

## Vision of the external control of efficiency of public spending on basic education

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### Article information

#### Article history

Received: February 8, 2017

Accepted: May 11, 2017

#### Keywords:

Opinions of Accounts Judgment.

Efficiency.

Court of Accounts

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### Abstract

This research aimed at analyzing if technical efficiency in investing public resources of the municipalities of Paraíba is related to the opinions of municipal accounts judgments issued by TCE-PB (Court of Accounts of State of Paraíba). For this purpose, one defined the hypothesis that there is positive relation between the opinions of municipal accounts judgments issued by TCE-PB and the level of technical efficiency in application of public resources in basic education. The 223 municipalities of the State of Paraíba were chosen as concrete case for the research development, with data encompassing the 2009-2011 period. The efficiency scores were collected on TCE-PB website. For testing the hypothesis, logit regression was used. Base on empirical findings, the research hypothesis is not rejected, and there is validation that, somehow, TCE-PB opinion realizes the dimension of the efficiency of public spending on basic education when assessing municipalities' management accounts.

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## 1. INTRODUCTION

The external control in the scope of government institutions is constitutional competence of the Courts of Accounts. In Article 70 of 1988 Federal Constitution (CF/88), and by means of Amendment 19 of 1998 (EC no.19/98), the Court of Accounts' mission was outlined, which is the "Control of accounts, finances, budget, operations and property of the Union and of the agencies of the direct and indirect administration, as to lawfulness, legitimacy, economic efficiency, application of subsidies and waiver of revenues."

The aspects linked to legality and legitimacy have been the main focus of the performance of the Courts of Accounts in the control of public spending. The analysis, most of times, has been restricted to verifying if the legal limits are respected regarding the spending conditioned on the legality and proof of spending performed by public administrators.

The dimensions of efficacy, efficiency and effectiveness of expenditures are responsible for assuring the success of state action, seeking to maximize results and minimize costs, that is, use of resources in the most intelligent way possible. The effectiveness of public action is more democratic, giving transparency and accountability regarding the benefits brought to society as a whole (Torres, 2004).

Efficiency Principle, expressed in Article 37 of CF/88, through EC no.19/98, determines that in direct and indirect administration, the managers and other people responsible for the use of public resources must report to the collective interest. This determination was reinforced by Complementary Law no. 101, called Fiscal Responsibility Law (LRF), by establishing that the managers' conduct must be turned to a responsible administration, demanding application of public resources in a planned way, economically and financially balanced; costs and results must be present in every administrative process. Thus, the old paradigm that "spending more is necessarily better" has been replaced by the idea that emphasizes the product of the spending in relation to its cost, that is, spending with quality.

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Article 37 of the Federal Constitution establishes that it is public administration's duty to obey several principles, efficiency principle among them, when performing management acts. Additionally, Art. 74, in items II and IV, establishes that the system of internal control must evaluate the management results, respecting the compliance with efficiency and efficacy principles and, in addition, support the external control. Thus, it is concluded that the external control, when judging jurisdictional accounts, besides observing legality, legitimacy and economicity, should be sure that the management results were reached with efficiency and efficacy.

As way of breaking this paradigm, giving more effectiveness to public spending control, this work presents the proposal of an approach on measurement of municipal public spending efficiency, using the concept of efficient frontier, which is the evidence of a public diagnosis about the managers' capacity to convert public resources into products and results of collective interest.

Thereby, efficiency is understood as a function that optimizes the resources applied in public services as well as the results obtained. The issue of this research can be defined in the following terms: Which is the relationship between the opinion of TCE-PB issued regarding judgment of accounts of municipalities of Paraíba and the level of technical efficiency in investing public resources in basic education?

Therefore, this study aims at analyzing the technical efficiency in investing public resources in basic education of municipalities of Paraíba, verifying if there are positive relationships with TCE-PB opinions on municipal accounts judgment.

After establishment of issue and objective of the research, the following guiding hypothesis of study was defined: there is positive relationship between TCE-PB opinion on the judgment of accounts of municipalities of Paraíba and the level of technical efficiency in investing public resources in basic education. The definition of this hypothesis has as objective to offer, as emphasized by Martins and Theóphilo (2007), orientation for the research path in order to establish explanations or susceptible solutions.

The contribution of this study is to demonstrate to public managers, external control bodies and society in general the importance of the evaluation of management results focused on the efficient application of public resources, which provides compliance with the constitutional limits of application of resources in education and, as consequence, approval of public managers' accounts.

## **2. THEORETICAL FRAMEWORK**

### **2.2 Evaluation of performance of public sector entities**

The State's main role is act in order to maximize population's well-being and the levels of socioeconomic development of its places. In this sense, local governments are responsible for providing a series of goods whose offer by the market is not enough (Samuelson, 1954). For this purpose, the society makes the resources available for the State through tributes collected for financing the State machine and provision of goods and services to society.

The fulfillment of these population's needs not necessarily causes governments to spend a great amount of public resources. On the contrary, the limited nature of these resources and how the managers have to rationally use them must be taken into account, privileging efficiency and evaluation of management performance.

In this sense, Heinrich (2003) highlights that the performance evaluation should be able to help public managers to understand how their policies and managerial decisions are connected to the results obtained and which internal and external factors may restrict or interfere with their performance.

According to literature on performance measurement, the efficiency and efficacy indicators are the main mechanisms of evaluation used to measure the government management performance and, consequently, provide accountability (Callahan, 2003; Haas, 2003; Julnes, 2003; Ammons, 2003; Oliveira & Turrioni, 2006). These indicators promote the opportunity to answer citizens' questions, such as: is crime increasing? Which is children's performance at school? Which are the results of health programs? Is government achieving the goal intended for education?

According to Pacheco (2009), there are several issues in the performance measurement indicators; however, the contribution that they offer to the management evaluation, both in results measurement and in information transparency, helps in identifying effectiveness of the results produced.

In order for managers to better use their available resources, attention should be drawn to several criteria that assure that the performance indicator is of a higher quality, such as: comprehensiveness, clarity, accessibility, comparability, low cost, stability, depending on the evaluation scenario. Therefore, the use of these criteria in the performance evaluation is important, since patterns, errors and strengths will be visualized for corrections of their activities and processes.

Thus, the State has the planning instruments, the execution techniques and the forms of control so that the public spending really makes public resources to be applied efficiently. Thus, in order to maintain compliance with efficiency dimension, external control has as mission to observe whether expenditures are being applied in accordance with the legal mandates of CF/88 and EC No. 19/98, as well as the allocation of resources leading to the efficiency dimension.

## **2.2 Efficient allocation of public resources in education**

The efficiency of public spending went through modifications from the new educational policy composed by CF/88. The process of decentralization of State's obligations, despite reducing the manager's autonomy, gave greater flexibility in the use of public resources with education, obeying the constitutional limits imposed, as indicated by Mendes (2003).

The reflections of these resource allocations are aimed to increase productivity, economic growth, and socio-economic opportunities in the country. According to Pritchett e Filmer (1999), one can express the function of education through the quantity of products generated for a possible amount of resources applied.

In order to establish standards and eliminate existing social differences, especially in basic education, the government created the Fund for the Development of Basic Education (FUNDEB) in Remuneration and Valorization of Teaching (RMV) within each state. The manager must somehow apply no less than 60% of the resources of FUNDEB for the valorization of teaching profession. These resources are mainly conditional on basic education for teacher salary expenditures and professional qualification.

CF/88 also requires municipalities to invest at least 25% revenue from taxes and transfers in Education Maintenance and Development (MDE), requiring managers and secretaries to use these resources according to required rules, as well as investing in the municipal education network in order to obtain positive impacts on basic education.

Discussions conducted by numerous international actors presented different results in relation to public spending and educational performance. In this perspective, most of these discussions emerged through the report of Coleman et al (1966), evidencing important results through the production function or efficient frontier in education. In view of this, Hanushek (1994) raised several questions about how to best increase school performance from the allocation of public resources.

It is possible to notice, through the results of this report, that educational performance depends not only on the allocation of resources in education, but also on other variables, both in the school context and in socioeconomic basis (Hanushek, 1986). Then, it can be highlighted that there is connection through the way of investing public resources and how they are directed in education (Diniz, Corrar, & Lima, 2014).

Other authors affirm that the search for improvement in educational performance involves several processes. The relationship of monetary and non-monetary resources is significant factor in education and learning, once the relationships at school are essential in education quality (Dourado, Oliveira, & Santos, 2007).

## **2.3 Courts of Accounts on the perspective of the analysis of legality, efficiency and economicity**

The evaluation of public managers has shown important gains in efficiency from the perspective of the Court of Accounts. In this sense, Belo (2013) points out that external control is responsible for reinforcing managers' transparency and accountability, ensuring high standards of audit work, such as the integrity of the financial system and the reliability of revenues and expenses.

External control is responsible for evaluating managers' information, analyzing their management in order to ensure the accuracy of financial statements and compliance with laws, regulations and agreements, and subsequently draw their conclusions.

These powers are granted autonomously to the Court of Accounts. Gualazzi (1992) states that the Court of Accounts is functionally autonomous. Because it is an administrative quasi-judicial body, it has the primary function of external control, in the factual and legal aspects of financial-budgetary execution. The TCs include broad attributions expressed in article 71 of CF/88, both in the acts of judgment and in the assessment for the purposes of registration and inspection of any resources passed on to the jurisdictions.

For Silva and Revorêdo (2005), external control has advanced in the dimension of efficiency since the audit reports have shown socioeconomic indicators as a way to induce managers in improving the population's living conditions.

This analysis has been a challenge for the Court of Accounts due to two aspects: first, the need for the development of specific electronic systems to adapt the large volume of documents received by TCs, contributing to and making standardization, reduction of operational costs and efficiency in the technical work developed possible (Lureiro, Teixeira & Moraes, 2009); secondly, the courts of accounts, because they are Courts, suffer great influence from positive law, that is, the application of the law connected to written codes and rules (code law system).

According to Weffort (2005), the Brazilian legal system is evidenced on the code law system of Roman law, as a result of Portuguese colonization. Thus, it is necessary to understand the two great traditions of law: Roman law or code law, and common law. The fundamental differences between these two systems are related to the origin and force of the law. In Roman law, the norms are emanated in laws; even in customary law, the origin is linked more to customs and cultural traditions (Lopes, 2009).

The use of the resources available for management of the managers must follow constitutional rules. In this way, the manager should not only focus his/her perspective on legality and legitimacy, but also on other aspects relevant to the efficient use of public expenditures, since the constitution delegated to the court the task of analyzing not only expenses from the perspective of legality, but also the economicity of public management acts.

Therefore, according to Herbest (2010), compliance with legal limits in relation to the LRF has been public managers' concern. Thus, to avoid punishment from TCs, they begin to use accounting information only to give legitimacy to their actions.

### 3. METHODOLOGY

This research was conducted through a descriptive study with quantitative data approach, using statistical and non-statistical procedures, operationalized through data collection. Supporting the quantitative approach, bibliographical and documentary survey was carried out.

#### 3.1 Data collection procedure

In order to achieve the objectives of this research, the 223 municipalities that were part of the State of Paraíba were chosen as a concrete case of analysis, with data from 2009 to 2011, which were collected from the following sources:

a) accounting and financial information on the database of the Court of Accounts of Paraíba - TCE-PB ([www.tce.pb.gov.br](http://www.tce.pb.gov.br));

b) educational information, provided by the National Institute for Educational Studies and Research "Anísio Teixeira" (INEP), by the Secretariat of Education and Culture of the State of Paraíba and by the National Basic Education Assessment System (SAEB / INEP);

c) information related to the previous opinion on the assessment of the managers' annual rendering of accounts, obtained from the TCE-PB website ([www.tce.pb.gov.br](http://www.tce.pb.gov.br)). For that, a documentary analysis of the rendering of accounts processes was carried out, identifying the type of opinion issued and the percentage of application in Education Maintenance and Development – MDE, and Remuneration and Valorization of Teaching - RVM.

### 3.2 Technical efficiency scores

This research collected efficiency scores directly from the TCE-PB website ([www.tce.pb.gov.br](http://www.tce.pb.gov.br)), which were calculated with the help of DEA-Data Envelopment Analysis technique, developed by Charnes et al. (1978). This technique consists of an approach used in the efficiency comparisons of organizational productive units with relatively homogeneous activities. DEA is a mathematical programming technique to evaluate similar units, that is, unities that perform the same function or subordinate to the same controlling body. They are called decision making units (DMUs), which, in this study, are represented by the 223 municipalities of Paraíba.

The efficiency indicator of each municipality (DMU) of Paraíba was calculated using the Sequential DEA technique (DEA-S), with the BCC model, created by Banker, Chanes and Cooper (1984).

The efficiency scores of the municipalities obtained were used to regress the explanatory variables of the type of opinion issued by TCE-PB, described below. In order to locate the way in which the efficiency calculation was performed, the parameters used by the TCE-PB are described below, according to the Performance Index of Public Expenses with Education in Paraíba (IDGPB), used to measure efficiency; available on <http://idgpb.tce.pb.gov.br/>.

The production frontier was estimated from input and outputs related to public services regarding Basic Education (EF) provided by the municipalities of Paraíba. The production function was composed of an input and two outputs as can be seen in Table 1.

Type	Variable	Description	Source
Input	Current expenditure per student	Total of current expenditures by the quantity of students enrolled in the Basic Education School network	TCE-PB/IDGPB
Output -1	Brazil Examination on Portuguese Language	Median proficiency grades in Portuguese Language	INEP
Output -2	Brazil Examination on Mathematics	Median proficiency grades in Mathematics	INEP

**Chart 1.** Variable of discretionary input and output of the model of technical efficiency  
Source: Elaborated by the authors

These variables are the most used in studies that aim to analyze the efficiency of public spending on education function and on the basic education governmental sub-function. Thus, corroborating the proposed definitions, among others, Hanushek (1994), Menezes Filho, Amaral (2009) and Diniz, Corrar, Lima (2014) are referenced.

### 3.3 Hypotheses Testing

The hypothesis test was performed from the categorical data analysis, developed by the logistic regression equation in cross section, similar to a pooling panel. Data panels were used to enrich the applied analysis since it would be impossible to use only temporal data (Gujarati & Porter, 2011), once the baseline data for efficiency calculation (IDEB) are biennial. Hair et al. (1998) stated that logistic regression allows probabilistic calculations of a particular phenomenon under study to be made - in the case under study, the probability of a municipal account being approved or not by TCE-PB given the technical efficiency of the spending in basic education. According to Tabachnick and Fidell (1996), the logit model is moderately free of restrictions, facilitating the use of several types of variables, whether continuous, discrete or dichotomous.

The empirical model has the following configuration:

$$\delta_i = \beta_1 + \beta_2 EF_i + MDE_i + RVM_i + w_i \quad (1)$$

where:

$\delta_{it}$  – is *dummy* variable that represents decision of TCE-PB regarding the annual rendering of accounts of municipality  $i$  (the result of opinion “1” indicates favorable situation and “0” indicates adverse to accounts approval);  $EF_i$  – scores of efficiency of municipality  $i$  for services of basic education;  $MDE_i$  – percentage of application in Education Maintenance and Development of municipality  $i$ ;  $RVM_i$  – percentage of application in Remuneration and Valorization of Teaching of municipality  $i$ ;  $w_{it}$  = regression error term.

The variables MDE and RMV work as variables of efficiency control and the dependent variable is represented by the opinions results. Performing a stacked cross-section regression was the choice, since the time factor is not relevant for achieving the objectives. The focus is the position of TCE-PB in the issuance of previous opinions on municipal accounts in relation to efficiency in the application of education resources.

#### 4. RESULTS AND DISCUSSIONS

In this research, the universe of study was the 223 municipalities that are part of the State of Paraíba, using data from the period from 2009 to 2011. The information used was that of basic education accounting and financial nature, as well as information about the previous opinion of TCE-PB on the assessment of the annual rendering of accounts of the managers.

Thus, the number of observations was 664 previous opinions, since 5 municipalities were excluded from this analysis because they did not contain the necessary information for the proposed analysis procedures. Data were tabulated and rotated using Stata 13 statistical software. Data on the efficiency of educational expenditures for fiscal year 2010 were obtained through linear interpolation, since the baseline data for the calculation of efficiency (IDEB) are biennial, published in odd years.

##### 4.1 Descriptive data analysis

The descriptive survey shown in Table 1 presents the annual results of previous opinions issued by TCE-PB in the assessment of the annual rendering of accounts of the municipal managers of the State of Paraíba.

**Table 1.** TCB-PB judgments of annual rendering of accounts of municipalities

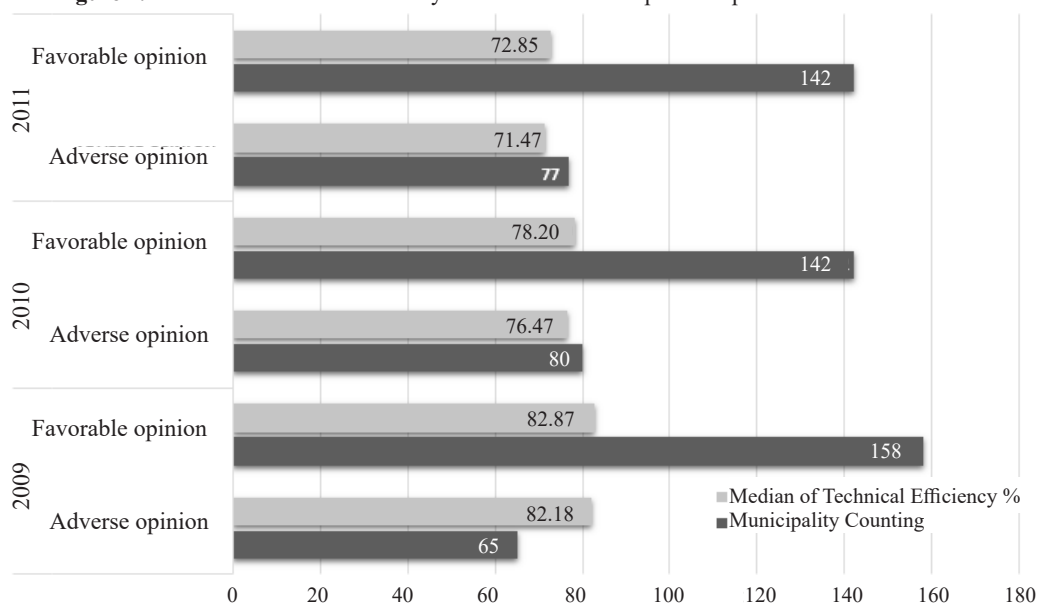
Opinion	2009		2010		2011		Total	
Adverse opinion	65	9.79%	80	12.05%	77	11.60%	222	33.43%
Favorable opinion	158	23.80%	142	21.39%	142	21.39%	442	66.57%
<b>Total</b>	<b>223</b>	<b>33.58%</b>	<b>222</b>	<b>33.43%</b>	<b>219</b>	<b>32.98%</b>	<b>664</b>	<b>100%</b>

Source: Elaborated by the authors

As can be seen in Table 1, 222 renderings of accounts were rejected, representing 33% of the accounts evaluated. In turn, 442 accounts out of 664 judgments were approved, representing 67%.

Analyzing Figure 1, under the periods investigated, 2009 was the period that presented the highest number of approved accounts, presenting exactly 158 favorable opinions, constituting the period with the least number of rejections. In Turn, 2010 was the most outstanding for the largest number of rejected accounts, bringing 80 disapprovals out of 222 adverse opinions found.

**Figure 1.** Median of technical efficiency in relation to municipalities opinions



Source: Elaborated by the authors

From the analysis of Table 2, it can be seen that, according to the annual rendering of accounts of managers, on average, municipalities allocate 63.93% of the resources in RVM, containing a standard deviation of 9.23%.

**Table 2.** Descriptive statistics

Variables	Median	Standard Deviation	Min	Max
RMV	63.93	9.23	0.78	100
MDE	27.46	3.46	14.66	68.82
Opinion	0.67	0.47	0.00	1
EF%	77.57	8.63	53.96	100

Source: Elaborated by the authors

According to legal norm, the application in RVM is 60%, and in the sample analyzed the average reached 63.93%. Regarding the application of resources in DEM, median of 27.46% is observed, with a standard deviation of 3.46%. For MDE applications, the constitutional minimum is 25%. In these circumstances, it can be seen that, on average, 67% of the EC-PB opinions were favorable. This finding is better justified by the probabilities calculated to have a favorable previous opinion in the probit model.

It can also observe in Table 2 that municipalities reached median of 77.57% of efficiency in municipal public spending on education, when, to be fully efficient, this score should reach 100%. These data show that the municipalities analyzed need to be more efficient in the application of public education resources.

#### 4.2 Analysis of empiric model

Simple binary regression method was used, whose main objective is to perform probabilistic calculations with the intention of verifying the chance of occurrence of a certain event - in the specific case, the probability of the municipality to obtain a previous TCE-PB opinion, given the technical efficiency of expenditures in basic education. This type of regression has the advantage of being more flexible in relation to other regression modalities, due to the flexibility of the assumptions required in its algorithm. According to Freitas (2013), the binding function present in the logit regression algorithm has as its dependent variable a binary variable (Favorable opinion = 1, adverse opinion = 0). To perform the calculation of probability, model-specific distribution functions were used; thus, the logistic distribution used was the normal one.

In this context, the maximum likelihood method is used to estimate the parameters of the two binding functions, since transformations of the accumulated distributions are performed. In the estimation of the logit model, four interactions were necessary and the probability of the chi-square test (Prob ( $\chi^2$ )) was approximately zero, indicating that one can not reject, with significance of 1%, the hypothesis that all coefficients are equal to zero.

According to Table 3, it can also be affirmed that the coefficients seen together are significant to explain the relationship between the type of opinion issued by the Court of Accounts and the efficiency measure of education expenditure, calculated by the Sequential DEA. On the other hand, all the estimators of the model were significant, consolidating the consistency of the model. Table 3 below brings the logit model information.

**Table 3.** Logit Model

Opinion	Estimator	Err	Z-test	Prob.
EF	0.0298	0.0104	2.8800	0.0040
RMV	0.0491	0.0115	4.2900	0.0000
MDE	0.1020	0.0307	3.3300	0.0010
Constant	-7.5021	1.3468	-5.5700	0.0000

Source: Elaborated by the authors

Note: Number of observations = 664;  $\chi^2 = 50.32$  (*chi2*); Prob ( $\chi^2$ ) = 0.0000

To verify the quality of the adjustment of the model, a contingency matrix was created (Table 4), which specifies the value and determines if an observation has a predicted positive result. For this, each observation was classified as positive if its predicted probability is greater than 0.5.

**Table 4.** Contingency Matrix

Classification	Favorable opinion (D)	Adverse opinion (~D)	Total
(+)	433	178	611
(-)	9	44	53
<b>Total</b>	<b>442</b>	<b>222</b>	<b>664</b>

Source: Elaborated by the authors

Note: Correct classification = 71.84% [(433+44)/664]

Within this same logic, as explained in Table 5, the various probabilistic calculations are presented from the contingency matrix (Table 4). According to Corrar et al. (2011), observations higher than the prediction of 0.5 are classified as positive and lower as negative. It can be observed, in the last line, that the model can classify 71.84% of the observations investigated correctly.

**Table 5.** Probability of events

Description	Argument	Prob. (%)
Sensitivity	Op( +  D)	97.96%
Specificity	Op(- ~D)	19.82%
Positive predictive value	Op( D  +)	70.87%
Negative predictive value	Op(~D  -)	83.02%
False (+) for true (~D)	Op( + ~D)	80.18%
False (+) for true (~D)	Op(- ~D)	2.04%
False (+) classified (+)	Op( D  +)	29.13%
False (-) classified (-)	Op( D  +)	16.98%
Correct classification		71.84%

Source: Elaborated by the authors

Note: Classification + prediction of Op (D)  $\geq$  0.5; True "D" defined as Opinion

Regarding the empirical model embodied in the logit regression, the interpretation of the coefficient estimates is not so trivial, but it is indisputable that the understanding is derived from the estimates of the positive or negative sign of marginal influence of the repressive agent in question on the probability of event, i.e., the type of opinion.

In the present case, all the regressing agents are significant at 1%, and the signals are all positive. Thus, one cannot deny the hypothesis that there is a positive relationship between TCE-PB Opinion issued in the municipal accounts judgment and the level of technical efficiency in the application of public resources in basic education.

From what was seen in the empirical model, the previous opinions issued and forwarded to the Municipal Legislative Power by the Court of Accounts present probability in a direct relation with the efficiency of municipal management in the application of public resources directed to basic education. There was verification of magnitude and efficiency relevance in the issuance of previous opinions of the annual accounts of the municipalities.

Thus, the model was run by calculating the marginal effect; data are shown in Table 6.

**Table 6.** Marginal Effect of Logit model

Opinion	dy/dx	Std. Err.	Z-test	P>z	X
EF	0.0065	0.0022	2.8900	0.0040	77.5694
RMV	0.0107	0.0025	4.3100	0.0000	63.9320
MDE	0.0222	0.0066	3.3500	0.0010	27.4578

Source: Elaborated by the authors

Note:  $y = \text{Op (Opinion)} = 0.67966557$



In the model of Table 6, the coefficients measure the variation in logit, estimated for a unit variation of the explained variable. This means that if the opinion is favorable, logit increases. The probability of an account being approved at the mid-point is 67.97%. In this case, the probability of an account being approved, considering the median municipality, is around 68%, for this sample.

The probability of an annual account being approved increases by 0.65% for each percentage point obtained in technical efficiency. Thus, for a municipality that has been efficient (100%), the probability of having its accounts approved is 65%.

In the case of FUNDEB, for each percentage point applied, the probability of an annual account being approved increases by 1.07%. As for MDE, the chances are increased by 2.22%. Thus, the municipality that applies in FUNDEB the minimum constitutional of 60% has the possibility of approval of the accounts of around 28% (1.07x60%). Regarding MDE, this probability is 55% (2.22x25%). It is evidenced that these values are taken in isolation, emphasizing that if the municipality applies less than the constitutional minimum, it will have its accounts rejected.

**Table 7.** Probability of approval of accounts being an efficient municipality

Opinion	dy/dx	Std. Err.	z	P>z	X
EF	0.0059	0.0015	4.0300	0.0000	100%
RMV	0.0098	0.0026	3.7200	0.0000	60%
MDE	0.0203	0.0067	3.0200	0.0030	25%

Source: Elaborated by the authors

Note:  $y = Op(\text{Opinion}) = 0.72655$

However, it should be noted in Table 7 that if the municipality applies 25% in MDE and 60% of FUNDEB resources in RMV, it is efficient (100%) and the probability of having accounts approved is 72.66 %.

**Table 8.** Probability of approval of accounts being an efficient municipality

Opinion	dy/dx	Std. Err.	z	P>z	X
EF	0.0047	0.0003	14.8700	0.0000	20%
RMV	0.0078	0.0033	2.3300	0.0200	60%
MDE	0.0161	0.0067	2.3900	0.0170	25%

Source: Elaborated by the authors

Note:  $y = Op(\text{Opinion}) = 0.19650$

On the other hand, in Table 8, one can calculate the probability of a municipality that fulfilled the constitutional minimum in MDE (25%) and RVM (60%); but if it has an efficiency ratio of 20%, the probability of having its accounts approved becomes 19%. It is worth mentioning that, since the decision to accounts judgment is collective, it is possible that the Court understands that failure to achieve a constitutional index is not a reason for disapproval of accounts, since the municipality had a good performance in education.

## 5. FINAL CONSIDERATIONS

This study did not seek to identify the factors that may contribute to the development of the manager's ability to deal with the problem of inefficiency, but to develop an empirical model defined by the regression technique containing a dependent variable of binary nature, to validate or not the hypothesis in question.

The study used the simple binary regression method to verify the relationship between the variables technical efficiency, RVM and MDE of the municipalities of Paraíba.

In the estimation of the logit model, it was verified that the coefficients seen together are significant to guarantee the consistency of the model, since the quality of the model must be adjusted by the contingency matrix. To increase the robustness of the model, probabilistic calculations were used, which classified that 71.84% of the observations were investigated correctly.

When interpreting the estimates, it was verified that all coefficients are significant at 1% with all positive signs. It is important to note that in the marginal effect calculation it was evidenced that the probability of an account being approved at the mid-point is 67.97%. In this sense, the model showed that each percentage point obtained in technical efficiency, FUNDEB and MDE, will lead to a significant increase of probability an annual account to be approved.

In other words, if the municipality follows the constitutional limits and obtains an efficiency index of 100%, there will have probability it has its accounts approved in 72.66%; in another case, if the municipality obtains an efficiency index of 20%, the probability of receiving a favorable opinion will be 19%. Therefore, technical efficiency is a factor that affects the probability of an account being favorable or not.

In addition, the analysis of the applications of public resources in MDE has been adhered to the type of opinion issued by the Court of Accounts. In a similar way, a direct and significant relationship is seen in the allocation of resources connected to FUNDEB.

It can be said that based on the results of the study, the research hypothesis is not rejected, validating that there is a positive relationship between TCE-PB opinion issued on the municipal accounts judgment and the level of technical efficiency in the application of public resources in basic education. With this, it is evident that TCE-PB can interfere in the dimension of the efficiency or improvement of the public spending on basic education.

As limitations of the present research, the analyzed period and lack of information in the years after 2010 stand out, restricting the sample of the current scenario of the State of Paraíba. Thus, the conclusions are restricted to the sample studied. Therefore, these limitations do not invalidate the results obtained.

It should be noted that the topic “efficiency of public spending” has been increasingly discussed; all the results found in the hypothesis of this research have to be highlighted, since they bring significant contributions that may be useful for managers of public agencies, and society as a whole.

Therefore, it is recommended that future studies to expand the sample and include other determining variables for approval of municipal accounts by Courts of Accounts.

## REFERENCES

- Ammons, D. N. (2003). Performance measurement and benchmarking in local government. In: Rabin, J. *Encyclopedia of public administration and public policy*. 2, Marcel Dekker: United States.
- Banker, R. D., Charnes, A., & Cooper, W. W. (1984). Some models for estimating technical scale inefficiencies in data envelopment analysis. *Management Science*. 30(9), pp. 1078-1092.
- Belo, H. (2013). Audit committee’s role in enhancing accountability of the Albanian public sector. *European Journal of Business and Economics*, 8(4).
- Constituição da República Federativa do Brasil de 1988. (2015). Brasília, DF: Senado Federal.
- Callahan, K. (2003). Performance measurement: citizen-driven. In: Rabin, J. *Encyclopedia of public administration and public policy*. 2, Marcel Dekker: United States.
- Charnes, A., Cooper, W.W., Rhodes, E. (1978) Measuring the efficiency of decision-making units. *European Journal of Operational Research*, 2, p. 429-444.
- Coleman, J. S., et al. (1966). Equality of education opportunity, GPO, Washington, DC.
- Corrar, L. J. (2011). Análise multivariada: para os cursos de administração, ciências contábeis e economia. FIPECAPÍ - Fundação Instituto de pesquisas Contábeis, Atuariais e Financeiras; Luiz J. Corrar, Edílson Paulo, José Maria Dias Filho (coordenadores). São Paulo: Atlas.
- Diniz, J. A., Corrar, L. J., & Lima, S. C. (2014). A influência das transferências condicionais na eficiência da educação fundamental brasileira. In: VIII Congresso ANPCONT, Rio de Janeiro. Desenvolvimento tecnológico e evolução contábil.
- Dourado, L. F., Oliveira, J. F., & Santos, C. A. (2007). A qualidade da educação: conceitos e definições. Brasília, DF: INEP.
- Freitas, L. R. (2013). Comparação das funções de ligação logit e probit em regressão binária considerando diferentes tamanhos amostrais. Tese (Doutorado) Universidade Federal de Viçosa.

- Gualazzi, E. L. B. (1992). Regime jurídico dos tribunais de contas. São Paulo: *Revista dos Tribunais*.
- Gujarati, D. N., & Porter, D. C. (2011). *Econometria básica*. 5a ed. Porto Alegre: AMGH.
- Hair, J.R., et al. (1998). *Multivariate analysis data*. New Jersey: Princeton University Press.
- Hanushek, E. A. (1986). The economics of schooling: production and efficiency in public schools. *Journal of Economic Literature*, 24, p. 1141-1177.
- Hanushek, E. A. (1994). Money might matter somewhere: a response to Hedges, Laine, and Greenwald. *Educational Researcher*. May, 23(4), p. 5-8.
- Haas, P. J. (2003). Performance indicators in state administration. In: Rabin, J. *Encyclopedia of public administration and public policy*. v.2, Marcel Dekker: United States.
- Heinrich, C. J. (2003). Measuring public sector performance and effectiveness. In: Peters, B. G. & Pierre, J. *The Sage Handbook of Public Administration*. 2nd ed. London: Sage.
- Herbest, F. G. (2010). Regime de competência no setor público: a experiência de implementação em diversos países. Dissertação. (Mestrado em Ciências Contábeis). Programa de Pós Graduação em Ciências Contábeis - Fundação Instituto Capixaba de Pesquisa em Contabilidade, Economia e Finanças (FUCAPE).
- Julnes, P. de L. (2003). Performance measurement. In: Rabin, J. *Encyclopedia of public administration and public policy*. 2, Marcel Dekker: United States.
- Lopes, A. B. (2009). Sistema de Informação de gestão econômica. In: Filho, J. F. R., Lopes, J., & Perderneiras, M. (Org.). *Estudando Teoria da Contabilidade*. São Paulo: Atlas.
- Loureiro, M. R., Teixeira, M. A. C., & Moraes, T.C. (2009). Democratização e reforma do Estado: o desenvolvimento institucional dos tribunais de contas no Brasil recente. *Revista de Administração Pública*, 43(4), pp. 739-72.
- Martins, G. A., & Theóphilo, C. R. (2007). *Metodologia da investigação científica para ciências sociais aplicadas*. São Paulo: Atlas.
- Menezes Filho, N. A., & Amaral, L. F. L. E. (2009). A relação entre gastos educacionais e desempenho escolar. IBMEC, São Paulo, Working Papers, n. 162.
- Mendes, M. (2003). A eficácia da vinculação de recursos no federalismo brasileiro: o caso do FUNDEF. In: *Finanças Públicas*. VIII Prêmio do Tesouro Nacional. Brasília: Universidade de Brasília.
- Oliveira, C. E. M., & Turrioni, J. B. (2006). Medidas de desempenho na gestão pública: estudo de caso em uma instituição federal de ensino superior. Anais do IX Simpósio de Administração da Produção, Logística e Operações Internacionais. SIMPOI.
- Pacheco, R. S. (2009). Mensuração de desempenho no setor público: os termos do debate. *Cadernos Gestão Pública e Cidadania*, FGV de Periódicos e Revistas, 14(55).
- Pritchett, L., & Filmer, D. (1999). What education production functions really show: a positive theory of education spending. *Economics of Education Review*, 18(2), pp. 223-239.
- Samuelson, P. A. (1954). The pure theory of public expenditure. *Review of economics and Statistics*, Massachusetts, 36, pp. 387-389.
- Silva, C. A. T., & Revorêdo, W. C. (2005). Economicidade da gestão pública municipal: um estudo das decisões do tribunal de contas do Estado de Pernambuco. *Revista Universo Contábil*, 1(2), pp. 09-2.
- Tabachnick, B. G., & Fidell, L. S. (1996). *Using multivariate statistics*. 4 ed., California State University, Northridge.
- Torres, M. D. F. (2004). *Estado, democracia e administração pública no Brasil*. Rio de Janeiro: Editora FGV.
- Weffort, E. F. J. (2005). *O Brasil e a harmonização contábil: Influências dos sistemas jurídicos e educacional, da cultura e do mercado*. São Paulo: Atlas.