, and enabling centralized

monitoring of both employees and taxpayers. This centralized oversight significantly reduces the likelihood of legal violations (Bouglia & Harraq, 2021, p. 157).

1.2 General Overview of Tax Collection

1.2.1 Definition of Tax Collection

Tax collection is defined as a set of administrative and technical procedures through which tax debts are transferred from taxpayers to the public treasury (Selini & Talbi, 2021, p. 395).

Furthermore, the term "tax collection" refers to a series of operations aimed at transferring tax amounts from taxpayers' pockets to the treasury's funds. Based on this definition, the collection phase represents the final stage of the tax process, where all preceding stages serve to prepare and facilitate this outcome (Bouzeida, 2007, p. 35).

Based on the above, it can be concluded that tax collection is the most critical phase of the taxation process, as it ensures the financing of the public treasury through revenues collected from taxpayers.

1.2.2 Tax Collection Guarantees

Tax collection is governed by several guarantees established by tax law, ensuring the efficient recovery of tax debts. These guarantees include the following (Ben Azoug & Mesqam, 2020, pp. 520, 521):

- Obligation to Pay Before Disputing: If a taxpayer disputes the validity or amount of a tax, this does not exempt them from paying it. The taxpayer must first fulfill their payment obligation and then seek reimbursement through the appropriate legal channels;

- Enforcement Measures for Non-Payment: Delays in paying taxes within the legally specified deadlines enable the tax administration to implement enforcement measures, including administrative seizures of the taxpayer's bank accounts, movable assets, and real estate. These measures serve as a means of pressuring the taxpayer to fulfill their obligations. Should the taxpayer fail to settle their tax debt, their movable and real estate assets may be auctioned to recover the state’s dues;

- Priority of Tax Debts: Tax debts are granted a legal privilege referred to as the "right of lien," which ensures their priority over other debts. This principle is explicitly outlined in Article 991 of the Civil Code, underscoring the precedence of tax obligations;

In conclusion, the guarantees associated with tax collection represent a set of legal provisions designed to ensure the efficient recovery of tax debts from taxpayers. These guarantees clarify the obligations of taxpayers and emphasize the priority of settling tax debts over other financial liabilities, thereby safeguarding the financial resources of the state.

1.2.3 Methods of Tax Collection

The process of tax collection is carried out using a variety of methods, which can be outlined as follows:

1.2.3.1 Direct Remittance

This method relies on the voluntary payment of taxes by the taxpayer, without any compulsion from the tax administration. This voluntary payment is the fundamental principle upon which the method is based. Tax obligations are settled according to one of the following two approaches (Boujriou & Hraq, 2022, p. 75):

- Total Direct Remittance: Under this approach, the full amount of tax is paid at once, either as a lump sum or in a single payment.

- Advance Installment Method: This method is considered one of the most significant in terms of financing the public treasury, as it generates regular liquidity for the government. It also alleviates the tax burden on the taxpayer, making it easier to fulfill the obligation. Unlike the taxpayer who settles the tax in one payment, this method allows for periodic installments throughout the fiscal year, based on the tax liability from the previous year. The settlement is then finalized by May 1st or after the taxable profit for the current year has been determined (Feroum, 2021, pp. 48, 49).

One of these two approaches is used for collecting specific types of taxes, with the possibility of choosing between them. For example, the flat-rate tax can be collected using either method, while the corporate profit tax is legally required to be paid through periodic installments.

1.2.3.2 Withholding at Source

The withholding at source method involves a third party, typically one that has a business relationship with the actual taxpayer, being designated to pay the tax on behalf of the taxpayer. This is done by withholding the owed tax amount and remitting it directly to the public treasury. An example of this method is the tax on income from movable property, which is paid through financial instruments, such as bonds or securities. Additionally, the tax on wages and salaries is often withheld by a third party—in this case, the employer (Mehrazzi, 2008, p. 159).

According to this method, two categories of taxpayers are faced by the tax administration: the actual taxpayer and the third-party payer who is responsible for remitting the tax to the public treasury.

1.2.4 Penalties and Sanctions Applied During the In-depth Tax Investigation to Improve Tax Collection

1.2.4.1 Penalty for Failure to File Registration

According to Article 194 of the Law on Direct Taxes and Similar Fees: a taxpayer who fails to file the required registration declaration, as outlined in Article 183 of this law, is subject to a tax penalty amounting to thirty thousand dinars (30.000 DZD) (Article 194 Bis 1, 2022, p. 46).

1.2.4.2 Penalty for Tax Evasion

Article 194 bis 1: The tax administration imposes a financial penalty of six hundred thousand dinars (600.000 DZD) on taxpayers involved in cases of tax evasion, as defined by the procedures in Article 20 bis 3 of the Tax Procedure Law. This penalty applies regardless of the tax system under which the taxpayer is subject;

This penalty amount increases to one million two hundred thousand dinars (1.200.000 DZD) if, at the time of the tax evasion report, the taxpayer's turnover exceeds fifteen million dinars (15.000.000 DZD), as set forth in the flat-rate tax system under Article 282 bis 4 of the Law on Direct Taxes and Similar Fees. If the taxpayer has incurred penalties for other reasons during the same period, these penalties relate to violations distinct from those triggering the tax evasion penalty (Article 194 Bis 1, 2022, p. 46).

1.2.4.3 Penalties for Late Filing of G50 Declaration

Article 115: A penalty of 10% is imposed for the late filing of the turnover declaration required by Article 76 (Article 116, 2022, p. 32).

This penalty increases to 25% if the tax administration sends a formal notice to the taxpayer via a registered letter with acknowledgment of receipt, instructing them to rectify their situation within one month.

1.2.4.4 Penalties for Tax Fraud Detection

Article 116:

- If, after an investigation, it is found that the annual turnover declared by the taxpayer is insufficient, or if deductions were improperly applied, the following percentages will be added to the amount of tax evaded: (Article 116, 2022, p. 32)

10%: If the total evaded tax for the fiscal year is less than or equal to 50.000 DZD;

15%: If the total evaded tax for the fiscal year exceeds 50.000 DZD but is less than or equal to 200.000 DZD;

25%: If the total evaded tax for the fiscal year exceeds 200.000 DZD.

- In cases where fraudulent methods were used, a 100% penalty will be applied to the total tax owed (Article 116, 2022, p. 33).

Additionally, the tax administration may request the application of Article 117, which pertains to criminal penalties, if the evaded tax exceeds 10% of the amount of taxes actually due (Article 116, 2022, p. 33).

Based on the penalties and sanctions outlined above, the taxpayer is required to fulfill their tax obligations in full. In the event of non-compliance with tax laws and regulations, the taxpayer will face a range of punitive and corrective measures, which will vary depending on the nature of the violation and the amount of concealed profits.

2. The Field Aspect of Measuring the Impact of Tax Administration Modernization on Tax Collection in the Tax Administrations of Batna Province

The field study is considered one of the practical procedures relied upon to determine the relationship between the variables of the study. It is conducted using a questionnaire as a tool to gather the opinions of the sample individuals on the study variables separately. The nature of the relationship is then identified using the SPSS software and applying a set of statistical tests. In this section, the impact of modernizing tax administration on tax collection in several tax centers in Batna Province will be examined through a series of steps. These steps are presented in two main sections: the methodological procedures of the study and the descriptive measures of the study participants' responses, followed by hypothesis testing, as outlined below:

2.1 Methodological Procedures of the Study

This section addresses the study's population and sample, presents the primary data collection tools related to this sample, and concludes with the validity testing of the measurement tool and descriptive analysis of the study's demographic variables.

2.1.1 Study Population and Sample

The study population consists of tax officers from various tax administrations in Batna Province. For the purpose of the field study, a random sample of 180 tax officers was selected.

Questionnaires were distributed to these individuals, and 165 valid responses were retrieved for analysis, representing 91.67% of the total distributed questionnaires.

2.1.2 Data Collection Tools

In this study, the questionnaire will be used as a survey tool to achieve the research objectives. The questionnaire is divided into two sections: the first section covers the demographic information of the tax officers, while the second section aims to assess the respondents' perceptions of each variable in the study model (modernization of tax administration and tax collection). The questionnaire is one of the tools employed in quantitative research, which is characterized by the use of various statistical software packages for data analysis.

The questionnaire was constructed using a five-point Likert scale, ranging from 1 ("Strongly Disagree") to 5 ("Strongly Agree"), to ensure the validity of the quantitative research tool.

The items in the questionnaire were selected based on a review of previous literature and evaluated by several academic researchers to avoid any potential errors that could negatively affect the results of the study.

2-1-3 Validity of the Measurement Tool and Descriptive Analysis of Study Participants' Responses:

2-1-3-1 Reliability of the Measurement Tool (Cronbach's Alpha Coefficient)

To verify the reliability of the study tool (the questionnaire), Cronbach's alpha coefficient was utilized, with the results presented as follows:

Table (1): Validity and Reliability Coefficients

Dimension	Number of Items	Cronbach's Alpha Coefficient	Reliability
First Dimension: Creation of New Structures	08	0.820	0.906
Second Dimension: Simplification of Procedures	08	0.886	0.941
Third Dimension: Introduction of Information and Communication Technology	08	0.782	0.884
First Core: Modernization of Tax Administration	**24**	**0.846**	**0.920**
Second Core: Tax Collection	**12**	**0.866**	**0.931**
Total	**36**	**0.848**	**0.921**

Source: Prepared by the researcher based on SPSS 26 results.

It is evident from **Table (1)** that the measurement tool used in this study exhibits a high level of reliability and consistency, as demonstrated by the elevated values of Cronbach's alpha and the associated reliability coefficients for each study dimension.

At the level of the sub-dimensions within the "Modernization of Tax Administration" core, the "Creation of New Structures" dimension achieved a Cronbach's alpha value of 0.820 with a reliability coefficient of 0.906, reflecting a strong internal consistency among the items within this dimension. The "Simplification of Procedures" dimension recorded a Cronbach's alpha of 0.886 with a high reliability of 0.941, while the "Introduction of Information and Communication Technology" dimension demonstrated a Cronbach's alpha of 0.782 and a reliability coefficient of 0.884, indicating good cohesion among the related items.

For the core dimensions of the study, the "Modernization of Tax Administration" core attained a Cronbach's alpha of 0.846 with a reliability coefficient of 0.920, while the "Tax Collection" core recorded a Cronbach's alpha of 0.866 and a high reliability of 0.931, signaling a high level of accuracy and trustworthiness. Overall, the total Cronbach's alpha coefficient for the measurement tool stood at 0.848, with a total reliability coefficient of 0.921, further affirming the tool's effectiveness in providing precise and consistent data that supports the achievement of the research objectives.

These results confirm the high-quality design of the questionnaire and its strong alignment with the study's objectives, reflecting accuracy in the selection of items and their capability to effectively and unprecedentedly measure the study variables.

2-1-3-2 Descriptive Characteristics of the Study Sample

The demographic characteristics and attributes of the study sample are summarized in the table below:

Table (2): Descriptive Characteristics of the Study Sample (Taxation Officers)

Demographic Variable	Category	Frequency	Percentage
Gender	Male	107	65%
	Female	58	35%
Educational Level	Professional Certificate	7	4%
	Bachelor's Degree	89	54%
	Master's Degree	38	23%
	Doctorate	13	8%
Job Position	Technical Roles	94	57%
	Administrative Roles	71	43%
Age	21 to <31 years	18	11%
	31 to <41 years	73	44%
	41 to <51 years	45	27%
	>51 years	29	18%

Source: Prepared by the researcher based on SPSS 26 results.

Table (2) highlights the demographic characteristics of the study sample, consisting of taxation officers from the tax administrations in Batna province. The results reveal that males represent the majority, accounting for 65% (107 officers), compared to females who make up 35% (58 officers), indicating a male-dominated professional environment in this sector.

In terms of educational attainment, most officers hold university degrees. Specifically, 54% (89 officers) have a bachelor's degree, followed by 23% (38 officers) with a master's degree, while only 8% (13 officers) have earned a doctorate. This distribution underscores a focus on medium to advanced qualifications within the workforce. Conversely, officers with professional certificates represent a marginal proportion, accounting for just 4% (7 officers), reflecting limited reliance on vocational qualifications in this field.

Regarding job positions, the majority of officers occupy technical roles, comprising 57% (94 officers), compared to 43% (71 officers) in administrative roles. This demonstrates a strong emphasis on technical expertise within tax administration structures.

Age-wise, the largest group falls within the 31 to <41 years category, accounting for 44% (73 officers), followed by the 41 to <51 years group at 27% (45 officers). Officers aged over 51 years represent 18% (29 officers), while the youngest age group, 21 to <31 years, constitutes the smallest proportion at 11% (18 officers).

2-2 Descriptive Measures of Responses and Hypothesis Testing

To test the study's hypotheses, several statistical tests will be conducted. The first step involves descriptive analysis, relying on measures such as the arithmetic mean and standard deviation. This analysis evaluates the tendencies of the responses and opinions of the study sample regarding each questionnaire item. Descriptive analysis serves as a foundational step in determining the nature of the relationship between study variables.

The second step involves T-tests and calculating the correlation coefficient (R) to confirm or reject the hypotheses. The following sections provide a detailed breakdown of these tests:

2-2-1 Descriptive Measures of Sample Responses

Descriptive analysis focuses on measuring the degree of agreement among the study participants for each item within the study dimensions, aiming to understand the impact of tax administration modernization on tax collection. Given that the questionnaire uses a five-point Likert scale, the following ranges for the arithmetic mean were established to classify responses:

[1–1.80]: Strongly Disagree;
[1.80–2.60]: Disagree;
[2.60–3.40]: Somewhat Agree;
[3.40–4.20]: Agree;
[4.20–5]: Strongly Agree;

Table (3): Responses of the Study Sample on the Dimensions of Tax Administration Modernization

Statement	Mean	Standard Deviation	Result
Establishing specialized tax centers contributes to improving the monitoring and collection of tax revenues.	3.93	0.66	Agree
Introducing new structures in tax administration enables better services for taxpayers.	3.92	0.85	Agree
Developing administrative structures ensures qualified competencies that support the performance of tax agents.	3.88	0.82	Agree
Establishing specialized directorates for major economic activities achieves tax fairness.	3.79	0.76	Agree
Organizing the tax structure enhances coordination between various tax administrations.	4.22	0.79	Strongly Agree
Establishing advanced structures improves the tax control system for taxpayers.	3.68	0.82	Agree
Introducing new administrative structures strengthens the ability to combat tax evasion.	3.18	1.04	Agree
Establishing new structures improves the quality of tax services at the local level.	3.12	0.89	Somewhat Agree
Dimension 01:Establishing New Structures	**3.92**	**0.88**	**Agree**
Simplifying tax procedures reduces the time required to complete tax transactions.	4.04	0.79	Agree
Facilitating tax declaration processes improves taxpayers' compliance.	4.18	0.64	Strongly Agree
Reducing complexity in tax laws and procedures enhances taxpayers' trust in the tax system.	4.18	0.98	Strongly Agree
Unifying tax declarations facilitates tax transactions.	3.84	0.68	Agree
Simplifying tax procedures reduces taxpayers' compliance	4.22	0.96	Strongly

costs.			Agree
Accelerating tax file processing increases the effectiveness of tax administration.	4.09	0.85	Agree
Simplifying procedures reduces disputes between taxpayers and tax administration.	4.24	0.79	Strongly Agree
Reducing the required documentation for taxpayers speeds up tax operations.	3.64	0.65	Agree
Dimension 02: Simplifying Procedures	**4.08**	**0.78**	**Agree**
Introducing information and communication technology accelerates tax collection procedures.	4.22	0.64	Strongly Agree
Using electronic systems improves the accuracy of tax declaration processes.	4.12	0.76	Agree
Adopting modern software reduces human errors in tax operations.	4.08	0.77	Agree
Applying technology enhances transparency and clarity in tax transactions.	4.12	0.72	Agree
Using information and communication technology facilitates communication between tax administration and taxpayers.	4.08	0.80	Agree
Introducing digital systems reduces the operating costs of tax administration.	3.90	0.68	Agree
Using modern technology simplifies tax audit and control processes.	4.00	0.80	Agree
Introducing information technology enhances the speed and accuracy of decision-making in tax administration.	4.39	0.60	Strongly Agree
Dimension 03: Introducing Information Technology	**4.06**	**0.82**	**Agree**
First Core: Modernization of Tax Administration	**4.00**	**0.89**	**Agree**

Source: Prepared by the researcher based on SPSS 26 results.

The analysis of **Table (3)** reveals that the dimension of "Simplifying Procedures" achieved the highest mean score (4.08), underscoring its critical role in enhancing tax administration performance. The findings indicate that statements related to reducing disputes between taxpayers and the tax administration received the highest evaluation (4.24), followed by the statement concerning lowering tax compliance costs for taxpayers (4.22). Furthermore, the analysis confirms that simplifying procedures contributes to shortening the time required for completing tax operations and increasing taxpayers' trust in the tax system by mitigating the complexities of laws and regulations (4.18). However, the statement regarding reducing the documentation required from taxpayers received a relatively lower evaluation (3.64), reflecting the need for further improvements in this area. Accordingly, it is recommended to strengthen procedural simplification by reducing administrative requirements and enhancing technical tools to achieve greater efficiency.

As for the introduction of information and communication technology, this dimension ranked second with a mean score of (4.06). The data show that the use of technology accelerates tax collection procedures (4.22), improves the accuracy of tax declaration processes (4.12), and reduces human errors through the adoption of modern software (4.08). Technology also enhances transparency and clarity in tax transactions and facilitates communication between the tax administration and taxpayers. Nevertheless, its impact on reducing the operating costs of the tax administration received a relatively lower evaluation (3.90). Therefore, continued investment in the digital transformation of tax administration is

recommended by enhancing and integrating digital systems to maximize their impact on operational efficiency.

Finally, the dimension of "Establishing New Structures" achieved a mean score of (3.92), ranking third among the studied dimensions. The results indicate that organizing the tax structure to improve coordination between tax departments received the highest evaluation (4.22), followed by the impact of developing structures on providing qualified competencies to support the performance of tax agents (3.88). However, the evaluation of improving the quality of tax services at the local level was relatively lower (3.12), signaling challenges in fully leveraging the benefits of new structures. Consequently, it is recommended to focus efforts on enhancing local tax services and linking new structures to clear strategic plans that ensure efficiency and tax fairness at both the central and local levels.

2-2-3 Descriptive Metrics for the Tax Collection Dimension

Table (4) Responses of Study Sample Participants on the Tax Collection Dimension

Statement	Mean	Standard Deviation	Result
Simplifying tax procedures facilitates collection processes and reduces delays in tax payments.	4.02	0.88	Agree
Reducing administrative complexities in the tax system improves taxpayer compliance and enhances tax revenue collection.	4.68	0.94	Strongly Agree
Standardizing tax forms and procedures improves the performance of tax officers and increases collection efficiency.	3.68	0.68	Agree
Establishing new structures for the tax administration enhances the effectiveness of tax monitoring and collection processes.	4.06	0.89	Agree
Creating specialized directorates for direct tax monitoring improves collection accuracy and ensures revenues reach the public treasury.	3.25	0.74	Agree
Organizing administrative structures reduces errors and enhances efficiency in collecting various types of taxes.	3.58	0.99	Agree
Improving coordination between tax departments accelerates collection processes and increases their efficiency.	3.88	0.69	Agree
Establishing regional offices for the tax administration enhances collection services at the local level and boosts tax revenue.	4.22	0.78	Agree
Simplifying the collection procedures for indirect taxes reduces administrative effort and improves treasury resources.	3.22	1.04	Agree
Reducing the tax burden in line with taxpayers' capacity enhances compliance and increases collection efficiency.	3.83	0.85	Agree
Updating monitoring methods in tax administration reduces tax evasion and enhances the effectiveness of collection processes.	3.22	0.66	Agree
Improving human resource management in tax administration strengthens tax officers' capabilities and ensures more efficient tax collection.	4.06	0.78	Agree
Second Core: Tax Collection	**4.16**	**0.82**	**Agree**

Source: Prepared by the researcher based on SPSS 26 results.

Table (4) highlights that the tax collection dimension achieved a high overall mean score of 4.16, reflecting a broad acknowledgment of the importance of improving tax collection procedures and mechanisms to enhance the efficiency of tax administration and boost public revenues. The data indicate that the most influential factor in enhancing tax collection efficiency is *reducing administrative complexities*, which recorded the highest mean score of 4.68. This underscores its pivotal role in fostering taxpayer compliance and increasing tax revenues. It emphasizes the necessity of adopting strategies focused on

simplifying administrative systems to promote voluntary compliance and reduce compliance costs.

On the other hand, the establishment of specialized regional offices for tax administration received a high mean score of 4.22, demonstrating their effectiveness in delivering exceptional collection services at the local level and achieving efficiency in tax monitoring processes. Similarly, the evaluation of human resource management improvement ranked among the top factors with a mean of 4.06, signifying the importance of developing human competencies as a cornerstone for ensuring the quality and effectiveness of tax collection operations.

Conversely, statements such as simplifying indirect tax collection procedures and updating monitoring methods in tax administration received relatively lower mean scores of 3.22 each. This highlights the need to review the mechanisms for collecting indirect taxes and redesign tax monitoring approaches to reduce evasion and ensure transparency. Additionally, the establishment of specialized directorates for direct tax monitoring scored a limited mean of 3.25, reflecting challenges associated with managing such organizational structures and necessitating a reevaluation of their efficiency and feasibility.

2-2-4 Hypothesis Testing:

- First Hypothesis:

There is a statistically significant effect of the establishment of new structures on tax collection in the tax administrations of Batna Province.

To test this hypothesis, the null and alternative hypotheses are formulated as follows:

H0: There is no statistically significant effect of the establishment of new structures on tax collection in the tax administrations of Batna Province.

H1: There is a statistically significant effect of the establishment of new structures on tax collection in the tax administrations of Batna Province.

Table (5): Regression Analysis of Variance, Correlation Coefficients, and R-Squared to Illustrate the Relationship Between the Establishment of New Structures and Tax Collection in Batna's Tax Administrations

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Significance Level	Correlation Coefficient	R-Squared
Regression	26.668	1	26.668	248.662	0.000	0.724	0.668
Residual	14.338	164	0.079				
Total	41.006	165					

Source: Prepared by the researcher based on SPSS V.26 results.

Table (5) reveals that the calculated F value is 248.662, which is higher than the tabulated F value of 3.84. The corresponding significance level is 0.000, which is less than the conventional significance level of 0.05. Therefore, the model is valid for testing the hypothesis.

Additionally, the table shows a strong positive correlation between the establishment of new structures and tax collection in the tax administrations of Batna Province, with a correlation coefficient of 0.724. This value, which lies between 0.50 and 1, indicates a substantial relationship between these two variables. The R-squared value is 0.668, meaning that 66.8% of the variation in the dependent variable (tax collection) can be explained by

changes in the independent variable (the establishment of new structures). The remaining variance is attributed to other factors not explored in this study.

Table (6) Significance Test of the Simple Linear Regression Model Coefficients for the Effect of Establishing New Structures on Tax Collection

Model	Coefficients	Standard Error	Bêta	T	(Sig)
Intercept (A)	1.05	160.1		2.228	0.000
Regression Coefficient (B1)	0.642	280.0	0.566	18.122	0.000
Simple Linear Regression	**Tax Collection = 1.05 + (0.642) Establishment of New Structures**				

Source: Prepared by the researcher based on SPSS V.26 results.

Table (6) shows that the coefficients of the simple linear regression model are statistically significant (non-zero), with a significance level of 0.000, which is lower than the accepted significance level of 0.05. The regression coefficient (B) is 0.642, meaning that a one-unit increase in the establishment of new structures leads to an increase of 64.20 in tax collection.

These findings lead to the rejection of the null hypothesis and acceptance of the alternative hypothesis, indicating that there is a statistically significant effect of establishing new structures on tax collection in the tax administrations of Batna Province.

- Second Hypothesis:

There is a statistically significant effect of simplifying procedures on tax collection in the tax administrations of Batna Province.

To test this hypothesis, the null and alternative hypotheses are formulated as follows:

H0: There is no statistically significant effect of simplifying procedures on tax collection in the tax administrations of Batna Province.

H1: There is a statistically significant effect of simplifying procedures on tax collection in the tax administrations of Batna Province.

Table (7): Regression Analysis of Variance, Correlation Coefficients, and R-Squared to Illustrate the Relationship Between Simplifying Procedures and Tax Collection in Batna's Tax Administrations

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Significance Level	Correlation Coefficient	R-Squared
Regression	32.448	1	32.448	228.512	0.000	0.704	0.580
Residual	16.862	164	0.069				
Total	49.310	165					

Source: Prepared by the researcher based on SPSS V.26 results.

Table (7) reveals that the calculated F value is 228.512, which exceeds the tabulated F value of 3.84. The corresponding significance level is 0.000, which is lower than the conventional significance level of 0.05. Thus, the model is valid for testing the hypothesis.

Additionally, this table shows a strong positive correlation between simplifying procedures and tax collection in the tax administrations of Batna Province, with a correlation coefficient of 0.704. This value, which lies between 0.50 and 1, indicates a substantial relationship between the two variables. The R-squared value is 0.580, meaning that 58% of the variation in the dependent variable (tax collection) can be explained by changes in the independent variable (simplifying procedures). The remaining variation is attributed to other unexamined factors.

Table (8): Significance Test of the Simple Linear Regression Model Coefficients for the Effect of Simplifying Procedures on Tax Collection

Model	Coefficients	Standard Error	Bêta	T	(Sig)
Intercept (A)	0.980	0.104		1.128	0.000
Regression Coefficient (B1)	0.552	0.086	0.664	20.024	0.000
Simple Linear Regression	**Tax Collection = 0.980 + (0.552) Simplifying Procedures**				

Source: Prepared by the researcher based on SPSS V.26 results.

Table (8) shows that the coefficients of the simple linear regression model are statistically significant (non-zero), with significance levels of 0.000, which are lower than the accepted significance level of 0.05. The regression coefficient (B) is 0.552, meaning that a one-unit increase in simplifying procedures leads to an increase of 55.20 in tax collection.

These findings lead to the rejection of the null hypothesis and the acceptance of the alternative hypothesis, indicating that there is a statistically significant effect of simplifying procedures on tax collection in the tax administrations of Batna Province.

- Third Hypothesis:

There is a statistically significant effect of the introduction of information and communication technologies (ICT) on tax collection in the tax administrations of Batna Province.

To test this hypothesis, the null and alternative hypotheses are formulated as follows:

H0: There is no statistically significant effect of the introduction of ICT on tax collection in the tax administrations of Batna Province.

H1: There is a statistically significant effect of the introduction of ICT on tax collection in the tax administrations of Batna Province.

Table (9) Regression Analysis of Variance, Correlation Coefficients, and R-Squared to Illustrate the Relationship Between Information and Communication Technologies and Tax Collection in Batna's Tax Administrations

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Significance Level	Correlation Coefficient	R-Squared
Regression	44.468	1	44.468	328.675	0.000	0.820	0.796
Residual	18.220	164	0.089				
Total	62.688	165					

Source: Prepared by the researcher based on SPSS V.26 results.

Table (9) indicates that the calculated F value is 328.675, which exceeds the tabulated F value of 3.84. The corresponding significance level is 0.000, which is less than the accepted significance level of 0.05. Therefore, the model is valid for testing the hypothesis.

Moreover, this table shows a strong positive correlation between the introduction of ICT and tax collection in the tax administrations of Batna Province, with a correlation coefficient of 0.820. This value, which lies between 0.50 and 1, indicates a substantial relationship between the two variables. The R-squared value of 0.796 means that 79.6% of the variation in the dependent variable (tax collection) can be explained by changes in the independent variable (ICT). The remaining variation is attributable to other unexamined factors.

Table (10): Significance Test of the Simple Linear Regression Model Coefficients for the Effect of Information and Communication Technologies on Tax Collection

Model	Coefficients	Standard Error	Bêta	T	(Sig)
Intercept (A)	1.12	0.214		2.068	0.000
Regression Coefficient (B1)	0.886	0.009	0.488	18.940	0.000

Simple Linear Regression	Tax Collection = 1.12 + (0.886) ICT

Source: Prepared by the researcher based on SPSS V.26 results.

Table (10) shows that the coefficients of the simple linear regression model are statistically significant (non-zero), with significance levels of 0.000, which are below the accepted significance level of 0.05. The regression coefficient (B) is 0.886, meaning that a one-unit increase in the introduction of ICT leads to an increase of 88.60 in tax collection.

These results lead to the rejection of the null hypothesis and the acceptance of the alternative hypothesis, indicating that there is a statistically significant effect of the introduction of ICT on tax collection in the tax administrations of Batna Province.

Conclusion:

Digitalization and modernization of tax administration are not merely technical matters or updates to procedures; they represent a comprehensive process that includes enhancing administrative structures, developing legislation, and building a strong relationship between the tax administration and taxpayers. The study demonstrated a significant improvement in tax collection in Batna Province as a result of digital initiatives. However, this improvement was not uniform across all tax centers, as some faced challenges related to infrastructure, insufficient staff training, and resistance to change.

Despite these challenges, the findings suggest that greater gains could be achieved by focusing on the integration of technological modernization and the development of human competencies, as well as strengthening transparency and trust in the tax system.

In light of the study's findings on the impact of tax administration modernization on tax collection, it is evident that modernizing tax administration and adopting modern technologies are essential to enhancing operational efficiency and achieving financial sustainability. Field evidence from tax collection centers in Batna Province indicates that digitalization and the improvement of services provided to taxpayers have significantly contributed to improving tax compliance rates, reducing tax evasion, and increasing transparency in administrative processes. However, the success of these initiatives depends on the tax administration’s ability to overcome a range of challenges, including inadequate digital infrastructure, a shortage of qualified personnel, and resistance from certain stakeholders to change.

Based on these findings, the study offers a set of strategic recommendations aimed at strengthening the impact of modernization efforts and achieving a qualitative leap in the performance of the tax system:

- Enhancing Digital Infrastructure: This can be achieved by improving information systems used in tax administration and developing integrated, comprehensive databases;
- Developing E-services for Taxpayers: Improve the quality of digital platforms and simplify their use by taxpayers to facilitate tax declarations and fulfill tax obligations;
- Implementing a Tax Compliance Incentive System: Introduce initiatives such as offering financial discounts or benefits to compliant taxpayers while imposing deterrent penalties on violators;
- Strengthening Partnerships with Economic Sectors: Collaborate with businesses and economic institutions to develop flexible and supportive tax policies for economic activity, especially in emerging sectors;

- Implementing Comprehensive Legislative Reforms: Ensure that legislative reforms keep pace with modernization needs and enhance the tax administration's ability to adapt to technological changes;
- Launching Intensive Awareness Campaigns: Educate the public on the importance of tax compliance and the role of tax collection in achieving national development.

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