THE EFFICIENCY OF PUBLIC SPENDING ON EDUCATION IN TUNISIA AND THE CHALLENGES OF INTEGRATING GRADUATES

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ABSTRACT

This article argues that the education sector generates economic growth if the expenditures allocated to it are appropriately used. Therefore, the mission of universities is no longer confined to the production and dissemination of knowledge and know-how but extends to training and professional integration. For this reason, public spending on education services is a very important part of total public expenditure in Tunisia. However, using the DEA (*Data Envelopment Analysis*) model and higher education data to calculate the efficiency scores for the 1971/ 2015 period, we found that education services are not efficient and therefore public spending in these sectors is not of good quality. For this reason, the authorities must introduce new and more transparent practices in the management of public expenditure in order to achieve the objectives being set in terms of educational policies.

Keywords: educational policy, human capital, university massification, DEA model.

JEL **Classification:** H52; I20; I21; I28

Tunisia, which is a small country by its surface and its natural resources, bet, from the day after the independence, on education as a vector of development. However, it has still to overcome major challenges today, such as pursuing the effort of basic education, fighting against school drop-out, and illiteracy in the rural areas, promoting women's education, improving the level of qualification of young graduates available on the labor market, developing the sectors that are helpful for the country (Information and Communication Technologies, in particular) and adapting training to the companies' needs to reduce unemployment.

For fifteen years, a renewed interest in the issues of quality, effectiveness and economic efficiency of the educational systems were observed by both economists and political decision-makers for the following reasons:

• Budget cuts faced by public training systems require them to produce benefits at lower costs while maintaining high quality services, that is to say, to improve their efficiency.

• The development of international studies on the performance of the pupils made many people wonder about the internal efficiency of the educational system (OECD, Unicef, ...)

• The obstinacy of unemployment in particular that of the youth, makes us wonder about the quality of the training spreading compared to the needs of the labor market, in other words, about the external efficiency of the school systems and vocational training.

Indeed, the practices of transparent public spending and more efficiency are necessary to ensure a fair allocation of resources and improve the well-being of the population (Aubyn, 2003 ; Afonso and al, 2005 ; Heller and Hauner, 2006). It was also recognized that the efficiency of the public spending, which is defined as the capacity of a State to maximize its production of goods and services or minimize its spending considering its level of production, is a necessary condition for the economic performance of a country (Brini and Jammeli, 2015).

In the economic theory, the effective use of the efficiency of the public resources is considered as the engine of economic growth and human development. In the educational sector, several authors, such as Lucas, 1988; Aubyn, 2003; Hauner, 2008; Afonso and Aubyn, 2006; Herrera and Pang, 2005; Becker, 2008, were considered the efficiency of the educational public spending as the determiners of the educational system. For Lucas (1988), the public spending on education helps improve the level of the human resources, which are necessary conditions for the economic prosperity.

The remaining part of the research study is structured as follows. The first section focuses on the definition of the concept of efficiency in the context of public spending management. The second section deals with a literature review on the determinants of this efficiency in the educational sector. Finally, the last section presents the methodology and the results as well as their interpretations.

I. Conceptual approach of the notion of efficiency

For the economists who consider education as one of the branches of the economy, the total productivity of the factors or the set of the used resources determine the efficiency of an economy and its various branches (Lê Thanh Khôï, 1967). In fact, efficiency, which is programmatic, is based on the relationship between the observed exits or effects and the entries exclusively defined on the basis of the mobilized resources. It expresses the "relationship between what is achieved and the implemented means" (Legendre, 1993, p. 476).

On the other hand, efficiency can be internal or external as it has a quantitative and a qualitative facet. The evaluation of the internal or external efficiency of an educational or sub-educational system, an institution or a training program can require the recourse to standardized procedures such as the ones mentioned in the evaluation of efficiency.

1.1. The internal efficiency

The quantitative internal efficiency is concerned with the quantitative nature of the observed effects and entries, expressed in terms of the mobilized resources. This type of efficiency is usually assessed by the ratio between the number of graduates and the expenses related to the staff. It may also reflect the ratio between the number of the registered and the supervisory staff. It would be also interesting to analyze the quantitative internal efficiency depending on the number of successful students compared to the supervisors. Moreover, the quantitative internal efficiency can try to determine the number of people, the amount of equipment and the volume of financial resources. The material, human and financial quantified resources can be compared to the really mobilized ones.

The qualitative internal efficiency places a special emphasis on the qualitative nature of both the exits and entries. For example, the citizenship matters can be estimated by examining the typical behavior of the products of the educational system, for example by wondering if they lead or not an existence of eccentric, if they become or not delinquents, etc.

All the studies conducted about the educational capital gain returned to the costs also evaluated the qualitative internal efficiency. The same applies to the profiles of skills of the school leavers while considering the skill level of the trainers. The internal qualitative efficiency should thus take into account both the desired and the actual profile of the human resources by considering the missions and the realized objectives. It also has to take into account the characteristics of both the necessary and available equipment when dealing with specific tasks and the reached objectives.

1.2. The external efficiency

The external efficiency refers to the external effects of the educational system. On the other hand, the quantitative external efficiency refers to the quantitative nature of the incoming and outgoing pupils. It can express the relationship between the number of actual jobs and the expenses invested in the educational system. In the current neoliberal context, a quite particular emphasis is placed on the analysis of ratio between the number of jobs created by the products of educational system and the costs of the training workshops to develop entrepreneurial spirit.

Moreover, the external qualitative efficiency takes into account the qualitative nature of entrances and exits as well as the ratio between the skills implemented in professional or social life and the costs of training workshops intended to develop the know-how. In the current trend

of a greater opening of the educational system to the productive world, the evaluation of the external qualitative efficiency should emphasize the ration between the acquired skills in the training process and the investments in-company training.

According to the definitions proposed for the concepts of efficiency and effectiveness, the evaluation of the educational system should seek to establish the factors which intervene in the determination of the various indicators of efficiency and effectiveness.

II.   Literature review on the determiners of the efficiency of the educational public spending

The research studies of the efficiency of the public expenses recorded an expansion in the economic literature with, in particular, the contributions of Afonso and al. (2005), Gupta and Verhoeven (2001) and Tanzi and Schuknecht (2000). In the sector of education, these studies estimated the efficiency of the State, and more particularly, the relationhip between the resources assigned to the sector and the indicators of efficiency, such as school enrolment rates. In fact, it is in this logic that many authors, such as Putnam, 1993, Mauro, 1995, La porta et al, 1999 and Hauner, 2008), were interested in the determiners of the efficiency of these resources. As a consequence, two groups of factors were identified in the literature, on the one hand, about the economic variables and, on the other hand, about the institutional and political variables.

2.1.The economic determiners

The variation of the economic environment is considered one of the fundamental factors in the analysis of the public policies dedicated to the efficiency of the governmental spending (Wilensky, 1975, 2002). It is obviously asserted that the level of the economic development of a country has an effect on the efficiency of the spending assigned to the educational sector. In their study, Nijkamp and Poot (2004) showed that investment in education is more beneficial for the economic development because it enables to increase the level of the human capital.

Furthermore, the degree to which a nation allocates its educational spending between the various levels of learning determines the redistributive effect, which is beneficial for the poor people (Patino, on 2011). On his part, Castles (in 1989 and 1998) explains the importance of the level of the investment in higher education and the educational spending showing the existence of a positive relationhip between both variables. However, Busemeyer (2007) considers that higher education is not the only explanatory factor of the educational spending of a country. It is therefore necessary to emphasize the effect of the variation of the demand in the primary and the secondary sector.

In the same direction, Pablo and Martinez (2010) showed that the parents' educational level positively affects that of the children and hence the efficiency of the spending. On the other hand, the equity in the distribution of income is a major determining factor in the analysis of the

efficiency of the educational spending. Indeed, some authors, such as Afonso and Aubyn, (2006), Afonso and al. (2006), and Herrera and Pang (2006) showed that countries characterized by a level of low per capita income are more inefficient in the use of the public resources. In the same order of ideas, they considered that a younger population causes an increase of the costs of the educational system with regard to the indicators of results.

2.2. Institutional and political determiners

Institutions have become a key determinant of a country's economic. This means that the quality of institutions are an explanatory factor of the efficiency of the public spending. On the other hand, Putnam (1993) and Gellner (1994) stated that the degree of development of a civil society influences the efficiency of the public sector. In other words, the cooperation between the citizens and the non governmental institutions helps the formers exercise more control over the governmental policies and bureaucracy. For these writers, the increased responsibility of the government greatly raises the performance of the educational spending.

In the same vein, Afonso et al. (2005) consider the level of the public sector apprehended by the government size as a fundamental tool in explaining the efficiency of the resources allocated to the educational sector.

For them, less developed countries are more efficient. Afterward, Becker (2008) asserted that countries with favorable statutory environments show greater efficiency and effectiveness in the use of the expenses on the educational sector. This argument was asserted by Feeny and Rogers (2008) in their study on the educational spending in the Sub-Saharan African countries.

In the case of low and middle income countries, Rayp Sijpe (2007) found that civil liberties and good governance contribute to the improvement of the effectiveness of the educational expenses. In their studies of some OECD countries, Adam et al. (2007) showed that the quality of government has a greater impact on the efficiency of educational expenses.

III. Empirical analysis

Indicators of effectiveness or efficiency are signals determined from subjective data or databases that indicate the need to analyze a deviation from normative activity performance criteria or other predefined values [OECD (1992)]. The relevance of education indicators for the decision-making process is directly related to the fact that, on the one hand, they feed the public debate and, on the other hand, they correspond to concrete objectives.

In this framework, we plan to calculate the efficiency scores to assess the performance of the Tunisian higher education sector in the production of graduates, which reflect the skills designed, on the one hand, to measure the amount human capital produced in the economy and, on the other hand, to test the impact of this performance measured by economic growth.

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For the economists, education is considered as one of the branches of the economy where efficiency is based on the ratio between the exits, the observed effects and the entries defined exclusively in terms of the mobilized resources. Moreover, it reflect the ratio between what is achieved and the employed means (Legendre, 1993, p. 476).

3.1 Methodology :

The purpose of this research is to measure how the economic and political environment affects the performance of the educational sector in Tunisia. For this reason, the chosen methodology consists in using the DEA model to measure the efficiency scores of higher education over the 1971/2015 period.

In fact, this method is a way of measuring the function of production which is a description of the input-output (Seiford and Thrall, on 1990), besides, it is the best adapted to calculate the efficiency as it captures the distance between the frontiers of efficiency and clearly determines if an institution is close to this efficiency. Generally, for the educational sector, it is better to take the method orientation input of Seiford and Thrall (1990) to measure its efficiency because it is the method which tries to minimize the entries and give a number of exits. We consider that it is a method suited to adapt itself to the non profit-making character of the sector of higher education.

The advantage of the DEA method is that it does not require proposals on the functional form of the efficiency of a Decision Making Unit (DMU). In fact, a DMU is the set of decisions that an institution takes on the amount of inputs in order to produce a number of outputs. Thanks to the DEA, the effectiveness of the DMU in the educational sector can be measured over a given period of time. This model actually seeks to maximize both the efficiency score based on the output to the input ratio and the number of inputs relative to the given output quantity.

In fact, this method is an excellent model for the representation of the business processes (Charnes, Coopers and Rhode, 1978), in addition, its empirical orientation and the prior absence of presumptions are interesting for studies involving the efficiency of the non-profit sector, and even of the regulated one (Charnes, Cooper and Rhode, 1978).

The program to be maximized is:

$$\begin{cases} Max\ E_K = \dfrac{\sum_{i=1}^{n} w_i^* \cdot y_i}{\sum_{j=1}^{m} v_j^* \cdot x_j} \\[2em] Under\ constraint: \ E_K \leq 1 \end{cases}$$

E_K is the efficiency score, with $y_i > 0$, the exits and x_j the entries

$v_i > 0$ et $w\mathrm{j} > 0$ are the weighting coefficients.

The resolution of this linear programming problem helps identify the weighted sum of the minimized inputs while keeping the outputs constant. The efficiency score (Furkan) changes according to the weights.

3.2 The selection of data:

Following the description of the methodology, it is important to determine the appropriate procedure to be followed for the data collection. In fact, we have targeted the higher educational sector in Tunisia during the period from 1971 to 2015. Therefore, the entries and exits chosen in the DEA model are as follows:

Variable	Nature	Notation
The number of teachers	Entries	x_1
The staff of the new students	Entries	x_2
The graduate students	Exits	Y

By means of the DEAP (*Data Envelopment Analysis Program*) software, version 2.1, we estimated the scores of efficiency of the education at the university level during the 1971/2015 period.

**Table No. 1: Efficiency Scores of Higher Education in Tunisia, 1971-2015**

Year	Efficiency Scores	Year	Efficiency Scores	Year	Efficiency Scores	Year	Efficiency Scores	Year	Efficiency Scores
1971	0.582	1980	0.823	1989	0.838	1998	0.800	2007	0.879
1972	0.662	1981	0.870	1990	0.820	1999	0.842	2008	0.801
1973	0.622	1982	0.844	1991	0.877	2000	0.957	2009	0.809
1974	0.653	1983	0.832	1992	0.842	2001	0.927	2010	0.795
1975	0.691	1984	0.825	1993	0.827	2002	0.929	2011	0.825
1976	0.662	1985	0.844	1994	0.745	2003	0.909	2012	0.789
1977	0.695	1986	0.932	1995	0.666	2004	1.000	2013	0.684
1978	0.724	1987	0.855	1996	0.688	2005	0.956	2014	0.561

1979	*0.714*	*1988*	*1.000*	*1997*	*0.680*	*2006*	*0.921*	*2015*	*0.526*

We graphically represent these scores to appreciate their evolution during the period of observation and seize their position with regard to the frontier of efficiency.

In any event, the scores of the obtained technical efficiency reflect not only the errors of management but also the appropriate environment for each university and each student. This should lead us to mention the universities with highest efficiency scores and those with low ones.

Graph No. 1: Efficiency frontier and evolution of the efficiency scores of higher education in Tunisia: 1971-2015
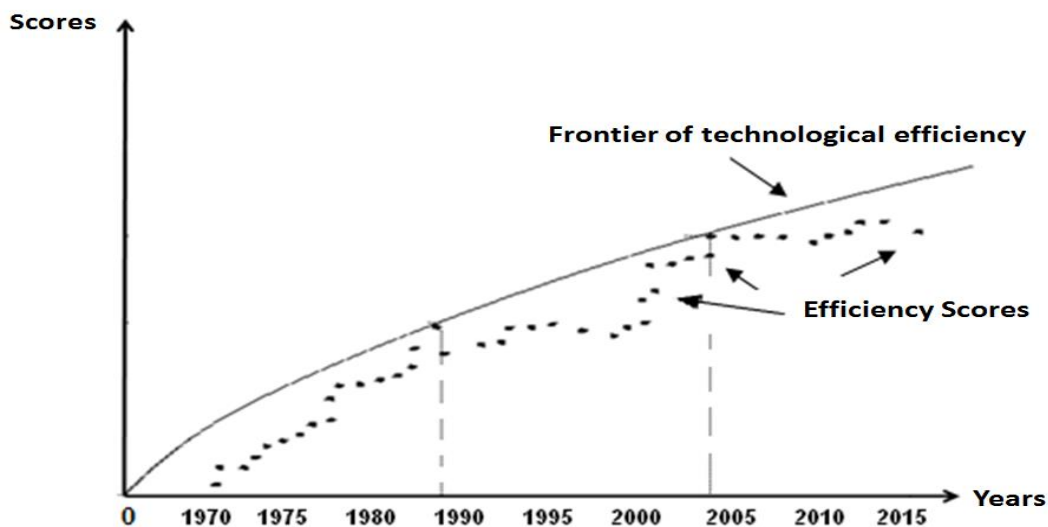

The technical efficiency frontier is the geometric location of the points corresponding to an efficiency score equal to 1. Most of the scores calculated for different the 1971 /2015 period are located close to this border. Their levels, which vary between 0.526 and 1, reflect the degree of the shortage of public spending on education, which are often combined with some waste of available resources

In economic theory, the efficient use and the efficiency of the public resources is regarded as the driving force for economic growth and human development. In the educational sector, several research studies, such as those of (Lucas, 1988; Aubyn, 2003; Hauner, 2008; Afonso and Aubyn, 2006; Herrera and Pang, 2005; Becker, 2008) were carried out about both the efficiency of public educational expenditure and its determinants. For Lucas (1988), public spending on

education makes it possible to improve the level of human capital, which is a necessary condition for economic prosperity.

Total public expenses on education are globally about 6% of the GDP in Tunisia, while the minimum rate desired by UNESCO is 20% (see graph below). This difficult situation has resulted in painful working conditions at schools and universities. In fact, most Tunisian universities operate at full capacity with outdated premises, deficient libraries, outdated study programs and underqualified teaching staff. All these adverse factors have been reflected in the performance of higher education in Tunisia.

Graph No. 2: Evolution of the efficiency scores and the ratio of the educational spending to GDP in Tunisia over the 1980/2015 period
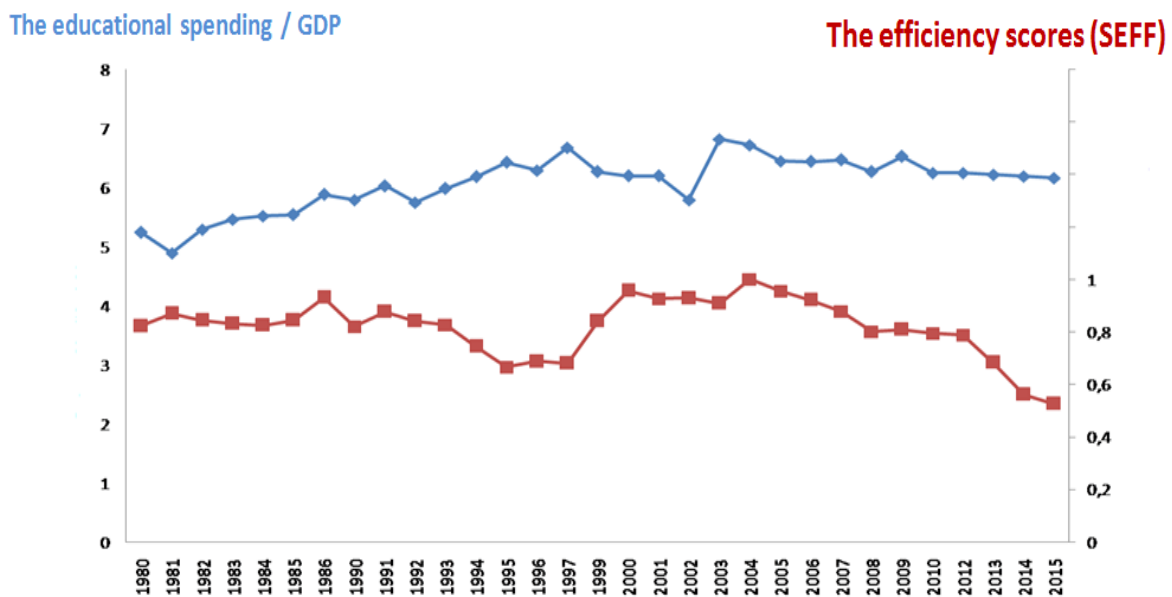
IV. Results and Analysis

Over the last few decades, the efficiency of public spending has become one of the key issues in public finance. In addition, it continues to be one of the ongoing concerns of the public policy makers, economists, and international organizations (World Bank, IMF, OECD, etc.). Indeed, transparent public expenditure practices and better efficiency are necessary to ensure a fair allocation of resources and improve the well-being of the population (Aubyn, 2003; Afonso et al, 2005; Heller and Hauner, 2006). It was also recognized that the efficiency of public expenditure, which is defined as the capacity of a State to maximize its production of goods and services or

minimize its expenditure according to its level of production, is a necessary condition for the economic performance of a country (Brini and Shubhdeep, 2015).

On the other hand, the economic situation seems to have a significant impact on both the government spending on education and on the efficiency scores. For example, during the 1980/1986 period, Tunisia was subject to an intense economic crisis because the economic policy did not react to adapt to the changing conditions of the international environment. Therefore, the economic activity slowed, as the real GDP growth was close to 3.3% per year. At the same time, the imbalances of domestic and external scales significantly increased due to the expansionary financial policies and the decline of the Tunisian trade linked mainly to the world oil prices. Moreover, the budget devoted to education during this period was in the order of 5.8% of the GDP. In fact, all these factors contributed to the degradation of the efficiency scores.

The 1987/ 2004 period is that of the structural adjustment and upgrading of the Tunisian enterprises by the IMF (International Monetary Fund) and the World Bank for the purpose of achieving a macroeconomic stability and introducing the initial measures of structural liberalisation while reducing the dependence of the export on oil. Nevertheless, unemployment, which continues to threaten the economic growth, is aggravated by an increasingly active population. The difficulties faced by young Tunisians to integrate into the labour market called into question the capacity of the the educational system to prepare them for a working life. Higher education under the sign of the massification is disconnected from the needs of the job market. In 1997, 63% of the unemployed were under 29 years old, 49% of whom were long-term unemployed. All these factors discouraged students from pursuing their university studies, given the difficulties encountered in finding a job, which explains the collapse of these scores during the 1990s.

Even the improvement of the scores from 2004 was artificial. It reflects the policy of the State which has privileged the quantity of graduates to the detriment of the quality. In fact all bachelors had the right to access o the university to follow studies according to the existing capacities and not according to the needs of the companies. Therefore, the student coaching rose from 20 per teacher in 2002 to 15.1 in 2012 (see the graph below). Nevertheless, this level has remained relatively low compared to universities in other countries (e.g. Italy, Greece, or Portugal with 8 teachers for 100 students in 2007). On the other hand, the recruitment of individual contractors made it possible to stabilize the coaching rate while reducing the expenses per student, but this was probably done at the expense of the education quality.

**Graph No. 3: Evolution of the coaching rate (students/teachers)**
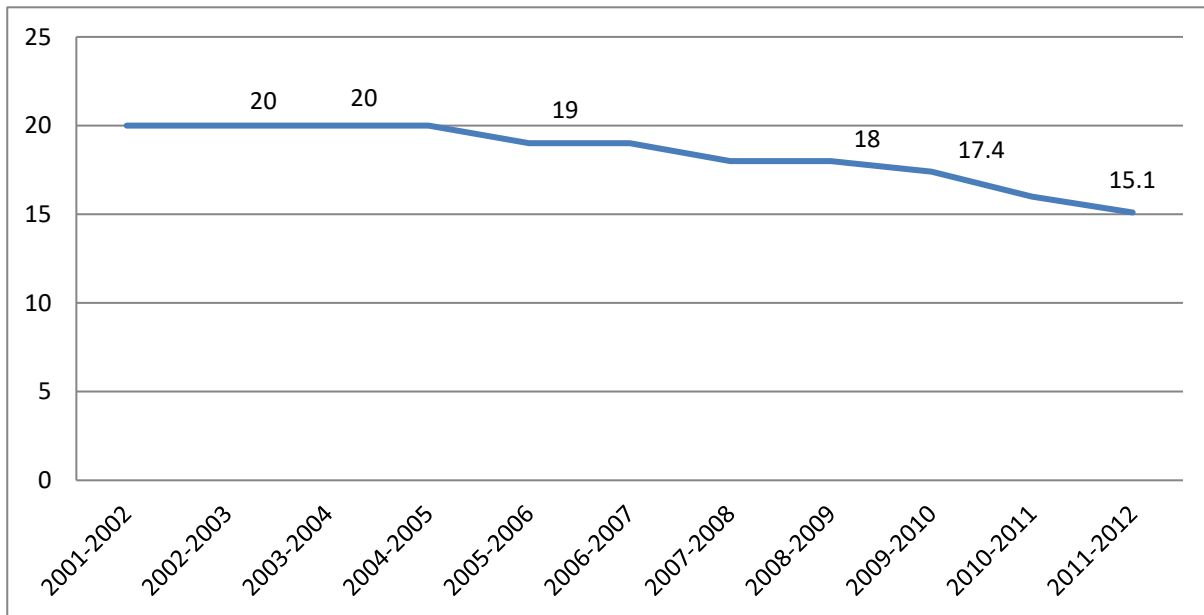

SOURCE: Yaagoubi M. (2013)

In 2010, Tunisia had about 170 000 graduates with no value in the job market and were doomed to despair after a prolonged unemployment. This situation had largely contributed to the outbreak of the 2011 revolution and raised a serious problem for the stability of the country.

Actually, since the 2011 revolution, the economic growth has ranged from 1% to 2.5% while the average rate during the last 20 years has been 5%. In fact, the successive governments did not dare to implement long term structural reforms although they were identified. On the other hand, the budgets devoted to education and higher education have decreased (see Graphs 4 and 5). As a result, the unemployment rate has stagnated at 15% of the labor force since 2013, however, with the crisis, it has begun to increase.

Graph N ° 4: Evolution on behalf of the budget of the education / State budget (%)
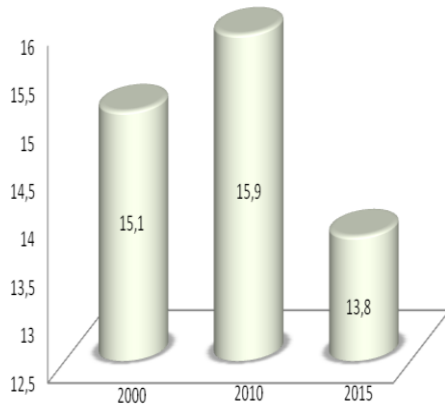
Graph N° 5 : Evolution of the percentage of the budget of the MESRS compared to the State budget
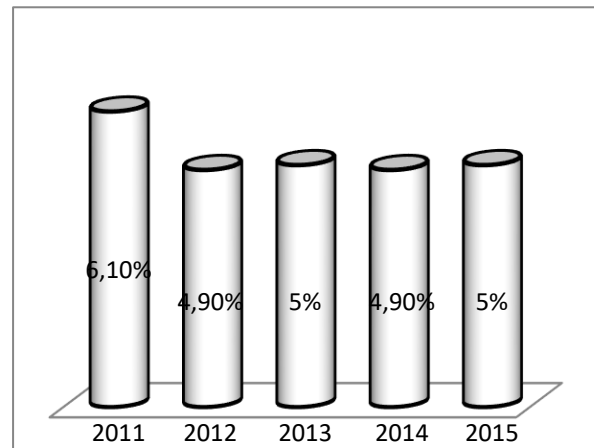
SOURCE: MESRST (2017)

Obviously, this difficult situation explains the collapse of the efficiency scores observed during this period. The difficulties of the young graduates' integration into the labor market since 2011 for some fields (senior technicians, human sciences, exact sciences..) made the introduction of some reforms in the university system a required measure [see graph N° 6] which should start a new vision of higher education offering market-oriented programs and new reassuring perspectives.

Graph No. 6 : Distribution of the unemployed according to the nature of the diploma between 2006 and 2016 (in thousands)
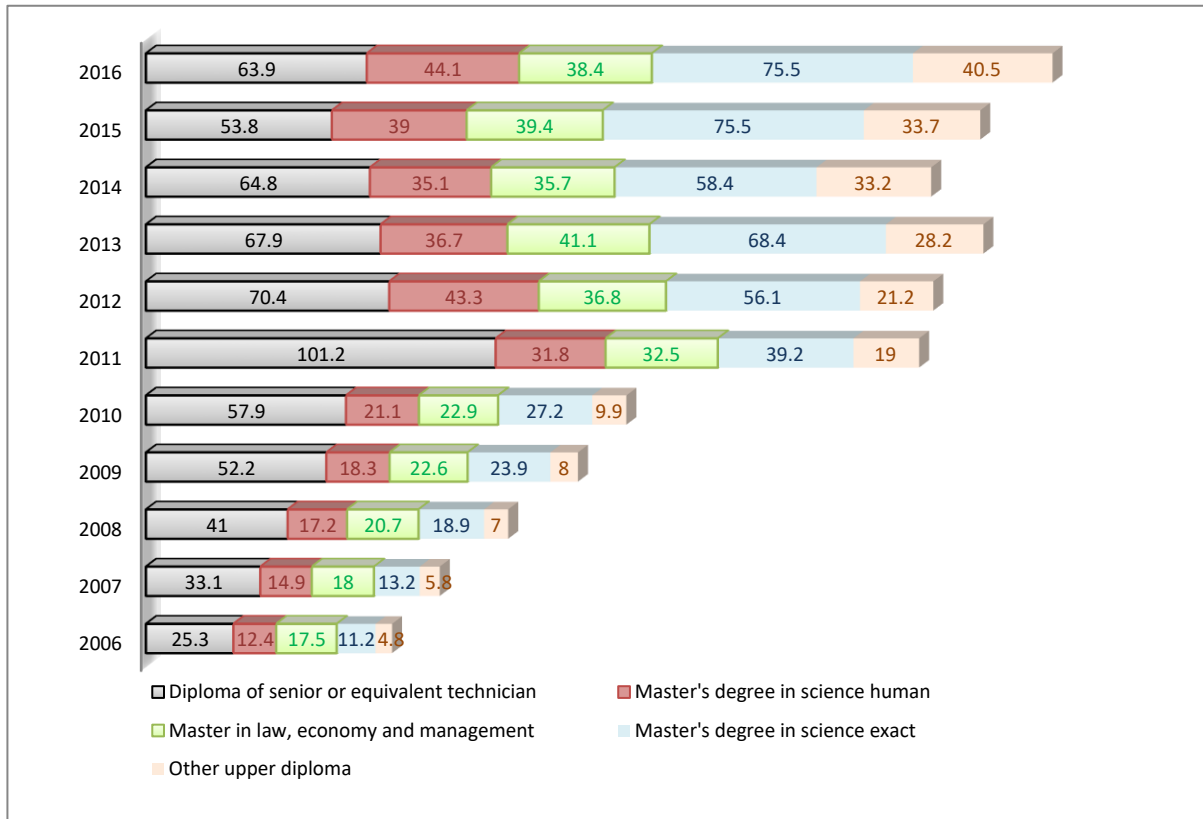
SOURCE: MESRST (2017)

The inadequacy of higher education programs with the imperatives of the labor market seems to aggravate the graduates' unemployment problem in several emerging countries [Davis R. (1979)]. In Tunisia, the labor market was full of university graduates in mathematics, biology, arts and physics, while employers, who are looking for skilled workers in air conditioning and plumbing, were disappointed.

V. Conclusion

The analysis of the efficiency of the educational spending with the implementation of effective and transparent management policies of the resources assigned to the educational sector. For Becker (2008), the analysis of the efficiency of the public spending is recognized as the best and the most transparent tool to understand the practices of the authorities to reach the goals fixed in terms of education policies.

As a result of this work, we have been able to empirically show that the educational sector in Tunisia is facing a serious problem of efficiency. In fact, despite the rapid growth of the resources devoted to education, the economic performance achieved is disappointing. Moreover, economic, political and institutional factors seem to significantly affect the efficiency scores and their positions relative to the efficiency frontier. Therefore, the question that arises is what guarantees and certifies some university degrees, which raises the question about the way in which universities operate. In fact, the unemployment rate of graduates not only reflects the difficulty of integrating young graduates into the labor market, but also the uncertainty of employers seeking certified skills and supported by diplomas.

In terms of economic policy implications, it has become important for the Tunisian government to establish a new method of transparent management of the educational resources through the implementation of monitoring and expenditure control cells in the universities. Moreover, the Government must urgently strengthen the anti-corruption institutions, put in place penalty mechanisms at all the levels of the educational system. On the other hand, it must increase its efficiency in terms of educational policies and improve the business environment for the development of private institutes.

If the efficiency of educational expenditure is one of the diagnostic studies that facilitate the implementation of policies for the efficient and transparent management of resources allocated to the education sector, it is also important to define the modalities of action for a partnership between universities and businesses in order to strengthen the collaborative links between these two worlds as a means to both efficiently transfer the economically useful knowledge and provide advanced training in the skills the industry needs. Thus, it is through this path that the insertion of young people into the labor market and the promotion of economic growth could be promoted.

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