Calculating the Hidden Costs of University Absenteeism Through Internal Efficiency and Loss

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Abstract

The current financial crisis in universities is multifaceted, it depends not only on visible aspects but also on latent aspects, this is why the prism of analysis must be broadened to include the various points that could explain the crisis in a university system on the brink of collapse. Therefore, in this article we will analyze through the theory of hidden performance costs, the indirect costs of the university system, especially the phenomenon of absenteeism of the student and teacher-researchers. Our objective is to explain that the absenteeism of students and teachers costs the state huge sums, leading to immeasurable consequences on the budgetary efficiency of universities. To do this, we will introduce this imperceptible phenomenon in the calculation of the internal efficiency and loss of a given university system.

Keywords: Hidden cost, Absenteeism, Loss, Student, Teacher-researchers

Introduction

The problem of lack of financial resources that university officials complain about is hidden where one would not expect to find it. This is a major problem, but the costs remain imperceptible; we are referring here to the phenomenon of absenteeism among students and university teachers. To better understand how absenteeism contributes to the impoverishment of the university system, we present below some figures indicating the budgetary state of Moroccan universities.

On the financial level, Morocco's budget deficit amounted to 173.0 MDE in 2023, with a financing requirement of 314.6 MDE (Court of Auditors: report on the state budget in 2023). In fact, the education, higher education and training sector has played a crucial role in the weakening of the financial system, since a large part of the sectoral budget distribution is devoted to it (45%) (draft finance law 2024: report on public establishments and enterprises).

On an institutional level, the student-teacher ratio in Moroccan public universities was 57 in 2016 (CSEFRS, 2018) largely exceeding other North African and Arab countries. Regarding the attrition rate, 47.2% of students drop out of university without a degree (National Assessment Panel, 2018). In terms of massification, the number of students in public universities is increasing annually, it reaches 1095668 in 2023 with 295108 new registered in the first year, an increase of 4470 new registered compared to 2022 only in public education (MESRSI: higher education report in figures 2022-2023).

Furthermore, if we take as an example the case of a teacher-researcher at the beginning of his career, receiving as starting a net salary 15000 dh in 2023 (excluding incentive bonuses) and teaching 14 hours per week, therefore his hourly rate is more than 200 dh (Ministry of Digital Transition and Administrative Reform: salary calculation simulator). Now imagine the financial waste that will be made by the university if only a few teacher-researchers are absent for 2 or 3 hours per week, adding to this the absenteeism of several students whose annual unit operating cost reached 9146 dh in 2015 for open access universities (CSEFRS, 2018, p.55).

All these figures open our minds to the financial ordeal that public universities could avoid if they adopted a cost accounting system that considers not only direct costs but also indirect costs due to the absenteeism of teacher-researchers and students. Therefore, the use of industrial financial practices in academia is considered. Here we use the theory of hidden performance costs which was our reference to show that absenteeism negatively impacts the financial stability of universities, through the introduction of this phenomenon in the calculation of internal efficiency and loss of a given university system.

1. Research questions

The research questions are:

In the absence of studies and national statistics that deal with the phenomenon of absenteeism of teacher-researchers and students, in the calculation of university expenses, our main concern is to know how can we include this financial burden in the calculation of direct costs of teachers and students? and how can managerial theories such as hidden performance cost be used to solve this problem?

2. Literature review

2.1. Absenteeism of students and teachers as an unaccounted cost

In 1974, Professor Henri Savall sought to pass a completely new theory on the possibility of expanding the scope of cost calculation by introducing the imperceptible costs generated by organizational dysfunctions (Savall and Zardet, 2005, 2011). In fact, his theory called "the hidden performance cost theory" focused on five key indicators that are responsible for financial waste within companies namely: absenteeism, accidents at work, staff turnover, direct productivity gaps, non-quality or lack of product quality (Savall and Zardet 1995).

In addition, at the university level, the most important unjustified expenses are those resulting from the phenomenon of absenteeism, particularly driven by massification, which had led to the collapse of the university budget. Indeed, many of the reports have drawn attention to financial squandering caused by absenteeism of teachers and students; the following reports are cited in this regard : "Higher education in Morocco: Effectiveness, Efficiency and Challenges of the Open Access University System" by the Moroccan Higher Council for Education, Training and Scientific Research in 2018, and "Morocco BA and Foundation Year Reform" Conducted in 2021 by the United States Agency for International Development (USAID). In view of such a financial situation, it seems essential to refer to the work of Henri Savall on the indirect costs caused by absenteeism, while taking up the same guiding ideas but reusing them in an academic context.

The management accounting of Moroccan university establishments does not provide better financial visibility, especially since this accounting is applied in a non-market services sector totally different from the industrial sector where the materialization of the product is easy to achieve.

Furthermore, like the education system of low-middle-income countries (Mashaba and Maile, 2013), the administrative system of Moroccan universities hides in its corners a deep managerial complexity linked to the inability to determine the exact number of teachers. and students who are absent every day. This is part of the problems relating to university governance characterized by a flagrant lack of an integrated, global and effective information system (Tawil et al., 2010). This problem is accentuated with the

evolution of the concept of digital information and futuristic technologies related to online learning which encourages non-physical presence and whose use would become more and more reinforced in the future (Murshidi, 2017; Ullrich et al., 2023).

In this regard, the adoption of analytical accounting which considers the hidden costs of the university system is urgent in that it makes it possible to bring greater depth and credibility to the budgetary management of Moroccan universities (Abderma and Benesrighe, 2015; Bollecker, 2016; Amrani et al., 2023).

Indeed, the OECD (2017) in its report entitled: "OECD Handbook for Internationally comparative education statistics concepts, standards, definitions and classifications", formulated the two indicators below which relate respectively to the annual expenditure for each student and the composition of the teacher salary considering the teacher/student ratio:

a) Annual expenditure per student by educational institutions at a particular level of education:

$$\frac{EDU\_EXPENDITUREyear\_x \ / \ PPPyear\_x}{AdjustedFTE\_ENRLyear\_x}$$

Where:

- EDU_EXPENDITUREyear_x / PPPyear_x is expenditure by educational institutions (in national currency) converted into equivalent USD by dividing the national currency figure by the purchasing power parity (PPP) index for gross domestic product (GDP)

- AdjustedFTE_ENRLyear_x is the number of full-time students enrolled in public or private educational institutions adjusted to the financial year.

b) Salary cost of teachers per student:

$$SAL \ \times \ instT \ \times \frac{1}{teachT} \times \frac{1}{ClassSize} = \frac{SAL}{Ratio_{stud} \ / \ teacher}$$

Where:

- SAL refers to teachers' salaries, estimated as the statutory salary after 15 years of experience
- instT refers to the instruction time of students, estimated as the annual intended instruction time, in hours, for students.

- teachT refers to teaching time of teachers estimated as the annual number of teaching hours for teachers.
- ClassSize is computed based on the ratio of students to teaching staff and the number of teaching hours and instruction hours.
- Ratiostud/teacher refers to the ratio of students to teaching staff.

But by reading the report, we noted that the two formulations do not allow a dive into the different categories of costs, in particular hidden costs, yet it is a fundamental problem which, little by little, imperceptibly accentuates the financial asphyxiation of universities.

Regarding the concept of efficiency, according to reports from international organizations (Lockheed and Hanushek, 1994), efficiency means: "Making the best use of a given input or resource expenditure", in terms of techniques, New tools for measuring university efficiency are emerging such as: Data envelopment analysis (DEA), which is a non-parametric method based on the comparison of production units (called decision units – DMUs –) that transform resources (inputs) in services (outputs) (Goksen et al., 2015); Free Disposal Hull (FDH) used to assess the efficiency without assumption of convexity of basic DEA models (Papaioannou and Podinovski, 2024); Stochastic frontier analysis (SFA) is defined as a parametric method that allows the examination of cost efficiency or production inefficiencies (Bouzouita and Kooli, 2024); Distribution-Free Approach is a method that makes no assumptions about the probability distributions of the variables in question (Tan and Does., 1994); Also the use of standardized tests to measure the efficiency of teachers (Brooks, 1921). Unfortunately, among all the works that directly address the concept of efficiency, we have not found studies that treat academic absenteeism as a hidden cost that gives free rein to a continuous flow of financial waste. This is also one of the reasons why we will try to explain in the following part how absenteeism among students and teachers is a fundamental problem which accentuates the budgetary difficulty of universities.

2.2. Measurement of Absenteeism in the education system

According to faucet's theory, it is impossible to dissociate absenteeism and academic achievement, the two have a strongly negative correlation (Entwisle et al., 2001), This relationship between the two concepts deserves special attention, especially since the public university system in Morocco suffers from the absence of mandatory attendance policies (Annual report of the Court of Auditors for the year 2018, pp.38-61). There is a large amount of literature available on the impact of absenteeism on the students' performance (Aburuz, 2015; Gubbels et al., 2019; Heyne et al., 2019; Gren-Landell, 2021). However, the aim of this study is limited in the analysis of measurement of the costs generated by the absenteeism of students and teachers.

The measurement of absenteeism has sparked debate among researchers who affirm the non-existence of a single method to evaluate the phenomenon of absenteeism. This

revelation was defended by Gaudet's (1963) research which proves that at least 41 different indicators of absenteeism have been used in the past. Among these parameters we find the four measurement criteria formulated by Huse and Taylor (1962): attitudinal absences, absence frequency, absence severity, and medical absences. Also, other methods were used in the calculations of the cost of absenteeism such as (Schmid et al., 2016) who use Adjusted interval regressions to examine the linkages between supportive leadership behavior (SLB), presenteeism/absenteeism, and the associated costs. In the university system, Tyndall and Barnes (1962) recalled the different efforts to measure and assess unit costs in the instructional area. They point out that unit cost is the result of three fundamental indicators: ""weekly teaching hours" for faculty time, "weekly student hours" for student time, and "semester hourly rate" for salary cost". in the same academic line, Milanowski and Odden (2007) have used ancient conceptual models on the estimation of turnover costs to use them in the case of teachers. Indeed, the Components of Cost of Turnover, which is positively correlated to the phenomenon of absenteeism, include: Cost of Separation; Cost of Replacement Staffing; Net Replacement Pay; Cost of Training and finally Value of Lost Productivity (Smith and Watkins 1978; Cascio 1991). The last method discussed in this part is related to: Cost–Benefit and Cost-Effectiveness Analysis which enable educational managers to choose the best strategies to adopt (Benshaul-Tolonen et al., 2020). However, Cost–Benefit Analysis Measures the benefits and costs of a policy through monetary terms which is very difficult to apply in the education sector, unlike Cost-Effectiveness Analysis which requires the comparison between two policies in order to choose the one which corresponds to the most cost-effective option. Following the same objective, we decided to determine the hidden costs of the university system, which often take second place by focusing this time on the introduction of the phenomenon of absenteeism of teachers and students in the calculation of internal efficiency and wastage.

3. Method

In a previous work entitled "Controlling the hidden cost due to the absenteeism of teacher-researchers and students as a means of alleviating university financial asphyxia", we introduced the phenomenon of absenteeism to calculate the cost of a student in the education system. In this paper, we propose to introduce this phenomenon of absenteeism into the calculation of internal efficiency and wastage, for a given education system. Through this work, we simply want to invite university managers to review their calculation of university-related costs. in fact, not only the direct costs such as payroll expenses, operating expenses, etc., weigh on the university budget, but also the hidden behavioral aspect reflected by the absenteeism of teacher-researchers and of students harms the organizational functioning of public university establishments.

4. Results and their discussion

4.1. Classical definition of efficiency coefficient

According to UNESCO, "The Efficiency Coefficient (EC) is the ideal (optimal) number of student years necessary (i.e. in the absence of repetitions and dropouts), so that a certain number of students in a given cohort complete their education at a given cycle or level of education, expressed as a percentage of the actual number of student years devoted to student training" (UNESCO, 2009).

The formula for calculating this factor is given by:

$$EC = \frac{\sum_{j=n}^{n+k} D_j \times n}{\sum_{j=n}^{n+k} D_j \times j + \sum_{j=1}^{n+k} A_j \times j} \times 100$$

With:

- D_j: number of graduates from a cohort of students after j years of study.

- A_j: number of students from a cohort dropping out after j years of study.

- n : normal number of years to obtain the diploma (In the case of Morocco n=3).

- j: number of years of study.

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In this case, the loss coefficient (LC) is given by:

$$LC = \frac{1}{EC} \times 100$$

This definition of efficiency or loss does not consider the problem of absenteeism among students and teacher-researchers, which causes the State to lose colossal sums each academic year.

4.2. Introduction of absenteeism in the calculation of efficiency

We propose a new formula for efficiency already developed by UNESCO while introducing beside repetition and dropout the phenomenon of absenteeism of teacher-researchers and students. In our opinion, these three elements are judged to be the origin of loss in a university system (Mansouri, 2017; Yılmaz and Sarpkaya, 2022; Llauró et al., 2023). Therefore, the new definition becomes:

"The efficiency coefficient is the ideal (optimal) number of student years necessary (i.e. in the absence of repetition, dropout and absenteeism), so that a certain number of "students in a given cohort complete their education at a given cycle or level of education, expressed as a percentage of the actual number of student years devoted to student training".

Considering this definition, the new formula for efficiency (noted *NEC*) becomes:

$$NEC = \frac{\sum_{j=n}^{n+k} D_{g,j} \times n}{\sum_{j=n}^{n+k} D_{g,j} \times j + \sum_{j=1}^{n+k} A_{g,j} \times j + \sum_{j=1}^{n+k} \frac{NJA_j}{NJE}} \times 100 \quad (1)$$

With:

- g: cohort of students.

- NE_g : total number of students in a cohort.

- $D_{g,j}$: number of graduates from a cohort g after j years of study.

- $A_{g,j}$: number of students (from a cohort g) dropping out after j years of study.

- D_g: Number of graduates from cohort g.

- n : Normal number of years to obtain the diploma (In the case of Morocco n=3).

- n+k: the duration of the cohort.

- $NBJA_j$: Number of days of absenteeism of students and teachers for year d.

- NJE : Overall number of days of study during a year (without vacation).

4.3. New method to calculate the number of days of absenteeism

We note by $NJAE_j$ the Number of Days of Student Absenteeism During the Year A_j (360 days).

For the entire cohort, the number of days of student absenteeism is:

$$NJAE = \sum_{j=1}^{n+k} NJAE_j$$

To calculate the number of days of absenteeism, we adopt the following notations:

For each year of the cohort studied A_j, and for each teacher $Prof_i$, we note by:

n_{ij} : the number of students overall, and who were assigned to the teacher $Prof_i$ throughout the year A_j.

a_{ij} : the number of days of absenteeism (without university catch-up: if a university professor makes up the sessions from which he was absent, it is no longer a question of absenteeism) of teacher $Prof_i$, throughout the year A_j.

Table 1. Representative table of absenteeism by teacher-researcher

	$Prof_1$	$Prof_2$	….	$Prof_M$
Number of students	n_{1j}	n_{2j}	….	n_{Mj}
Number of absenteeism in days without catching up	a_{1j}	a_{2j}	….	a_{Mj}

Source: Jafari and Yousfi, 2020.

If a teacher is absent unduly during a session, this means that all the students to whom this session is dedicated are implicitly absent as well.

Furthermore, the absenteeism of a teacher $Prof_i$, during the year A_j, it is equivalent to absenteeism $n_{ij} \times a_{ij}$ of days students.

So, the absenteeism of all teachers for a year A_j, is equivalent to the number of days of student absenteeism:

$$NJAP_j = \sum_{i=1}^{M} n_{ij} \times a_{ij}$$

With this calculation, equation (1) becomes:

$$NEC = \frac{\sum_{j=n}^{n+k} D_{g,j} \times n}{\sum_{j=n}^{n+k} D_{g,j} \times j + \sum_{j=1}^{n+k} A_{g,j} \times j + \sum_{j=1}^{n+k} \frac{NJAE_j + NJAP_j}{NJE}} \times 100$$

Example:

In an establishment of 5 professors and 100 students, each year we have on average 20 days of absenteeism for each student, and 5 days of absenteeism without catching-up for each university professor. Likewise, we have 20 repeaters each year, and we have 0 dropouts. The diploma is obtained for 3 years, and these numbers are applied for a 5-year cohort:

$$NEC = \frac{100 \times 3}{300 + 20 \times 5 + \sum_{j=1}^{n+k} \frac{NJAE_j + NJAP_j}{NJE}} \times 100$$

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$$NJAE = \sum_{j=1}^{5} NJAE_j = 20 * 100 * 5 = 10000$$

$$NJAP_j = \sum_{i=1}^{5} n_{ij} \times a_{ij} = 5 * 100 = 500$$

NJE=360

Without considering absenteeism:

$$EC = \frac{100 \times 3}{300 + 20 \times 5} \times 100 = \frac{30000}{400} = 75$$

$$LC = \frac{1}{NEC} \times 100 = 1,333$$

With the consideration of absenteeism:

$$NEC = \frac{100 \times 3}{300 + 20 \times 5 + \frac{(10000 + 500 * 5)}{360}} \times 100 = \frac{30000}{434,72} = 69,001$$

$$NLC = \frac{1}{NEC} \times 100 = 1,449$$

We notice that there is a difference of 0.116 between the classic value of the efficiency coefficient and the new efficiency coefficient that we defined after the introduction of absenteeism. This difference (0.116) has always been neglected in the calculation of this coefficient, even though this value is very important compared to the classic value of this coefficient (it represents 8.70% of the classic EC value). This simple example with a very small number of students and teachers showed that absenteeism causes significant loss in the education system, which is why it must be integrated into all the efficient coefficients of the education system.

5. Conclusion

The absenteeism of teacher-researchers and students forces university institutions to pay an additional cost that they are unable to trace, since it is a hidden cost which does not actually appear in the academic balance sheet. Thus, by taking the theory of hidden performance costs (Savall and Zardet 1995), we were able to raise awareness about the threats that annihilate the university budget system through incalculable inconsistencies.

The simulation we have given shows how absenteeism, as a phenomenon excluded from financial results, constitutes a danger to the fiscal sustainability of universities. This is why

we insisted on the importance of incorporating hidden costs in the calculation of efficiency and loss because their neglect certainly distorts the real value of the said indicators. In addition, the fact that we do not have reliable information on absenteeism, which is completely understandable, since we are facing an unnoticeable phenomenon, forced us to settle for a representative example of the phenomenon, All this to say that the availability of national absenteeism data from all academic institutions will provide accurate information on the actual financial loss borne annually by universities.

Finally, university absenteeism has often been approached from various theoretical and empirical angles (Jacobs and Kritsonis, 2007; Triadó-Ivern et al., 2013). In this sense, we searched everywhere for studies that treat absenteeism as a hidden cost at the university level, but we found nothing. As a result, our focus was more on highlighting the imperceptible aspect of absenteeism, which even with E-administration and the digitalization of universities remains undetectable to this day (El Ferouali and Ouhadi, 2023). The solution lies in the transposition of techniques used purely in industry to the university sector, which brings a real plus to the analysis of absenteeism of teachers and students, since this is a field where the calculation of hidden costs is far from new (Luongo, 1959; Brouwer et al., 2023; Nowak et al., 2023).

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