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Assessing the impact of modernization as a mediating variable on the relationship between tax administration digitization and tax collection in Eastern Algerian Tax Departments: A structural equation modeling approach using AMOS

Saida Slimani
Department of Finance and Accounting, Faculty of Economic, Commercial and Management Sciences, University of Constantine 2, Algeria.
Email: saida.slimani@univ-constantine2.dz
ORCID: https://orcid.org/0000-0001-5334-5801

Mousaab Sahnoune
Department of Finance and Accounting, Faculty of Economic, Commercial and Management Sciences, University of Constantine 2, Algeria.
Email: mousaab.sahnoune@univ-constantine2.dz

Zoheir Bouchemla
Department of Finance and Accounting, Faculty of Economic, Commercial and Management Sciences, University of Constantine 2, Algeria.
Email: zoheir.bouchemla@univ-constantine2.dz

***Abstract*---**This study aims to measure the impact of modernization on the relationship between tax administration digitization and tax collection within tax departements in Eastern Algeria. To achieve the study's objectives, 581 questionnaires, representing a 96.83% response rate, were analyzed using the advanced statistical software Amos.v26 and SPSS.v26. The study revealed a statistically significant indirect effect of each dimension of tax administration digitization on tax collection in Eastern Algerian tax departments, with tax administration modernization serving as a mediating variable. Based on these findings, several recommendations were made, the most important of which is the necessity of providing suitable infrastructure by intensifying efforts to modernize tax administration, thereby

Corresponding author: *Bouchemla, Z., Email: zoheir.bouchemla@univ-constantine2.dz*
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enhancing the success of tax administration digitization strategies in improving tax collection in Algeria.

***Keywords*---**Tax Administration Modernization, Tax Administration Digitization, Tax Collection, Eastern Algeria.

1. Introduction

Taxes have been the backbone of public revenue for the state for centuries (Suharyono, 2018, p. 47). They serve as a fundamental governmental tool for generating income and are among the essential strategic assets needed to finance infrastructure, including providing basic goods, delivering public services, ensuring the efficient management of governmental institutions, and achieving economic growth and stability (ADEKOYA, 2022, p. 309).

Some define taxes as a contribution contract between taxpayers and the state, resulting in financial resources directed towards developing infrastructure and meeting the various needs of citizens (Adekoya, Olaoye, & Lawal, 2020, p. 57). The primary objective of all countries, whether developed or developing, in imposing taxes is to achieve a level of tax collection that aligns with the country's legal framework. The strength of tax administration lies in ensuring a high level of tax compliance by effectively applying tax laws and regulations (Clement , Abiola , & Abiodun , 2017, p. 131).

In order to achieve the greatest possible benefit across various government institutions, and in line with rapid developments and the widespread adoption of Information and Communication Technology (ICT), government institutions have moved towards adopting these technological strategies as an entry point to e-government. This aims to modernize administrative work procedures in accordance with these developments (ALKHSABAH, 2017, p. 329). This shift contributes to greater efficiency and increases the level of citizen engagement by allowing access from anywhere and at any time via the internet, which has led to the emergence of the e-government concept (Majdalawi, Almarabeh, Mohammad, & Quteshate, 2015, pp. 131,132).

Among the drivers that led governments to adopt these modern strategies are the need for technologies that contribute to increasing operational efficiency, reducing costs, improving promotional strategies, and achieving greater profitability. Developed countries have successfully undergone this transformation and have moved towards adopting more effective technologies, such as artificial intelligence. As for developing countries, they are striving to keep pace with this progress by incorporating e-administration into their institutions (Almutairi, 2014, p. 57).

Digital tax systems are considered an electronic government service aimed at taxpayers, facilitating the process of paying imposed taxes using ICT (Hammouri & Abu-Shanab, 2017, p. 170). The United States of America was the first Western country to digitize tax administration in 1986, followed by the governments of Turkey and Taiwan in 1998, the Australian government in 1999, the South Korean government in 2002, the Japanese government in 2004, and the

Malaysian government in 2006. Among Arab countries, the Jordanian government was the pioneer in this transformation in 2005 (Hammouri & Abu-Shanab, 2017, p. 172), while the digitization of tax administration in Algeria began in 2017.

2. Previous studies

Recently, there has been an increased focus on explaining the relationship between the digitization of tax administration and taxpayers' inclination to pay their taxes—thus contributing to improved tax collection—as well as the acceptance or rejection of modern, information, and communication technology-based methods in the field of taxation (Momani, Jamous, & Hilles, 2017, p. 1). Among the topics that have gained considerable attention in this field, researchers differ in defining taxpayer behavior toward electronic systems. Western researchers often rely on various models and theories to explain taxpayers' acceptance of technology, such as the Technology Acceptance Model (TAM) introduced by Davis (1989). TAM focuses on two main factors: perceived usefulness and perceived ease of use to determine the behavioral intention to adopt technology. Studies have shown varying results, with some supporting the relationship between these factors and advocating for the use of digital tax administration, or what is commonly called e-tax (Azmi, Kamarulzaman, & Hamid, 2012) (Azmi & Bee, 2010) (SUHANI & RADIAH , 2012) (BILAL, HASHMI, & FIAZ, 2015) (I-Chiu, Yi-Chang , Won-Fu , & Hisn-Ginn, 2005) (Azleen, 2009) (Syed Kashif , Cassy Daniels, & Gaurav, 2017) (Patience Njina & Jackson, 2019) (Wang, 2003) (Otieno, 2018).

Another widely used model among Western researchers in this area is the Unified Theory of Acceptance and Use of Technology (UTAUT), introduced in 2003, which includes several determinants (performance expectancy, effort expectancy, social influence, and facilitating conditions), with added factors that vary depending on the context and purpose of the study (Alibrahee & Abdul-Jabbar, 2016) (Carter & al, 2011) (Lu & al, 2016). UTAUT factors were found insufficient to explain the electronic tax filing environment in Nigeria due to the specificity of systems deployed by the government. Some studies on this topic were conducted without relying on the mentioned models (Allahverdi & al, 2017) (Do, 2022) (Lymer & al, 2012) (Night & Bananuka, 2020) (Saibon & al, 2016).

Further research contrasts with previous studies in terms of results, arguing that adopting an e-tax system was not highly effective in improving tax collection due to a lack of trust and security among its users. (Edward & Ambrose, 2017) (Hammouri & Abu-Shanab, 2017). Other studies suggested it might be better to combine several models to study taxpayers' behavior towards tax administration digitization (Syed Kashif , Cassy Daniels, & Gaurav, 2017). Findings from these studies indicate that combining determinants from various models (Venkatesh & al, 2003) positively influenced taxpayers' behavioral intentions to use e-tax systems.

The primary aim of this study is to simulate Algeria’s situation amid the digitization of tax administration by using a model developed by the researcher, which includes two directly related variables: the digitization of tax administration and tax collection. This relationship is mediated by a third variable, the

modernization of tax administration, as the Algerian environment is a developing one with unique methods for digitizing tax administration, facing challenges that hinder the adoption of digital portals without modernizing the tax administration, used here as a mediating variable.

3. The problematic

The availability of indicators of tax administration modernization is one of the essential factors contributing to the effectiveness of adopting digitization in tax administration, aimed at improving tax collection in Algeria. This study seeks to prove this by addressing the following problem: Does the digitization of tax administration affect tax collection in the tax administrations of Eastern Algeria, with the modernization of tax administration acting as an intermediary variable?

4. Literature review

4.1. Tax administration modernization

It includes the tax procedures aimed at modernizing the current system, by controlling tax rates and improving the tax base in a way that contributes to establishing an effective system, characterized by flexibility, where the rate of tax evasion decreases and tax collection improves (Laariba & Sahnoun, 2021, p. 511). It also seeks to address the challenges of the third millennium and achieve alignment between the tax field and technological developments in other areas, while providing administrative procedures that are simple and straightforward (Qannas & Zein, 2021, p. 218).

4.2. Tax administration digitalization

It represents a strategy consisting of a set of electronic portals that provide various tax services to taxpayers, such as tax registration, tax Filling and payment, and requesting a tax clearance certificate (Akpubi & Igbekoyi , 2019, p. 54). It relies on information and communication technology to implement, evaluate, and manage all processes related to tax collection. It is considered one of the modern governmental technologies in the tax field, aimed at improving the quality of tax services, delivering them in a timely manner, and at the lowest possible cost (Chijioke, Ofurum , Amaefule, & Henry, 2018, pp. 20, 21).

4.3. Tax collection

It refers to the administrative and technical methods aimed at funding the state's public treasury through the collection of various types of taxes and fees imposed on taxpayers (Ben Mohammed & Qatal, 2022, p. 749). It consists of a set of procedures aimed at transferring tax debt from the pockets of taxpayers to the tax administration, which is responsible for transferring it to the state's public treasury, in accordance with a set of laws and regulations established by tax legislation (Ben Yaba & al, 2021, p. 188).

5. Development of Hypotheses and Presentation of the Conceptual Model for the Study

5.1 Development of Hypotheses and Presentation of the Conceptual Model for the Study

5.1.1 Electronic Tax Registration and tax Services Provision

Electronic registration is a procedure that relies on information and communication technologies and is considered a type of digital service (Dajana & Zein El Abidine Badr, 2020, p. 38).

- H1: There is a statistically significant indirect effect of electronic tax registration and service provision on tax collection in the tax administrations of Eastern Algeria, mediated by the modernization of tax administration as an intermediary variable.

5.1.2 Electronic National Card for Tax Fraudsters

This card is an electronic document that contains information proving that taxpayers have committed serious legal and legislative violations against the tax administration, customs, and commercial authorities (Boudali & Bouchaneb, 2016, p. 270).

- H2: There is a statistically significant indirect effect of the electronic national card for tax offenders on tax collection in the tax administrations of Eastern Algeria, mediated by the modernization of tax administration as an intermediary variable.

5.1.3. Service Quality Reference System

It is a system aimed at improving the level and quality of reception services, consisting of 15 commitment standards related to the quality of reception and 5 standards related to commitments subject to continuous change. Thus, they collectively form 20 standards known as service quality commitments. This system is derived from the best international practices (Shaabani & Zarqwad, 2017, p. 11).

- H3: There is a statistically significant indirect effect of the service quality reference system on tax collection in the tax administrations of Eastern Algeria, mediated by the modernization of tax administration as an intermediary variable.

5.1.4 the declaration and payment portals JIBAYA'TIC and MOUSAHAMA'TIC

This technology was adopted and implemented at the level of the Regional Tax administration of Eastern Algeria on April 30, 2017, which was responsible for managing 2,662 taxpayers associated with this portal (Kheir, 2022, p. 625). In addition to declaration services, these two portals are characterized by the capability for remote payment (Beloul, 2022, p. 405).

- H4: There is a significant indirect effect of the electronic declaration and payment portals "JIBAYA'TIC " and " MOUSAHAMA'TIC " on tax collection in the tax administrations of Eastern Algeria, mediated by the modernization of tax administration as an intermediary variable.

5.1.5. Electronic Tax control SAP-TRM

It is the mechanism responsible for transferring various files to the relevant tax authorities for evaluation. Therefore, the submission of tax declarations requires them to be subjected to electronic tax supervision to ensure the documentation of the declared data (Toumi & Ben Amara, 2019, p. 246).
- H5: There is a significant indirect effect of the electronic tax control SAP-TRM on tax collection in the tax administrations of Eastern Algeria, mediated by the modernization of tax administration as an intermediary variable.

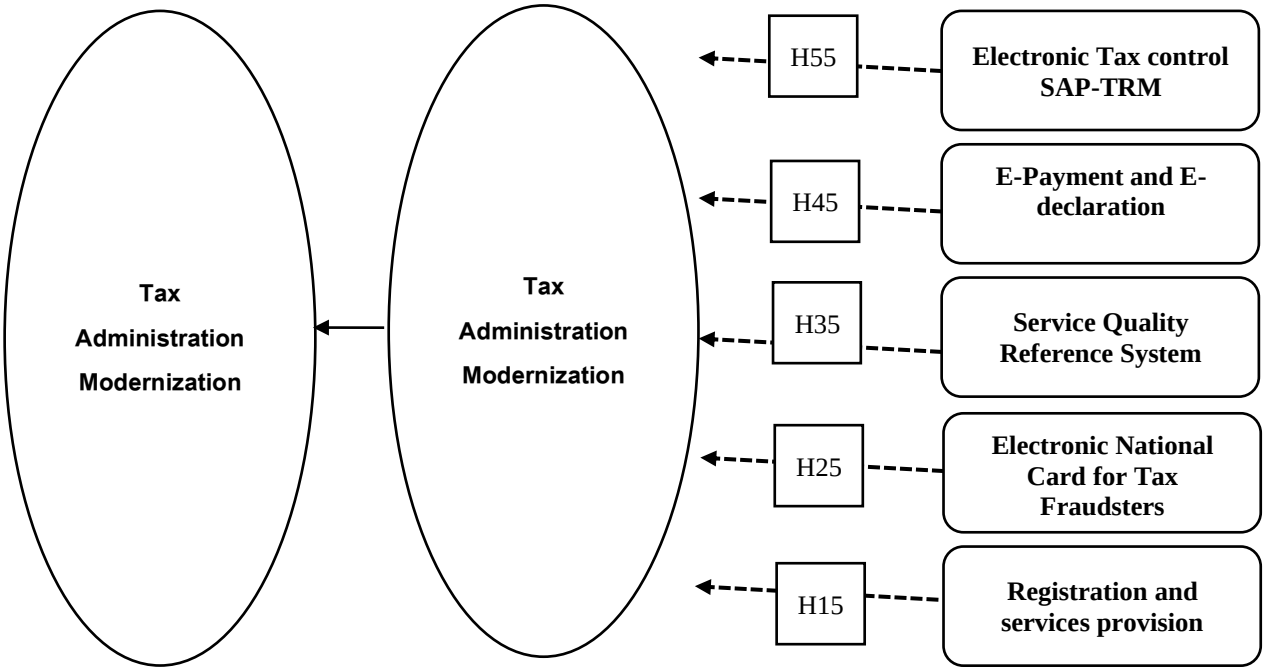

Figure 01: The Study model.
Source: made by the researchers based on the theoretical aspect and the previous studies

5.2. Research Tools

5.2.1. Research Method

The quantitative approach is the methodology adopted in this study to test the research hypotheses and to ensure the validity and quality of the fit and stability of the conceptual model. The statistical programs Spss v.26 and Amos v.26 were utilized (Hair Jr & al, 2010). Data corrections were made to address errors during data collection and prior to data analysis, along with the exclusion of incomplete questionnaires. These measures are referred to as data screening, where unusable responses are eliminated as suggested by (Hu & Bentler, 1999, p. 09).
In this study, the Structural Equation Modeling (SEM) technique was employed to confirm the existence of a specific relationship through the application of multivariate techniques, using Spss v.26, Amos v.26, and Confirmatory Factor Analysis (CFA) (Levy, 2003).

5.2.2. Population and Study Sample:

Determining the sample size is one of the most crucial steps undertaken by the researcher, as noted by (Hulley & al, 1988), after identifying the problem to be studied in general. Regarding structural equation modeling, according to (Hair & al, 2014), the minimum sample size is 200. In this study, the approach suggested by (Hair & al, 2014) was followed, with the studied sample size reaching 581 respondents, collected using a purposive sampling method (non-random sampling). This study targeted a sample of taxpayers.

5.2.3. Data-collection tool:

The tool used in this study is the questionnaire as a survey method to achieve the study's objective. It is one of the tools relied upon in quantitative research (Hair & al, 2014) and is widely used in topics related to digital adoption, as it employs a set of detailed questions to cover the study's subject and target a large number of participants in a practical and efficient manner (Venkatesh & al, 2003). The questionnaire was divided into two sections: the first section represents the demographic information of each respondent, while the second section aims to understand the respondent's perception of each variable. It includes dimensions of tax administration digitization in Algeria, consisting of 52 statements, constructed according to a five-point Likert scale ranging from 1 "Strongly Disagree" to 5 "Strongly Agree." The statements were selected based on a comprehensive review of the previous literature and evaluated by several academic researchers to avoid any errors that could negatively impact the survey results.

5.3. Results analysis and Hypothesises testing

5.3.1. Credibility and consistency of the measurement tool

5.3.1.1. Conceptual integrity

To test the conceptual integrity, all measurement tools were tested as well to determine the credibility all measurement scales were tested for reliability and construct validity using CFA (Levy, 2003, p. 08). Before that, the variable coding is presented as follows:

Table 01: Variables abbreviations and the study's dimensions

The variable	The dimention	Number of phrases	abbreviation
Digitalization of the tax administration	E-registration and application of fiscal services	05	**ETSG**
	The National Electronic Card for Tax Fraudsters	05	**ECTG**
	The reference system of service quality	05	**RSQG**
	E-declaration and E-payment through Jibaya'tic and Mousahama'tic	06	**EDPG**
	The Electronic Tax Audit Program SAP-TRM	05	**ECPG**
Modernization of the tax administration	/	16	**MTAG**
Tax collection	/	10	**TCG**

Source: Made by the researchers

- The Confirmatory Factor Analysis (CFA) for the Variable of Tax Administration Digitalization :

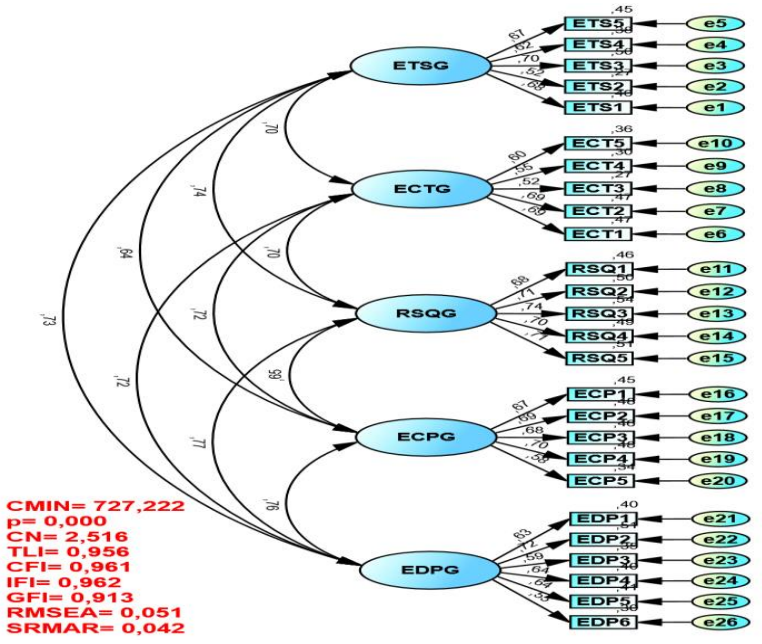

Figure 02: The result of the Confirmatory Factor Analysis (CFA) for the Variable of Tax Administration Digitalization.
Source: made by the researchers through Amos V.26.

Table 02: The results of the Confirmatory factor analysis of the tax digitalization variable

			Estimate	C.R.	P
ETS1	<---	**ETSG**	,682		
ETS2	<---	**ETSG**	,519	10,982	***
ETS3	<---	**ETSG**	,705	14,379	***
ETS4	<---	**ETSG**	,619	12,872	***
ETS5	<---	**ETSG**	,668	13,392	***
ECT1	<---	**ECTG**	,685		
ECT2	<---	**ECTG**	,686	14,177	***
ECT3	<---	**ECTG**	,518	10,738	***
ECT4	<---	**ECTG**	,546	11,085	***
ECT5	<---	**ECTG**	,601	12,268	***
RSQ1	<---	**RSQG**	,678		
RSQ2	<---	**RSQG**	,707	14,868	***
RSQ3	<---	**RSQG**	,736	15,258	***
RSQ4	<---	**RSQG**	,698	14,559	***
RSQ5	<---	**RSQG**	,713	14,749	***

			Estimate	C.R.	P
ECP1	<---	**ECPG**	,671		
ECP2	<---	**ECPG**	,693	14,095	***
ECP3	<---	**ECPG**	,679	13,486	***
ECP4	<---	**ECPG**	,696	13,741	***
ECP5	<---	**ECPG**	,581	12,236	***
EDP1	<---	**EDPG**	,635		
EDP2	<---	**EDPG**	,716	14,122	***
EDP3	<---	**EDPG**	,593	11,982	***
EDP4	<---	**EDPG**	,636	12,581	***
EDP5	<---	**EDPG**	,637	12,687	***
EDP6	<---	EDPG	,549	11,134	***

Source: made by the researchers through Amos V.26.

It is evident from Figure (02) and Table (02), and according to the general rule for accepting factor analysis values, they must be greater than or equal to 0.50, as indicated by Hair J.F and al. It shows that all statements are above the minimum threshold for confirmatory factor analysis values, ranging between 0.518 and 0.736, making them valid for subsequent statistical analyses. The results from the Amos program indicate that all estimates for the model focused on tax administration digitalization are significant at p<0.001, and the C.R. values are greater than 1.96.

- Confirmatory Factor Analysis for the Variable of Tax Administration Modernization

- Confirmatory Factor Analysis for the Variable of Tax Administration Modernization

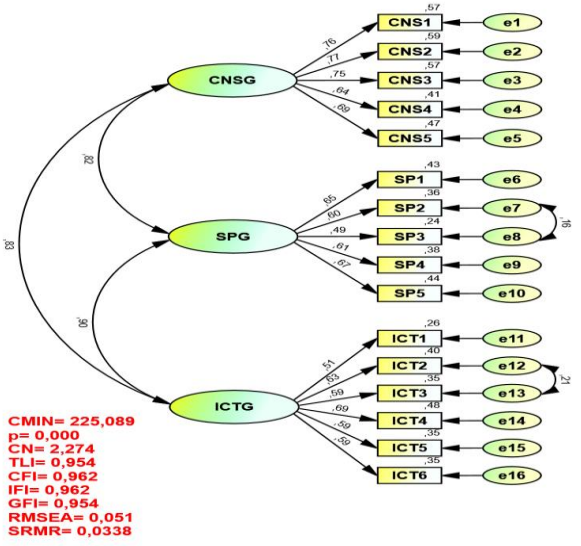

Figure 03: The results of Confirmatory factor Analysis for the Variable of Tax Administration Modernization.

Source: made by the researchers through Amos V.26.

Table 03: The results of Confirmatory factor Analysis for the Variable of Tax Administration Modernization

			Estimate	C.R.	P
CNS1	<---	**CNSG**	,758		
CNS2	<---	**CNSG**	,768	18,296	***
CNS3	<---	**CNSG**	,755	17,674	***
CNS4	<---	**CNSG**	,641	14,862	***
CNS5	<---	**CNSG**	,687	16,101	***
SP1	<---	**SPG**	,654		
SP2	<---	**SPG**	,598	12,247	***
SP3	<---	**SPG**	,493	10,169	***
SP4	<---	**SPG**	,615	12,284	***
SP5	<---	**SPG**	,666	13,484	***
ICT1	<---	**ICTG**	,506		
ICT2	<---	**ICTG**	,632	10,558	***
ICT3	<---	**ICTG**	,591	10,076	***
ICT4	<---	**ICTG**	,694	10,802	***
ICT5	<---	**ICTG**	,590	9,910	***
ICT6	<---	**ICTG**	,591	9,960	***

Source: made by the researchers through Amos V.26.

It is evident from Figure (03) and Table (03), and according to the general rule for accepting factor analysis values, they must be greater than or equal to 0.50, as indicated by Hair J.F and al. It shows that all statements exceed the minimum threshold for confirmatory factor analysis values, ranging between 0.493 and 0.768, making them valid for subsequent statistical analyses. The results from the Amos program indicate that all estimates for the model focused on tax administration modernization are significant at $p<0.001$, and the C.R. values are greater than 1.96.

- Confirmatory Factor Analysis for the Tax Collection Variable

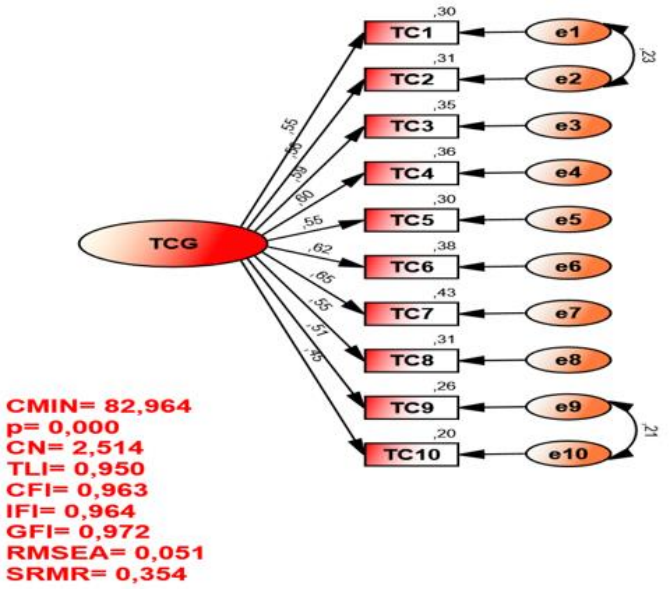

Figure 04: Results of the Confirmatory Factor Analysis for the Tax Collection Variable
Source: made by the researchers through Amos V.26.

Table 04: Results of the Confirmatory Factor Analysis for the Tax Collection Variable

			Estimate	C.R.	P
TC1	**←-**	**TCG**	,552		
TC2	**←-**	**TCG**	,560	11,525	***
TC3	**←-**	**TCG**	,593	10,569	***
TC4	**←-**	**TCG**	,600	10,522	***
TC5	**←-**	**TCG**	,547	9,815	***
TC6	**←-**	**TCG**	,619	10,590	***
TC7	**←-**	**TCG**	,655	11,079	***
TC8	**←-**	**TCG**	,553	9,941	***
TC9	**←-**	**TCG**	,509	9,079	***
TC10	**←-**	**TCG**	,449	8,477	***

Source: made by the researchers through Amos V.26.

It is evident from Figure (04) and Table (04) that, according to the general rule for accepting factor analysis values, they should be greater than or equal to 0.50, as indicated by Hair.J.F and al. All statements exceed the minimum threshold for confirmatory factor analysis values, ranging between 0.449 and 0.655, making them valid for subsequent statistical analyses. The results from the Amos

software show that all estimates of the tax collection axis model are significant at p<0.001, and the C.R values are greater than 1.96.

5.3.1.2. the consistency of the measurement tool

To measure the reliability of the study tool, Cronbach's Alpha coefficient is used for the axes of the questionnaire in this study, which consists of 52 statements distributed across three axes. It achieved a value of 0.954, which is greater than the standard Cronbach's Alpha value of 0.60. The obtained value is considered good, acceptable, and aligns with the purposes of scientific research.

5.3.2. Data Analysis

5.3.2.1. Descriptive Analysis of Demographic Variables

The demographic characteristics of the study sample individuals include predominant traits such as gender, age, educational level, and job position.

Table 05: Sample distribution according its characteristics

gender		Age		Educational level		Career position	
Option	**Repition and ratio**	**Option**	**Repition and ratio**	**Option**	**Repition and ratio**	**Option**	**Repition and ratio**
Male	268 49,2	**30-18**	248 42,7	**High school**	27 4,6	**Technical fields**	463 79,69
Female	295 50,8	**40-31**	146 25,1	**Bachelor**	285 49,1	**Common fields**	100 20,31
		50-41	131 22,5	**Masters**	199 34,3		
		60-51	53 9,1	**Magister**	20 3,4		
		Above 60	03 0,5	**PhD**	42 7,2		
				Work diploma	08 1,4		

Source: made by the researchers based on the results of SPSS 26.

From Table (05), we observe that the female category represents the highest percentage of respondents to the survey at 50.8%. Regarding age, the age group of 18-30 achieved the highest percentage at 42.7%. Meanwhile, individuals with a Bachelor's degree had the highest response rate in terms of educational level, reaching 49.1%. Additionally, technical staff received the highest response rate concerning job position, accounting for 79.69%.

5.3.2.2. Analysis of Descriptive Metrics for Survey Axes

The descriptive analysis focuses on measuring the degree of agreement of the sample individuals with each item in the study's axes to understand their

response towards the impact of modernizing tax administration and its effect on the relationship between the digitization of tax administration and tax collection.

Table 06: The Responses of the sample (tax agents) regarding the mediating effect of modernizing tax administration on the relationship between the digitization of tax administration and collection in the East of Algeria

The Variables	Average	Standard deviation	Evaluation
E- registration and E-declaration	4,11	0,604	**Agree**
The National Electronic Card for Tax Fraudsters	4,03	0,609	**Agree**
The reference system of service quality	4,00	0,632	**Agree**
E-declaration and E-payment through Jibaya'tic and Mousahama'tic	4,04	0,579	**Agree**
The electronic tax control program SAP-TRM	4,04	0,600	**Agree**
Tax administration digitalization	4,04	0,489	**Agree**
Tax administration modernization	4,12	0,513	**Agree**
Tax Collection	4,15	0,469	**Agree**

Source: made by the researchers based on the results of SPSS 26.

From the previous table, it is evident that the highest Average in the axis of tax administration digitization was for the dimension of e-registration and e-declaration of tax services, with an average of 4.11 and a standard deviation of 0.604. This indicates that the tax administrations in Eastern Algeria have the necessary websites to provide various tax services to taxpayers. In second place is the dimension of electronic declaration and payment through the 'Jibaya'Tic' and 'Mousahama'Tic' portals, with an Average of 4.04 and a standard deviation of 0.579. This shows that these administrations use electronic declaration and payment through these portals, as they offer advantages that facilitate tax procedures across different structures. In third place is the electronic tax control program SAP-TRM, which achieved an Average of 4.04 and a standard deviation of 0.600. This indicates that these administrations rely on the SAP-TRM electronic tax control program, known for its accuracy in reviewing various tax declarations, and for its ability to provide detailed reports on the tax status of taxpayers. In fourth place is the national electronic card for tax evaders, with an Average of 4.03 and a standard deviation of 0.609, which falls within the approval range. This value suggests that these administrations use this card to monitor this category of taxpayers, as it simplifies the process of tracking them. In fifth place is the service quality reference system, with an average of 4.00 and a standard deviation of 0.632. This demonstrates that these administrations are committed to achieving service quality by applying the standards of the service quality reference system, which includes the necessary flexibility to measure the quality of services provided by their various structures, contributing to effective reception tasks.

The axis of tax administration modernization achieved an Average of 4.12 and a standard deviation of 0.513. This shows that the study sample in these administrations agrees on the existence of an implemented tax administration

modernization program through the establishment of new structures, the simplification of tax imposition and collection procedures, and the integration of information and communication technology. Meanwhile, the average for the tax collection axis was 4.15 with a standard deviation of 0.469, indicating that the study sample of tax agents in these administrations agrees on the presence of modern methods used by their administrations that contribute to improving tax collection.

5.3.3. Natural distribution test

To test for normal distribution, skewness and kurtosis coefficients are used, where skewness should fall within the range [-3; +3] and kurtosis within the range [-10; +10]. There is less consensus regarding kurtosis, but absolute values from 8 to 20 are described as indicating 'severe' kurtosis, with the general rule being that a value exceeding 10 suggests a problem, and a value above 20 indicates a more serious issue (Kline Rex, 2016, pp. 76, 77). It is evident, based on Hair's rule, that the values of both Skewness and Kurtosis should all fall within the lower and upper limits of normal distribution [-1.96; +1.96] (Hair Jr & al, 2010, p. 116). After applying the normal distribution test to the data obtained from respondents for each of the study variables, the following results were obtained:

Table 7: Natural distribution results

Variable	Skewness factor	c.r.	Kurtosis factor	c.r.
Tax administration digitalization variable				
ETS1	-1,024	-10,073	1,166	5,739
ETS2	-,860	-8,459	1,009	4,963
ETS3	-,859	-8,457	,671	3,302
ETS4	-,880	-8,663	,442	2,176
ETS5	-,695	-6,841	-,021	-,101
EDP6	-,904	-8,896	1,361	6,697
ECT1	-1,135	-11,164	1,412	6,948
ECT2	-,873	-8,591	,648	3,190
ECT3	-,786	-7,737	,529	2,604
ECT4	-,713	-7,015	,524	2,579
ECT5	-,719	-7,077	,350	1,723
RSQ1	-,871	-8,573	,884	4,350
RSQ2	-,728	-7,166	,556	2,736
RSQ3	-,686	-6,752	,674	3,315
RSQ4	-,970	-9,547	1,447	7,121
RSQ5	-,775	-7,624	,504	2,479
ECP1	-,653	-6,426	,445	2,189
ECP2	-,820	-8,067	,747	3,676
ECP3	-,629	-6,186	,223	1,095
ECP4	-,618	-6,084	,397	1,951
ECP5	-,593	-5,834	,102	,501

EDP1	-,772	-7,599	,351	1,729
EDP2	-,673	-6,625	-,020	-,097
EDP3	-,823	-8,099	,723	3,557
EDP4	-,546	-5,371	,007	,034
EDP5	-,779	-7,667	,380	1,871
EDP6	-,904	-8,896	1,361	6,697
Multivariate			**259,611**	**81,998**
Tax administration modernization variable				
CNS1	-1,303	-12,827	2,085	10,259
CNS2	-,825	-8,119	,709	3,489
CNS3	-1,061	-10,440	1,461	7,188
CNS4	-,931	-9,161	1,014	4,989
CNS5	-,933	-9,185	1,123	5,523
SP1	-,884	-8,702	,871	4,286
SP2	-,827	-8,135	,943	4,642
SP3	-,960	-9,449	1,225	6,027
SP4	-,757	-7,451	,333	1,639
SP5	-,989	-9,728	1,416	6,968
ICT1	-,821	-8,079	,544	2,678
ICT2	-,766	-7,542	,680	3,347
ICT3	-,851	-8,371	1,305	6,419
ICT4	-1,022	-10,054	1,471	7,236
ICT5	-,653	-6,423	,170	,834
ICT6	-,756	-7,442	,516	2,538
Multivariate			**163,749**	**82,229**
Tax collection variable				
TC1	-,941	-9,260	1,354	6,662
TC2	-,890	-8,758	1,795	8,831
TC3	-,744	-7,324	1,175	5,783
TC4	-,620	-6,102	,198	,974
TC5	-,758	-7,456	,706	3,475
TC6	-,600	-5,905	,419	2,059
TC7	-,682	-6,712	,354	1,740
TC8	-,624	-6,137	,773	3,806
TC9	-,794	-7,815	1,037	5,103
TC10	-1,558	-15,330	3,624	17,831
Multivariate			**50,640**	**39,395**

Source: made by the researchers based on Amos 26.

From the previous Table, it is evident that the data for each variable of the study, based on the rule of Hair J.F. and others, which defines when data is normally distributed, show that all skewness and kurtosis values fall within the lower and upper limits of normal distribution [-1.96; +1.96]. This provides an indication that the study data related to each variable follow a normal distribution, according to the results from the Amos software, making it suitable for subsequent statistical analyses.

5.3.4. Testing Hypotheses:

In order to test the hypotheses and determine whether they should be accepted or rejected, the Regression Weights method was used, which includes the output of regression estimates that indicate how much of the dependent variable is explained by the independent variable. This method relies on using structural equation modeling, which provides the researcher with Goodness of Fit indicators to test the suitability or fit of the model to the data through the Amos.v.26 software. When these indicators are well-accepted, the test becomes very accurate (Hakim & al, 2009, p. 25). The Bootstrapping method was also used to determine the statistical significance of the mediating relationship and to set confidence intervals at a 95% confidence level. This method is considered the best for testing statistical significance because it draws thousands of samples from the original sample, making the test very precise, and it determines the most accurate range for the confidence intervals of the mediating relationship.

Table 08: Indicators of Fit Quality

Indicator	The perfect range of the indicator
K square CMIN	To be non-significant High values indicate a mismatch
CN=CMIN/DF	Less than 5 indicates good match and fit
GFI	GFI>=0.90 Better match
TLI	TLI>=0.95 Better match
CFI	CFI>=0.95 Better match
SRMR	SRMR<=0.05 Better match
RMSEA	0.05<=RMSEA<=0.08 Indicates a good match If 0.08<=RMSEA<=0.10 indicates an acceptable match

Source: Prepared by the researcher based on (Tigza, 2012, pp. 244, 247).

5.3.4.1. Testing the first Hypothesis

To test the first hypothesis, two hypotheses are formulated:
H0: There is no statistical indirect effect of electronic registration and submission of tax services on tax collection by the tax administrations in Eastern Algeria through tax administration modernization as a mediating variable.
H1: There is a statistical indirect effect of electronic registration and submission of tax services on tax collection by the tax administrations in Eastern Algeria through tax administration modernization as a mediating variable

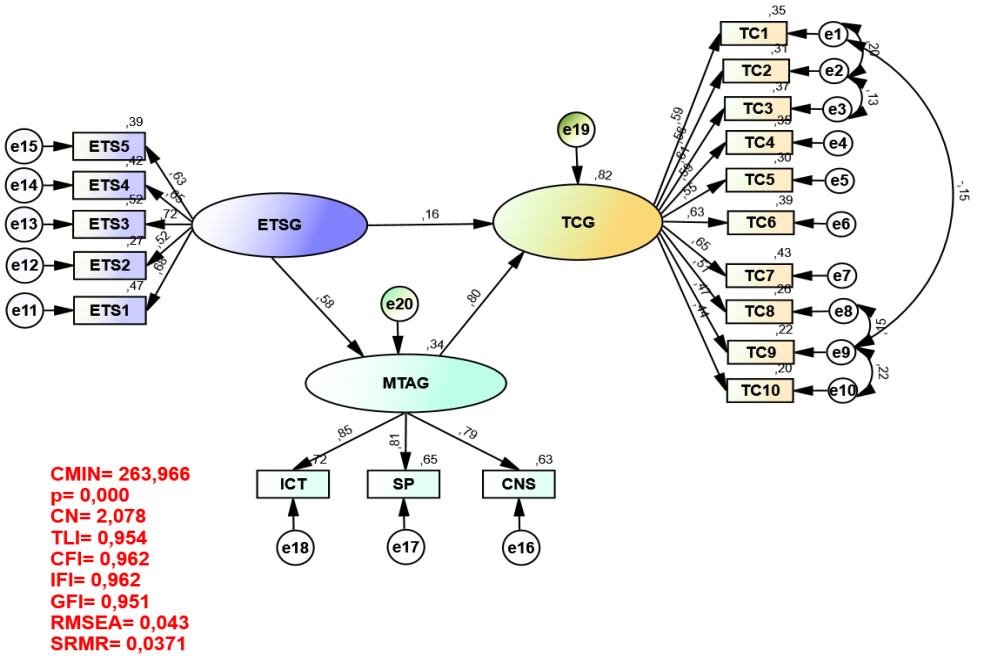

Figure 05: Structural Equation Modeling to Test the Effect of E-Registration and declaration of Tax Services on Tax Collection through Tax Administration Modernization as a Mediating Variable.
Source: made by the researchers based on Amos 26.

Table 09: Testing the Indirect Mediating Relationship between E-Registration and declaration of Tax Services and Tax Collection through Tax Administration Modernization

Testing the Indirect Mediating Relationship before the bootstrap	**Standardized Indirect Effects**			
		ETSG	**MTAG**	**TCG**
	TCG	0,468	00	**00**
Testing the Indirect Mediating Relationship after the bootstrap	**Indirect Effects – Lower Bounds**			
	TCG	0,396	00	**00**
	Indirect Effects – Upper Bounds			
	TCG	0,549	00	**00**
	Indirect Effects – Two Tailed Significance			
	TCG	0,000	**...**	**...**

Source: made by the researchers based on Amos 26.

From Figure we can see that all Quality match indicators for the model are good and achieved, indicating the complete suitability of the test model; therefore, no modifications will be made to the original model. This figure also illustrates the results of the analysis of direct effects among three variables: the independent variable ETSG, the mediating variable MTAG, and the dependent variable TCG. It can be observed from the one-way arrows indicating the direct effect relationship between e- registration and declaration of tax services and tax collection that the

regression coefficient is 0.16, and the multiple correlation squared is 0.82. This means that e-registration and declaration of tax services explain approximately 82% of the variation in tax collection for the tax administrations in Eastern Algeria through the mediating variable of tax administration modernization.

As for table 09, it shows the results of the Bootstrapping method to determine the statistical significance of the mediating relationship between e-registration and declaration of tax services and collection through tax administration modernization, which reached 0.468. It is evident that the statistical significance value of the indirect relationship equals 0.000, indicating it is statistically significant. Also, according to the bootstrap confidence interval, the lower bound of the confidence interval equals 0.396, and the upper bound equals 0.549. Therefore, we reject the null hypothesis and accept the alternative hypothesis, meaning there is a statistically significant indirect effect of e-registration and declaration of tax services on tax collection by the tax administrations in Eastern Algeria through tax administration modernization as a mediating variable.

5.3.4.2. Testing the second Hypothesis

To test the second hypothesis, two hypotheses are formulated:
H0: There is no statistical indirect effect of the national electronic card for tax fraudsters on tax collection by the tax administrations in Eastern Algeria through tax administration modernization as a mediating variable.
H1: There is a statistical indirect effect of the national electronic card for tax evaders on tax collection by the tax administrations in Eastern Algeria through tax administration modernization as a mediating variable.

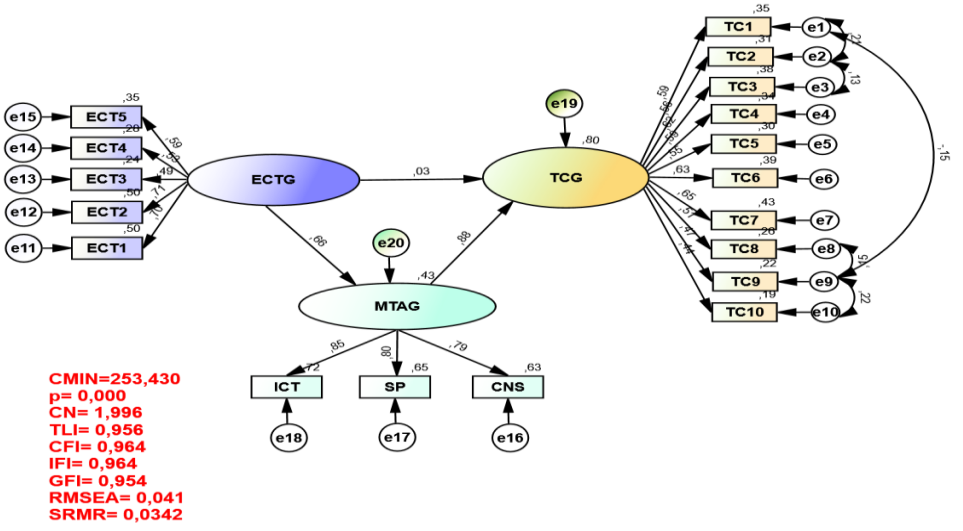

Figure 06: Structural Equation Modeling to Test the Effect of the National Electronic Card for Tax fraudsters on Tax Collection through Tax Administration Modernization as a Mediating Variable.
Source: made by the researchers using Amos v.26.

Table 10: Test the Indirect Mediating Relationship between the Effect of the National Electronic Card for Tax fraudsters on Tax Collection

Testing the Indirect Mediating Relationship before the bootstrap	**Standardized Indirect Effects**			
		ECTG	**MTAG**	**TCG**
	TCG	0,576	00	**00**
Testing the Indirect Mediating Relationship after the bootstrap	**Indirect Effects – Lower Bounds**			
	TCG	0,494	00	**00**
	Indirect Effects – Upper Bounds			
	TCG	0,677	00	**00**
	Indirect Effects – Two Tailed Significance			
	TCG	0,000	**...**	**...**

Source: made by the researchers using Amos v.26.

From Figure 12, it is evident that all Quality match indicators for the model are good and achieved, indicating the complete suitability of the test model; therefore, no modifications will be made to the original model. This figure also illustrates the results of the analysis of direct effects among three variables: the independent variable ECTG, the mediating variable MTAG, and the dependent variable TCG. It can be observed from the one-way arrows indicating the direct effect relationship between the national electronic card for tax evaders and tax collection that the regression coefficient is 0.03, and the multiple correlation squared is 0.80. This means that the national electronic card for tax evaders explains approximately 80% of the variation in tax collection for the tax administrations in Eastern Algeria through the mediating variable of tax administration modernization.

Table 10 shows the results of the Bootstrapping method to determine the statistical significance of the mediating relationship between the national electronic card for tax evaders and tax collection through tax administration modernization, which reached 0.576. It is evident that the statistical significance value of the indirect relationship equals 0.000, indicating it is statistically significant. Also, according to the bootstrap confidence interval, the lower bound of the confidence interval equals 0.494, and the upper bound equals 0.677. Therefore, we reject the null hypothesis and accept the alternative hypothesis, meaning there is a statistically significant indirect effect of the national electronic card for tax evaders on tax collection by the tax administrations in Eastern Algeria through tax administration modernization as a mediating variable

5.3.4.3. Testing the third Hypothesis

To test the third hypothesis, we establish two hypotheses:
H0: There is no statistical indirect effect of the service quality reference system on tax collection by tax administrations in Eastern Algeria through tax administration modernization as a mediating variable.
H1: There is a statistical indirect effect of the service quality reference system on tax collection by tax administrations in Eastern Algeria through tax administration modernization as a mediating variable."

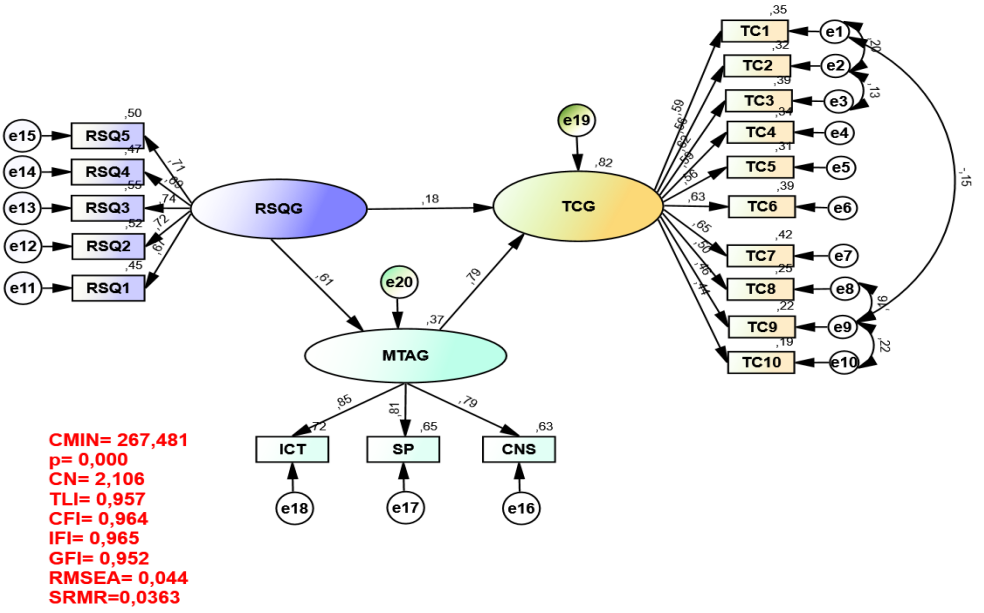

Figure 07: Structural Equation Modeling to Test the Effect of the Service Quality Reference System on Tax Collection through Tax Administration Modernization as a Mediating Variable.

Table 11: Testing the mediating relationship between the Service Quality Reference System on Tax Collection through Tax Administration Modernization as a Mediating Variable

Testing the Indirect Mediating Relationship before the bootstrap	**Standardized Indirect Effects**			
		RSQG	**MTAG**	**TCG**
	TCG	0,481	00	**00**
Testing the Indirect Mediating Relationship after the bootstrap	**Indirect Effects - Lower Bounds**			
	TCG	0,414	00	**00**
	Indirect Effects - Upper Bounds			
	TCG	0,559	00	**00**
	Indirect Effects - Two Tailed Significance			
	TCG	0,000	**...**	**...**

source: made by the researchers using Amos v.26.

From Figure 7, it is clear that all Quality match indicators for the model are good and achieved, indicating the complete suitability of the test model; therefore, no modifications will be made to the original model. This figure also illustrates the results of the analysis of direct effects among three variables: the independent variable RSQG, the mediating variable MTAG, and the dependent variable TCG. It can be observed from the one-way arrows indicating the direct effect relationship between the service quality reference system and tax collection that the regression coefficient is 0.18, and the multiple correlation squared is 0.82. This means that

the service quality reference system explains approximately 82% of the variation in tax collection for the tax administrations in Eastern Algeria through the mediating variable of tax administration modernization.

Table 11 shows the results of the Bootstrapping method to determine the statistical significance of the mediating relationship between the service quality reference system and tax collection through tax administration modernization, which reached 0.481. It is evident that the statistical significance value of the indirect relationship equals 0.000, indicating it is statistically significant. Also, according to the bootstrap confidence interval, the lower bound of the confidence interval equals 0.414, and the upper bound equals 0.559. Therefore, we reject the null hypothesis and accept the alternative hypothesis, meaning there is a statistically significant indirect effect of the service quality reference system on tax collection by the tax administrations in Eastern Algeria through tax administration modernization as a mediating variable.

5.3.4.4 Testing the Fourth Hypothesis:

To test the fourth hypothesis, we propose two hypotheses:
H0: There is no statistical indirect effect of the electronic declaration and payment portals, Jibaya'Tic and 'Mousahama'Tic,' on tax collection by tax administrations in Eastern Algeria through tax administration modernization as a mediating variable.
H1: There is a statistically significant indirect effect of the electronic declaration and payment portals, 'Jibaya'Tic' and 'Mousahama'Tic, on tax collection by tax administrations in Eastern Algeria through tax administration modernization as a mediating variable.

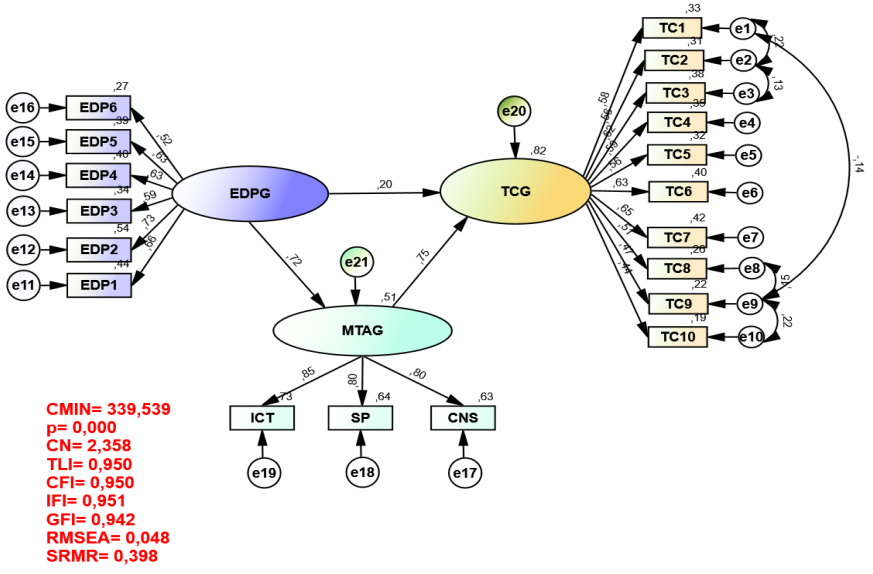

Figure 8: Structural Equation Modeling to test the effect of Jibaya'Tic and Mousahama'Tic on tax collection through modernization of tax administration as a mediating variable
source: made by the researchers using Amos v.26.

Table 12: Testing the mediating relationship between Payment and declaration portals Jibaya"Tic and Mousahama"Tic and tax collection through modernization of tax administration

Testing the Indirect Mediating Relationship before the bootstrap	**Standardized Indirect Effects**			
		EDPG	**MTAG**	**TCG**
	TCG	0,537	00	**00**
Testing the Indirect Mediating Relationship after the bootstrap	**Indirect Effects - Lower Bounds**			
	TCG	0,458	00	**00**
	Indirect Effects - Upper Bounds			
	TCG	0,634	00	**00**
	Indirect Effects - Two Tailed Significance			
	TCG	0,000	**...**	**...**

source: made by the researchers using Amos v.26.

As shown in Figure 08, all indicators of model fit are good and achieved, indicating a complete suitability of the test model. Therefore, no modifications will be made to the original model. This figure also illustrates the analysis results of the direct effects among three variables: the independent variable EDPG, the mediating variable MTAG, and the dependent variable TCG.

It can be observed from the one-way arrows representing the direct relationship between the electronic declaration and payment portals, 'Jibaya"Tic' and 'Mousahama"Tic' and tax collection that the regression coefficient is 0.20, with a multiple correlation squared value of 0.82. This implies that the electronic declaration and payment portals 'Jibaya"Tic' and 'Mousahama"Tic' explain approximately 82% of the variation in tax collection by tax administrations in Eastern Algeria through the mediating factor of tax administration modernization. Table 12 presents the results of the Bootstrapping method used to determine the statistical significance of the mediating relationship between the electronic declaration and payment portals 'Jibaya"Tic' and 'Mousahama"Tic' and tax collection through tax administration modernization, which reached 0.537. The statistical significance of the indirect relationship is 0.000, indicating it is statistically significant. Additionally, according to the bootstrap confidence interval, the minimum confidence interval is 0.458, and the maximum confidence interval is 0.634.

Thus, we reject the null hypothesis and accept the alternative hypothesis, which states that there is a statistically significant indirect effect of the electronic declaration and payment portals 'Jibaya"Tic' and 'Mousahama"Tic' on tax collection by tax administrations in Eastern Algeria through tax administration modernization as a mediating variable

5.3.4.5 Testing the Fifth Hypothesis:

To test the fifth hypothesis, we establish the following null and alternative hypotheses:

H0: There is no statistically significant indirect effect of the electronic tax monitoring system SAP-TRM on tax collection by tax administrations in Eastern Algeria through tax administration modernization as a mediating variable.
H1: There is a statistically significant indirect effect of the electronic tax monitoring system SAP-TRM on tax collection by tax administrations in Eastern Algeria through tax administration modernization as a mediating variable.

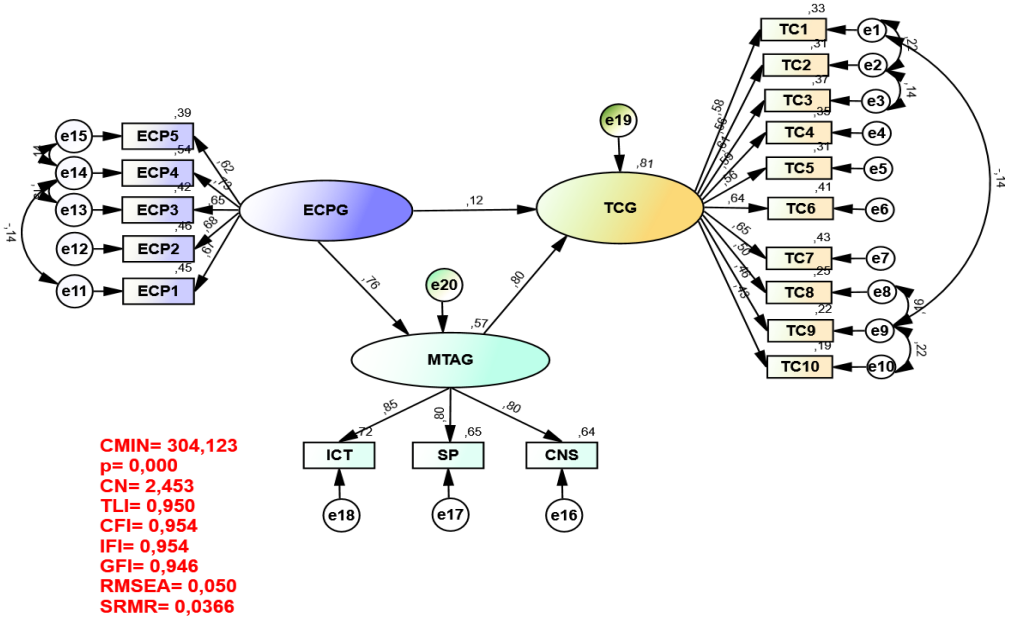

Figure 09: Structural Equation Modeling to Test the Effect of the Electronic Tax Control System SAP-TRM on Tax Collection through Tax Administration Modernization as a Mediating Variable.
source: made by the researchers using Amos v.26.

Table 13: Testing the Indirect Mediating Relationship Between the Electronic Tax Control System SAP-TRM and Tax Collection through Tax Administration Modernization

Testing the Indirect Mediating Relationship before the bootstrap	**Standardized Indirect Effects**			
		ECPG	**MTAG**	**TCG**
	TCG	0,605	00	**00**
Testing the Indirect Mediating Relationship after the bootstrap	**Indirect Effects – Lower Bounds**			
	TCG	0,512	00	**00**
	Indirect Effects – Upper Bounds			
	TCG	0,720	00	**00**
	Indirect Effects – Two Tailed Significance			
	TCG	0,000	**...**	**...**

source: made by the researchers using Amos v.26.

It can be seen from Figure 09 that all matching indicators for the model are satisfactory and achieved, indicating a perfect fit for the test model. Consequently, no modifications will be made to the original model. This figure also illustrates the results of the analysis of direct effects among three variables: the independent variable ECPG, the mediating variable MTAG, and the dependent variable TCG. The unidirectional arrows indicate the direct effect between the electronic tax monitoring system SAP-TRM and tax collection, showing that the regression coefficient is 0.12 and the coefficient of determination (R^2) is 0.81. This means that the electronic tax monitoring system SAP-TRM, through the mediating variable of tax administration modernization, explains approximately 81% of the variation in tax collection by the tax administrations in Eastern Algeria.

Table 13 presents the results of the Bootstrapping method to determine the statistical significance of the mediating relationship between the electronic tax monitoring system SAP-TRM and tax collection through tax administration modernization, which is 0.605. It is clear that the statistical significance of the indirect relationship equals 0.000, indicating it is statistically significant. Additionally, according to the bootstrap confidence interval, the lower limit is 0.512, and the upper limit is 0.720. Therefore, we reject the null hypothesis and accept the alternative hypothesis, indicating that there is a statistically significant indirect effect of the electronic tax monitoring system SAP-TRM on tax collection by tax administrations in Eastern Algeria through tax administration modernization as a mediating variable.

5.3.5. Discussing the results:

Through the field study conducted on a sample of tax administrations in Eastern Algeria, several findings were reached, namely:

- The registration and provision of electronic tax services have a direct impact on tax collection by tax administrations in Eastern Algeria, with a regression coefficient of 0.16, and an indirect effect through the modernization of tax administration, achieving an impact of 0.468.
- The electronic national card for tax evaders directly influences tax collection by tax administrations in Eastern Algeria, with a regression coefficient of 0.03, and an indirect effect through the modernization of tax administration, achieving an impact of 0.576.
- The reference system for service quality directly affects tax collection by tax administrations in Eastern Algeria, with a regression coefficient of 0.18, and an indirect effect through the modernization of tax administration, achieving an impact of 0.481.
- The electronic declaration and payment portals "Jibaya'Tic" and "Mousahama'Tic" have a direct influence on tax collection by tax administrations in Eastern Algeria, with a regression coefficient of 0.20, and an indirect effect through the modernization of tax administration, achieving an impact of 0.537.
- The electronic tax monitoring system SAP-TRM has a direct impact on tax collection by tax administrations in Eastern Algeria, with a regression coefficient of 0.12, and an indirect effect through the modernization of tax administration, achieving an impact of 0.605.

It is evident from these results that the digitization of tax administration in its various dimensions has a positive impact on tax collection. This aligns with the findings in studies by (Azmi, Kamarulzaman, & Hamid, 2012), (Azmi & Bee, 2010), (SUHANI & RADIAH , 2012), (BILAL, HASHMI, & FIAZ, 2015), (I-Chiu, Yi-Chang , Won-Fu , & Hisn-Ginn, 2005), (Azleen, 2009), (Patience Njina & Jackson, 2019), (Wang, 2003), and (Otieno, 2018), which support the use of digitization in tax administration for several reasons, including the improvement of tax collection. With the modernization of tax administration, the impact improves significantly and noticeably, indicating that modernization in tax administrations is essential, particularly given the deficiencies faced by tax structures in developing countries, which require modernization programs to address these issues, aiming to create an environment conducive to successful digital transformation in the tax field.

6. Conclusion

Tax collection is the primary and ongoing source of financing for various government sectors and meeting the essential needs of citizens in all countries, whether developed or developing. This necessitates the pursuit of strategies that contribute to maintaining and enhancing these resources while also adapting to the rapid developments that have taken place in other fields, which have opened up to the outside world and are now based on information and communication technology (ICT). Algeria is among the countries that have responded to this trend by introducing ICT in its tax administrations, relying on a range of portals that provide taxpayers with various tax services at minimal costs and in the shortest possible time. The importance of having an appropriate infrastructure for this transformation has not been overlooked, as evidenced by the implementation of a tax administration modernization program.

This study, conducted based on a model developed by the researcher, highlights the need for modernization of tax administration in Algeria due to the unique characteristics of its tax environment, the weakness of its administrative infrastructure, and the lack of adequate financial, material, technological, and informational resources. The findings emphasize that modernizing tax administration is crucial to effectively digitize the tax administration and improve tax collection.

Contributions and Future Perspectives

In light of the results obtained, several suggestions must be presented, the most important of which are:
- In developing countries like Algeria, it is essential to focus on the infrastructure of tax administrations and update various resources, starting from the establishment of structures to the introduction of globally used technologies.
- Emphasize the importance of human resources employed in user technologies and ensure precise selection based on their skills in both technical and tax aspects, rather than solely on their qualifications.

- Reassess the content of tax laws and legislation, identify gaps that hinder the successful implementation of modernization and digitization projects in tax administration, and address them.
- Work towards realizing the concept of electronic or virtual administration based on modern technology, including artificial intelligence. It is crucial to ensure cybersecurity for the information held by the tax administration before embarking on the execution of this program.
- Enhance the element of trust between taxpayers and the tax administration by providing virtual spaces for communication and inquiries regarding various tax services, featuring automatic response capabilities using artificial intelligence technologies. Additionally, efforts should be made to eliminate the widespread bureaucracy in developing countries, including Algeria.

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