

Evaluation of the impact of post bureaucratic management on Moroccan schools efficiency

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Abstract- *The aim of this paper is to estimate the impact of the post-bureaucratic model on schools efficiency. We use a Data Envelopment Analysis to compare efficiency scores in bureaucratic schools and those operating with post-bureaucratic model. Using the TIMSS 2011 (Trends in International Mathematics and Science Study) database for Morocco and the contribution of Kernaghan, Kenneth, Sandford F. Borins, (2001), we determined and measured three main characteristics of post-bureaucratic organization. We also used these measures to determine and compared the efficiency of Moroccan school. Our result shows that using post-bureaucratic management the mean school efficiency was increased from 4% to 59%.*

I. INTRODUCTION

Ce document est un modèle.

In the last years, many reforms in Morocco occurred in public education tried to make the management more efficient. The main reform that happened is the transformation of the education from a bureaucratic structure into a new one, which serve the interest of students. (Chubb and Moe, 1990).

In this environment, the argument in favor of the modernization of education system is a powerful one. It is associated with the practice of post-bureaucratic management. However, schools differ in their degree of adherence to this model.

In addition, the evidence of a declining student performance and the deterioration of the financial condition of Moroccan governments raise questions about the efficiency of the education

system. So evaluating this efficiency has become a key objective. This evaluation allows the country, not only to know the level of school efficiency but also the potential improvements to achieve the required level.

The aim of this paper is to estimate the impact of post-bureaucratic model on schools efficiency. We use a Data Envelopment Analysis to compare efficiency scores in bureaucratic schools and those operating with the post-bureaucratic model.

The development of Data Envelopment Analysis (DEA) was introduced in the late of 1970s based on Farrell (1957) definition: Input oriented efficiency indicates the ability of each Decision-Making Unit to minimize input consumption for a given level of output. Also, Sengupta (1995) and Cooper, Seiford (2000) define efficiency as the ratio between outputs and inputs. The integration of multiple outputs in DEA, make the adaptation of this method to different sectors, such as education easy (Fare, Grosskopf, and Weber, 1989).

This paper sheds new light on the current debate about the emerging of post-Weberian organizational forms and it sought to respond to the lack of empirical studies about post-bureaucratic management in Morocco.

The cause of this lack is the measurement difficulties of post-bureaucratic management.

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This model of management has been proposed as an extension of bureaucratic principles, which puts some management changes in bureaucratic principles. These changes concern the introduction of other human dimensions such as trust, empowerment, personal treatment and shared responsibility (Christopher Grey, 2006).

II. LITERATURE BACKGROUND

One of the first who have studied the function of efficiency in education was Coleman (1966), using the conceptual framework of the input-output analysis. He was the first to introduce a connection between school inputs and performance of students in the school. The most original contribution of this study is the introduction of variables related to the effects of the social composition of schools on student performance.

More recent studies also analyzed this issue. For example the study of Liouaeddine (2015), which shows that a high number of students impacts negatively the academic results of Moroccan students in science and reading and hence the efficiency of schools.

Also, an interesting result advanced by Kirjavainen and Loikkanen (1998), who analyzed the differences, in efficiency between 291 schools, and deduced that the inefficiency increases when the average class size increases.

In the same way, Christian Maroy (2008), has analyzed the evolution of post-bureaucratic modes of regulation of education systems in Europe. His results showed that the policies of the last twenty years that characterizes the post-bureaucratic system are based on increased autonomy, decentralization of decisions, the introduction of parental choice, and diversity of educational

provision, introduction of evaluation mechanisms or control of the results.

However, these characteristics are the same in one country and then it's not varied between schools. Kernaghan, Kenneth, Sandford F. Borins, (2001) proposed to separate between characteristics related to general environments and their related to administrative culture. In his view, these attributes are the basis for measuring performance and thus the effectiveness of public organization.

III. THE METHODOLOGY AND DATABASE

For this study, we use a database TIMSS 2011 (Trends in International Mathematics and Science Study) for Morocco. This database is the result of an international survey organized by IEA (International Association for the Evaluation of Educational Achievement).

We propose to apply the DEA methodology initially to determine the efficiency of 278 schools in Morocco. We use this technique to assess the differences between the points representing the values of inputs and outputs observed over a point on the production frontier. The efficient frontier is estimated from an envelope curve.

The inputs retained in our analysis are based on their relevance in the educational production process.

We based our analysis on the empirical research of Kenneth Kernaghan, Sandford F. Borins (2001) and Christian Maroy (2008), to select the measures of post-bureaucratic management, taking account of the availability of information in the database. In addition, to these measures, it is important to control for such socio-economic factors related to student achievement.

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A. The measure of efficiency: DEA method

The concepts of efficiency were originally introduced by the work of Koopmans (1951) and Debreu (1951). The first has put forward a technical definition of efficiency; the production of a unit is considered to be technically efficient if it is impossible to increase an output or / and reduce input without simultaneously reducing, at least, another output and / or increase at least another input.

Debreu (1951), introduced the first measure of technical efficiency and defines efficiency as the distance between the combination of inputs and outputs achieved and the feasible maximum. However, it is

Farrell (1957), which has defined more accurately the efficiency by separating allocative efficiency and technical efficiency. The first reflects the ability of a production unit to use its inputs in optimal proportions, with regard to their prices. The second results from the possibility to avoid waste in the production, as defined by Koopmans (1951).

It is the concept of technical efficiency that is used in the present study as in most of the contributions on the subject of the efficiency of educational structures. We are interested in this study in the analysis of technical efficiency.

So, to measure this efficiency we used a non-parametric approach known as "Data Envelopment Analysis" (DEA).

The DEA method was originally designed to measure the relative technical efficiency organizations whose production technology is not clearly identified; such as schools. The economic

assumptions to the DEA method are free provision of inputs, the outputs.

In our first analysis, we use four inputs and two outputs to determine school efficiency.

Our inputs:

- The books used in mathematics and science courses.
- The hours of education in mathematics and science courses.
- The material used in mathematics and science courses.
- The computer software using in mathematics and sciences courses.

The outputs are:

- The mean of mathematics scores.
- The mean of sciences scores.

a. THE MEASURE OF POST-BUREAUCRATIC MANAGEMENT

In this paper the measures of post-bureaucratic management are based on Kernaghan, Kenneth, Sandford F. Borins, (2001) contribution. These authors define six characteristics relatives to administrations and others relative to type of structure and market policy.

However, in the case of schools, the type structure is same and the market policies don't vary also. So, we considered only administrative characteristics in this paper. These characteristics can be regrouped into three main ones.

- Participative management;

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- Staff satisfaction;
- Collective action.

However, these characteristics are difficult to measure so we use a proxy variable. The proxy of participative management used is teacher's collaboration in programs and educative material. Also, the proxy of staff satisfaction is general teacher's satisfaction in schools. And finally, the proxy of collective action is parent involvement in schools activities and programs.

IV. THE EFFICIENCY OF SCHOOLS: THE EFFECT OF POST-BUREAUCRATIC MANAGEMENT:

A. The inputs and outputs variables in Moroccan schools

Tableau I
Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Books	286	75.89161	48.41399	0	172
Hours	286	105.7238	83.75237	0	364
Computer Software	286	8.017483	15.29533	0	76
Materiel	286	28.85664	21.933	0	86
Math score	286	341.8311	68.57453	203.3509	571.3757
Science_score	286	272.7587	79.55301	76.16035	545.595
Collaboration	286	1.216783	0.4685155	1	3
Satisfaction	222	2.138889	0.97845	1	5
Parent involvement	222	3.447489	0.8730052	1	5

The average of the results of the schools is 341 points in mathematics, and 272 in sciences. These performances are below the international average (500 points).

The number of education varies considerably between minimum and maximum indeed with a high standard deviation. The same result is shown in computer software which are the standard deviation is higher than the mean, which means that there was a large variation.

Besides, the table shows that the parents' involvement is generally higher in Moroccan schools. Indeed, the mean is 3.55 in the scale of 5 with a low standard deviation. However, the satisfaction mean is 2.13 which is below to medium scale (3). The same result is observed in teacher collaboration. This result shows that teachers are not really satisfied and not really collaborate in Moroccan schools.

a. Efficiency estimation

Tableau III
Efficiency estimation results

	Obs	Mean	Std. Dev.	Min	Max
Basic efficiency	286	0.0402056	0.1669796	0	1
Efficiency after introduction of all management variables	220	0.594753	0.1704395	0.2753166	1
Efficiency after introduction of satisfaction variable	218	0.3790447	0.1406097	0.1055121	1
Efficiency after introduction of collaboration variable	286	0.542846	0.1584054	0.1829699	1
Efficiency after introduction of parent involvement variable	219	0.3885155	0.2101879	0.0522615	1

The result of efficiency estimation shows that the basic efficiency of Moroccan schools is 4%. However, using post-bureaucratic management the mean school efficiency was increased from 4% to 59%. Also, the variable which has a higher impact is the proxy of participative management. Indeed, the mean school efficiency was increased from 4% to 54%, only with this variable. The proxy of collective action and the proxy of staff satisfaction have almost the same impact, with respectively 39% and 38% in mean

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score. According to this result, the adoption of post-bureaucratic model has a big impact on school efficiency. However, this paper has limits on the approximation of post-bureaucratic model. This limit is caused by the lack of information about schools' management characteristics.

V. CONCLUSION:

In this study, we try to estimate the impact of post-bureaucratic model on schools efficiency. We use TIMSS 2011 data and Data Envelopment Analysis to compare efficiency scores in with and without using post-bureaucratic management variable.

The result shows that, despite the diversity of equipment of the school and the number of hours of study, a large part of the difference of efficiency between schools in Morocco, is due to the characteristics of management.

These results must obviously be taken with caution, the study presents some limitations are bound to the data used.

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