



# Assessment of efficiency in basic and secondary education in Tunisia: A regional analysis



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## ABSTRACT

To determine the factors enhancing the efficiency of basic and secondary education in 24 governorates of Tunisia in 1999, 2003, 2006 and 2008, we apply a non-parametric approach, Data Envelopment Analysis (DEA) to multi-inputs and multi-outputs. Physical resources used in the study are: the number of classes per 100 students and the number of schools per million inhabitants. Human and financial resources are described by the number of teacher per 100 students and education spending per student respectively. The output measures include the success rate of baccalaureate exam and the rate of non-doubling in the 9th year. Our results show the absence of significant relationship between school resources and student performance. The output variable, non-doubling rate in the 9th year is the only factor able to influence the efficiency level of governorates in terms of 2nd cycle of basic education and secondary education. By regressing efficiency scores on non-discretionary variables, we find that inefficiency in education is strongly related to poverty within governorates.

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## 1. Introduction

Economic recession and deterioration of the situation of the labour market in many countries are the essential basis of the evolution issues associated to education. It is important to recognize the role of education in stimulating economic growth and in the promotion of social development. As regards expenditure, the education sector absorbs a large share of the state budget in most countries. In some developing countries, despite the important financial effort in education, it still remains insufficient to reach the level of efficiency and to improve the quality of teaching activities provided to students. School resources have to be allocated within educational institutions and between governorates in a rational manner.

Therefore, each country seeks to achieve the level of efficiency in education, minimizing costs and resources used in this sector. To evaluate the degree of efficiency in education sector, it is important to analyse the connection between school inputs and student

performance and outcomes (amount invested versus resulted obtained).

In this paper, we measure the efficiency in 2nd cycle of basic education and secondary education in 24 Tunisian governorates in 1999, 2003, 2006 and 2008.<sup>1</sup> The objective is to study the effect of school resources on student achievement and to determine the major influencing factor of basic and secondary education efficiency.

In methodological terms, we employ an output-oriented DEA model with constant returns to scale (CRS) and variable returns to scale (VRS) assumptions to assess the efficiency of decision making units (DMUs). We use four input variables describing human, material and financial resources (number of teacher per 100 students, number of classes per 100 students, number of schools per million inhabitants, and spending education per student) and two output variables describing student achievement: the success rate of the baccalaureate exam and the rate of non-doubling in the 9th year.

Our main results show the absence of a significant relation between school resources and the level of education efficiency in Tunisian governorates, where more resources do not directly improve efficiency. For instance, the non-doubling rate in the 9th

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<sup>1</sup> In 1999, only 23 governorates were introduced into the analysis because the governorate of Manouba was created in 2000.

year is the only factor that seems relevant to increase the level of efficiency level of governorates in terms of 2nd cycle of basic education and secondary education. Moreover, a regional difference between the East region (North East and Centre East) and the other regions in terms of the 2nd cycle of basic education and secondary education efficiency is clearly evident from the efficiency scores results. In fact, a disparity of socio-economic characteristics among Tunisian regions and the insufficiency of school resources within the North West and South regions could be at the origin of these regional efficiency differences. In addition, using Tobit regressions, we show that efficiency in basic and secondary education is significantly influenced by employment and poverty.

The paper is organized as follows. In Section 2, we describe the Tunisian Education System and we present the framework of elementary, secondary and higher education in Tunisia. Section 3 corresponds to the review of the related existing literature on the effect of school resources on student performance and the methodology used in the paper. In Section 4, we proceed first to a description of the data used in the analysis, its evolution and the eventual patterns in the link between inputs and outputs by governorate. Secondly, we present the DEA results of efficiency and their explanation using non-discretionary inputs. Finally, Section 5 provides the conclusion.

## 2. Framework of elementary, secondary and higher education in Tunisia

The evolution in the level of Tunisian educated population over time is presented in Table 1.

The quantitative results taken from Table 1, demonstrate a general improvement in the level of education for the population aged 10 years and over. We observe a progress in the population with secondary and higher level of education and a reduction of the illiteracy rate.

The decrease noticed in the population with a primary level of education can be explained by the decrease in the new entrants to the primary cycle which passed from 199465 in 2000 to 162346 in 2004.<sup>2</sup>

The general improvement in the number of educated people aged 10 years and over in Tunisia reflects the double concern that characterize the Tunisian education policy: the control and the strict regulation in the number of students and the consecration of a sustainable financial effort reserved to education. Controlling the number of enrolled students allows the Tunisian government to have a control over its expenditure devoted to education sector. This process can be reinforced by the predominance of public education sector compared to private sector. The limited number of students accepted by the private educational institutions and the high cost of private sector (absence of public funding of private education) reduce the choice between private and public education for the students (Akkari, 2005).

The evolution of expenditure devoted to the three levels of education as percentage of total government expenditure is presented below in Table 2.

Compared to countries with similar economic situation, Tunisia procures a significant effort devoted to public education. To ensure quality education and to move from quantitative advances characterising the different levels of educational system to qualitative issues, this financial effort still remains insufficient and an efficiency measure of school resources' allocation seems to be necessary to achieve this goal. Internal inefficiency observed in Tunisian educational system is represented by the low quality of

**Table 1**

The level of education of the population aged 10 years and over (%).<sup>7</sup>

Level of instruction	2000	2001	2004	2014
Without education	24.9	24.1	23.5	19
Primary education	39.6	40.4	36.6	32.5
Secondary education	29.7	29.7	32.2	35
Higher Education	5.8	5.8	7.7	13

Sources: National study on population and employment: 2000 and 2001/National Institutes of statistics (INS, 2004 and 2014).

teaching and learning activities that characterized many educational institutions in primary, secondary and higher education.

This problem can be viewed by the deterioration of academic achievement, the reduction of the number of students in different educational levels and the high levels of drop-out and repetition rates (Table 3).

In our analysis, we measure the efficiency of public secondary education and of the 2nd cycle of basic education in 24 Tunisian governorates in 1999, 2003, 2006 and 2008 through non-parametric Data Envelopment Analysis (DEA) approach. During this period, the overall number of teachers in public institutes of secondary education and pre-secondary schools in Tunisia increased around 96.6 percent and the number of teachers per 100 students increased from 4.7 in 1999 to 7.1 in 2008 (Ministry of Secondary Education). It should be noted also that the efficiency of education can positively influence the labour market in Tunisia in which the number of employed persons with secondary education has also increased nearly 4 percentage points ranging from 32 per cent in 2000 to 36.1 percent in 2007 (Source: Ministry of Employment, 2008) (Table 4).

## 3. Literature review

Enrolling students in schools providing a weak quality of education means an inefficient use of time and resources dedicated to education sector. Because allocation of school resources within schools and higher educational institutions should depend on the performance of individual educational establishments, it is necessary to perform a measurement of efficiency connecting school resources (human, materiel and financial resources) to student outcomes and achievement.

A large body of research appears after the publication of Coleman report (1966) to re-evaluate the connection between school resources and student achievement. The results generated from the diverse literature yield to a mixed conclusion about the relationship between school resources and student performance and outcomes.

Two different strands of literature regarding the issue of resources and student achievement exist. The first one deals with the absence of relationship between school resources and student performance (Coleman et al., 1966; Hanushek 1986, 1996; Coladarsi and Cobb, 1996; Ruggiero and Vitaliano, 1999). The second one sheds lights on the significant effect and impact of school resources and environmental variables (pupil-teacher ratio, size of school, school expenditure, family characteristics) on educational outcomes (Kuziemko, 2006; Giorgio and Daniele, 2005; Essid et al., 2013; Kirjavainen and Loikkanen, 1998; Afonso and Aubyn, 2006; Lee and Barro, 2001; Ray, 1991; Greenwald et al., 1996).

Coleman et al. (1966) is the first group of researchers considering that higher levels of school resources like lower class sizes have no effect and influence on student achievement. Since

<sup>2</sup> Source: UNESCO Institute for statistics.

<sup>7</sup> For 2014, 0.5% (84357) of the population aged between 10 years and over is undeclared.

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