

**EFFICIENCY OF MERGERS AND ACQUISITIONS BY BRAZILIAN
EDUCATIONAL GROUPS BASED ON THE DATA ENVELOPMENT
ANALYSIS (DEA)**

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Abstract: The M&A are part of a capitalist system in the mercantile process of private institutions, in this way. This study has as main objective, to introduce the efficiency of acquisitions of these large HEIs (Higher Educational Institutions) in relation to the number of students and ENADE grades. With the results we can visualize through the Data Envelopment Analysis method that ENADE notes have greater weight of efficiency in the value of acquisitions, but not necessarily higher grades are equivalent to higher values. The most efficient acquisitions correspond to the HEIs acquired by the lowest values, concluding that the analyzed resources are better used and managed in lower averages.

Keywords: Educational Oligopolies; DEA; Mergers and Acquisitions.



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EFICIENCIA DE FUSIONES Y ADQUISICIONES DE GRUPOS EDUCATIVOS BRASILEÑOS A PARTIR DEL ANÁLISIS ENVOLVENTE DE DATOS (DEA)

Resumen: Las M&A forman parte de un sistema capitalista en el proceso mercantil de las instituciones privadas, de esta manera. Este estudio tiene como objetivo principal, presentar la eficiencia de las adquisiciones de estas grandes IES (Instituciones de Educación Superior) en relación con el número de estudiantes y las calificaciones de ENADE. Con los resultados podemos visualizar a través del método de Análisis Envoltente de Datos que las notas de ENADE tienen mayor peso de eficiencia en el valor de las adquisiciones, pero no necesariamente las notas más altas equivalen a valores más altos. Las adquisiciones más eficientes corresponden a las IES adquiridas por los valores más bajos, concluyendo que los recursos analizados son mejor utilizados y administrados en promedios más bajos.

Palabras clave: Oligopolios Educativos; DEA; Fusiones y Adquisiciones.

EFICIÊNCIA DE FUSÕES E AQUISIÇÕES POR GRUPOS EDUCACIONAIS BRASILEIROS COM BASE NA DATA ENVELOPMENT ANALYSIS (DEA)

Resumo: As F&A fazem parte de uma sistemática capitalista no processo mercantil de instituições privadas, dessa forma. Este estudo tem como principal objetivo, introduzir a eficiência das aquisições dessas grandes IES em relação ao número de alunos e notas do ENADE. Com os resultados podemos visualizar através do método da Análise de Envoltória de Dados que, as notas do ENADE têm maior peso de eficiência no valor das aquisições, porém, não necessariamente notas mais altas equivalem a valores mais altos. As aquisições mais eficientes correspondem às IES adquiridas pelos menores valores, concluindo que os recursos analisados são melhores utilizados e administrados em médias inferiores.

Palavras-chave: Oligopólios Educacionais; DEA; Fusões e Aquisições.

Introduction

During the second half of the 20th century, Brazil began to use a more market-based perspective for higher education goods, similar to the American model. For Rodrigues (2007, p. 582) higher education, passed: "[...] to be a business governed by the sign of the globalized economy in which the most varied products are marketed, from sandwiches to undergraduate courses."

During this period, there was an exponential increase in demand growth so that the public sector could not keep up, alternating the priority for the private sector. This expansion caused the market to seek new ways of expansion, being part of the "[...] consolidation of the sector that refers to the movement of expansion, acquisition and merger of HEIs (High Educational Institutions), generating large institutions that start to concentrate a large part of the student of the country" (Monteiro; Braga, 2007). This movement of commodification of higher education may have had its initial milestone in Brazil with the beginning of the partnership between the Pitágoras Group from Minas Gerais, and Apollo International. This partnership lasted until 2006 when Pitágoras bought Apollo's share of the assets.

These market movement call an attention to two more milestones for the creation of HEIs conglomerates. The first refers to the laureate group's purchase of Anhembi Morumbi University in 2005. The sale of 51% of Anhembi Morumbi University had an investment value of U\$69 million (Gois, 2005).

In the second milestone, it was realized in the acquisition of 70% of Anhanguera Educational by an investment fund of Pátria Bank. Thus, the companies Anhanguera, Estácio de Sá, Kroton and Brazilian Educational Society (SEB in Portuguese), opened their capital on the stock exchange, starting in 2007, increasing the process of buying and selling Brazilian HEIs. Anhanguera Educational was the first company to join the opening of capital.

In general, this movement resulted in the formation of the largest educational groups that operate in Brazil: Anhanguera Educational, Estácio de Sá, Kroton Educational and SEB. This movement for the growth of educational groups remained, bringing with it new dynamics to the market, because large oligopolies minimize their costs and bet on a scale production, causing prices to stay low, encouraging the market to adhere to the product. These

strategies still make there more profitability for shareholders, which can be defined as the end point of the process.

Theoretical and empirical review

Mergers and Acquisitions in Private Higher Education

Mergers and Acquisitions (M&A) are key parts for the maintenance and growth of organizations, especially in large oligopolies. In general, we can see that the principle of mergers and acquisitions is strongly linked to the Firm Theory, where, for classical and neoclassical economists, the development of the organization is linked to the notion of rationality of efficiency, defined by the allocation of productive factors in a way that maximizes profits for shareholders. This is a primary characteristic of the M&A, based on the demand for maximizing profits and expanding the management utility, so that in the process both companies seek reciprocal gains and proactive and joint maintenance of the inserted market (Camargos; Coutinho, 2008).

For Camargo and Coutinho (2008), Spolavori (2016) and Santos (2016), M&A has a role to maximize shareholder wealth, so as to allow an expansion of operational efficiency and market maintenance.

Thus, the market process of M&A is only a formal explanation for acquisitions, and this fact is even more evident in Brazil, as presented throughout the article. Large HEIs become *holding companies* and make mergers with smaller HEIs.

The process of commodification of Brazilian HEIs becomes substantially more visible when we allow ourselves to visualize a common characteristic of large companies, especially those of publicly traded: mergers and acquisitions. This process of market growth, supported by a line of constant maintenance of the oligopoly, so that large companies aim to destroy competitors or expand their size, thus evidencing a clear characteristic of capitalism (Cano, 2002). Since 2007, when the large educational groups opened their capital on the Brazilian stock exchange, a strategy of capital speculation has been seen, where groups use *holding companies*, that is, entities that subsidize the financial activities of the HEIs in their possession (Carvalho, 2013).

The M&A process allows these companies to add growth at the time of purchase and expansion of HEIs in the future, in addition to enabling the relationship of synergistic gains between acquirer and acquirer (Santos, 2016).

In 2011 we can see one of the most aggressive periods of acquisitions and mergers in the educational sector, in particular due to Kroton. frame 1 shows some of the group's largest acquisitions from 2011 to 2013:

Frame 1 - Largest HEIs acquired by Kroton group (2011-2013)

Year	Acquirer	Acquired College	Purchase Price (mi)	Number of Students
2013	Kroton	Anhanguera	R\$5,000.00	450.000
2011	Kroton	CEAMA	R\$28,40	5.000
2011	Kroton	Fais	R\$7,00	1.302
2011	Kroton	Unopar	R\$1,600.00	145.600
2012	Kroton	Uniasselvi	R\$ 510,00	86.200

Source: Author's elaboration based on the media vehicle InfoMoney (TOLOTTI, 2013).

In 2015 the Kroton group already had 970.152 students enrolled, a large part represented by the large acquisition of UNOPAR (Santos, 2016). We also see that, along with the acquisition of Anhanguera, the largest acquisitions of HEIs in the group (1,6 billion and 5 billion, respectively) are formed.

Frame 2 - Largest educational groups in the country in 2016 (in relation to the number of students)

Group	Students (in thousands)
Kroton	877
Estácio	436,3

UNIP	403
Laureate	245
Ser Educational	137

Source: Adapted from Hoper Educational (Braga, 2011).

In summary, the acquisition and merger strategy enable cost control and increases the expertise of organizations, as mentioned above (Santos, 2016). These HEIs are acquired as a means of survival, however, they enter even deeper into capitalist environments, with products offered in scale and substantially standardized.

Now, in a brief history of the M&A of the Brazilian private education sector, we can see how this market has reached large proportions. In PwC's 2020 survey, 1.038 transactions were reported, with the acquisition of Laureate Educational assets in Brazil ranked 5th in the largest of the period with \$770 million. The Ser Educational group also expressed great influence in the market, buying the Assets ASPEC and SOCEC of Ânima Educational for R\$180 million (PWC, 2021).

In the first half of 2021, significant values were also shown in the M&A of the education sector in Brazil, where 20 transactions were carried out. The frame below shows KPMG data (KPMG, 2021) on the cumulative total of transactions in the education sector in Brazil from 2010 to 2020:

Frame 3 - Accumulated Transactions of the Education Sector in Brazil

Year	Transactions
2020	27
2019	32
2018	29
2017	30
2016	19

2015	27
2014	26
2013	24
2012	19
2011	27
2010	20

Source: Author's elaboration based on KPMG data (2021).

We can see that the sector has an average of 26 annual transactions involving publicly traded holding companies.

Nevertheless, 2021 was marked by the aggressiveness of the sector and the resumption of this M&A record of 2008. Fifty-two transactions were recorded, of which 46 of these M&A were carried out by Brazilian capital companies and 6 by foreign companies (Fusões, 2022).

The M&A process is already systemically inserted into the sector and presents possible trends and expand further. According to McKinsey and Company, in the publish “The next wave of M&A in advanced industries: Are you prepared?” (2021) industries have always sought ways to expand to add value through M&A, and this systemic process was a major key to surviving economic cycles.

Methodology

The dissertation will use documentary and qualitative research as primary and secondary sources, in addition to seeking data from sources such as journals, news portals of scholarships and markets, and others widely known for content.

This research will use as a basis for studies of platforms of scientific articles, Scielo and Google Academic, Elsevier, of news portals in economic and stock exchange, mainly the InfoMoney portal and others to be explored, starting with the identification of the theme, followed by the search for literature based on inclusion and exclusion criteria; definition of information through a previously constructed bibliographic record; collection, evaluation of data, and final analysis of the study.

Documentary Research

The Documentary Research Strategy is characteristic of studies that use documents as a source of data, information and evidence. The documents are of the most varied types, written or not, for this work it is intended, for the understanding and characterization of the educational institutions acquired the use of documents from the platform: National Registry of Courses and Institutions of Higher Education Registration e-MEC, and the Institutional Development Plans (PDI in Portuguese) of these institutions.

With regard to the acquiring educational groups, it is intended to search for and present the values, visions, strategies of each of the groups, in addition to the presentation of their relations with investors and governance manuals. Finally, the purpose of the market is to search for documents in electronic portals of stock exchange movement information, information obtained from the Brazilian Securities and Exchange Commission (CVM in Portuguese) and documents produced by the National Institute of Educational Studies and Research Anísio Teixeira (INEP in Portuguese). The institutions were deliberately chosen. The HEIs under analysis are faculties acquired by educational groups from 2006, one year before the entry of these companies and groups in the stock exchange, so it is not possible to generalize the results of the sample to the population, because such samples do not guarantee the representativeness of the population. It also becomes accidental when being formed by those elements that are possible to obtain until you complete the desired number of elements of the sample.

Search relationship

The documentary research of this work uses a consubstantiation between two objects of analysis, which translate as stages of the research: the first, is what refers to the database used to analyze market movements. The second refers to the epistemological process of the data obtained; it is defined as the crossing of the data with the main theories of the field of mercantilization of Brazilian higher education.

The first phase of the present study focuses on conceiving a significant sampling of acquisitions of large educational groups. Next, we tabulate the data for further analysis using the Data Envelopment Analysis method.

In frame 4 we will see the main media vehicles to which we use to carry out the documentary research of data from acquisitions and mergers of some private HEIs in Brazil:

Frame 4 - Research sources: Acquisitions of large educational groups

Acquirer	Acquired College	Reference
Kroton	CEAMA	(TOLOTTI, 2013)
Kroton	Fais	
Kroton	Unopar	
Kroton	Uniasselvi	
YDUQS	Radial University Center	(ESTÁCIO, 2007)
YDUQS	SEAMA	(ROSTÁS, 2012)
Ser Educational	UNIFASB	(SER EDUCACIONAL, 2020)
Ser Educational	Ung	(GUTIERREZ, 2015)
Ser Educational	Unespa	(MEIBAK, 2014)
Ser Educational	FAEL	(JULIANI, 2022)
Ânima Holding	Cesuc	(ANIMA..., 2018b)
Ânima Holding	FACED	(ÂNIMA..., 2018a)
Ânima Holding	FASEH	(MACIEL, 2020)

Source: Elaboration of the authors.

Data Envelopment Analysis

For the present study, Data Envelopment Analysis (DEA) will be used in the CCR-oriented model, a model originally defined by Charnes, Cooper and Rhodes (1978).

We will use the synthesis of the concepts of DEA modeling presented by Sant’Anna (2002) to elucidate the chosen methodology, finally, to justify it.

Data Envelopment Analysis is a calculation model for efficiency metrification, based on an *input* and *outputs* that depend directly or indirectly on those *inputs*. In summary, the

DEA calculates the efficiency of a given action by assigning the respective impact weights of the input-dependent variables. In a brief example, we could consider as *input* the amount invested in a marketing strategy in an organization, and its *outputs* being the number of customers aggregated with the share and capital value acquired with those customers.

The crucial factor for this modeling to be of paramount importance to the study is one of its definitions, where, the DEA works with the optimization of each observation at the individual level, determining how the maximum efficiency within the sample itself, so that the units that are efficient Pareto's become the frontier of efficiency, that is, it would not be possible to improve its attributes without harming the rest.

The input-oriented CCR or CRS (*constant returns to scale*) model is supported by Charnes, Cooper and Rhodes (1978), which determine a linear programming model, where each variation in inputs has proportional reaction in the outputs. This *input-oriented model* creates a calculation of weighted sums of inputs due to the outputs, assigning weights for each *decision-making unit* (DMU), this ratio is further delimited so that the weights applied to the other samples do not gain weight greater than 1, thus creating a fully delimited sampling analysis system with individual weights.

The DEA in CCR in the model of *multipliers oriented to inputs* has the peculiarity of calculating efficiency by reducing resources. Thus, several weight sets are considered and the model even assumes to assign null weights to the variables disregarded in the orientation.

Following the calculation, we have in equation (1) which Eff_o is the total efficiency of the sample (1), and are the weights $DMU_o v_i, u_j$ of inputs $i, i = 1, \dots, r$, and outputs $j, j = 1, \dots, s$. Respectively, we have that x_{ik}, y_{jk} are the inputs and outputs of the $DMU_k, k = 1, \dots, n$; x_{io}, y_{jo} are the inputs and outputs of the DMU o . This way we have, per hour (1):

$$Max\ Eff_o = \left[\frac{\sum_{j=1}^s u_j y_{jo}}{\sum_{i=1}^r v_i x_{io}} \right] \quad (1)$$

Limitations (1.1); (1.2):

$$\left[\frac{\sum_{j=1}^s u_j y_{jk}}{\sum_{i=1}^r v_i x_{ik}} \right] \leq 1, \forall k \quad (1.1)$$

$$v_i, u_j \geq 0, \forall i, j \quad (1.2)$$

Now, it is of paramount importance for the resolution of calculations, that this fractional programming model is delimited in order to obtain linear results, so it will be possible to use a multitude of tools or even simplify the calculation to a notion of linear programming (PLL); (Equation 2). Thus:

$$\text{Max } \text{Eff}_o \sum_{j=1}^s u_j y_{jo} \quad (2)$$

Limitations (2.1); (2.2); (2.3):

$$\sum_{i=1}^r v_i x_{io} = 1 \quad (2.1)$$

$$\sum_{j=1}^s u_j y_{jk} - \sum_{i=1}^r v_i x_{ik} \leq 0, \forall k \quad (2.2)$$

$$v_i, u_j \geq 0, \forall i, j \quad (2.3)$$

This model provides the objective function of a dataset, this objective function is the value that multiplies all inputs so that they reach the efficiency boundary of DMUs.

Given this, we identified as interest the use of DEA in CCR in the form of *input-oriented multipliers*, because this model provides an individual analysis of the samples in the scenario of similar collective actions, with good and bad results. The DEA methodology is still little explored in Brazil and substantially more present in studies of the financial sector, more specifically, in banking institution operations.

Data modeling

We chose to use an adequacy of the DEA model in input-oriented CCR in the form of multipliers, because thus we will have an idea of the weights between the value of acquisitions and the influence of the ENADE scores and the number of students in this pricing.

In this way, the input of the purchase price and the two outputs as a score of ENADE and Number of students are added, thus:

Frame 5 - Inputs and outputs for the DEA-CCR model in the form of multipliers (Continues)

DMUs	V1	U1	U2
	Purchase Price (millions)	ENADE Score	Number of Students
CEAMA	28,4	3	5.000
Fais	7	3	1.302
Unopar	1600	4	145.600
Uniasselvi	510	2	86.200
Athenas	120	2	9.000
Centro Universitário Radial	56,67	2	10.800
SEAMA	21,72	2	2.750
UNIFASB	34	3	

			1.600
UNG	199,08	3	18.300
Unespa	151,2	3	7.253
FAEL	280	2	90.000
Cesuc	32,25	2	2.500
FACED	5,5	4	700

Source: Elaboration of the authors.

Results and interpretations

The main conclusion we have with the model, and is also a visible conclusion in other studies with the DEA, is that the acquisitions of lower prices suggest a slight tendency to be more efficient in terms of the number of students and ENADE score, this is justified by the control of variables, where the input is low and the outputs represent large weights of influence on. We can see the results below and soon after we will discuss graphically about:

Frame 6 - Results of DEA Modeling of Mergers and Acquisitions in Large Educational Groups

Institution	Price of Purchase (millions)	Efficiency	V1	u1	U2
			Price	Score of ENADE	Number of Students
FACED	5,5	1,00	0,18182	0,15160	0,00056
FAEL	280	1,00	0,00357	0,00000	0,00001

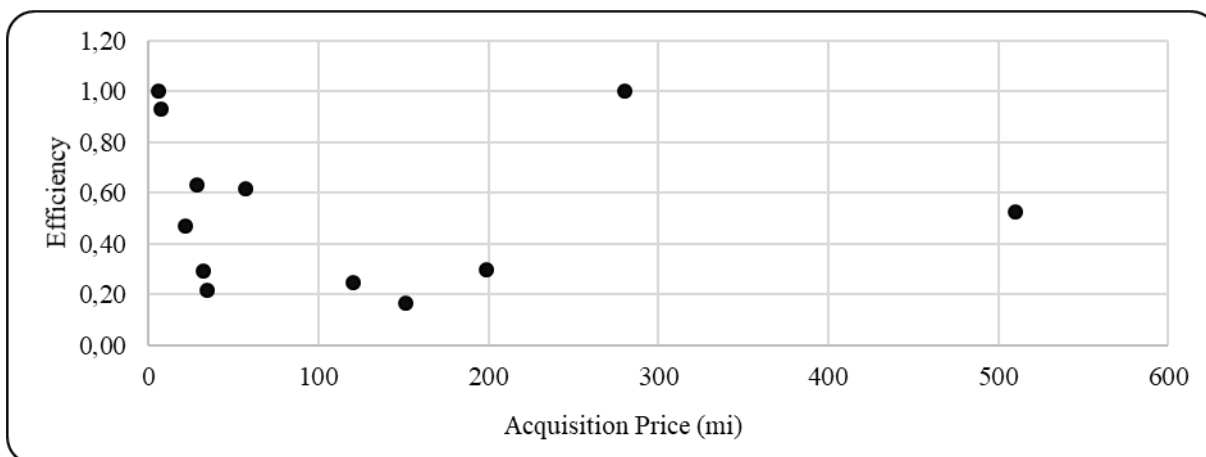
Fais	7	0,93	0,14286	0,11911	0,00044
CEAMA	28,4	0,63	0,03521	0,02936	0,00011
Radial University Center	56,67	0,62	0,01765	0,01471	0,00005
Uniasselvi	510	0,53	0,00196	0,00163	0,00001
SEAMA	21,72	0,47	0,04604	0,03839	0,00014
Ung	199,08	0,30	0,00502	0,00419	0,00002
Cesuc	32,25	0,29	0,03101	0,02585	0,00010
Unopar	1600	0,28	0,00063	0,00052	0,00000
Athens	120	0,25	0,00833	0,00695	0,00003
UNIFASB	34	0,22	0,02941	0,02452	0,00009
Unespa	151,2	0,16	0,00661	0,00551	0,00002

Source: Elaboration of the authors

As mentioned, the two DMUs that outnumber the rest are FACED (5.5 million, 700 students at the time, and a score 4 in ENADE) and FAEL (280 million, 90,000 students and score 2 in ENADE). Both have no common characteristic, indicating that FACED has an efficient acquisition in *terms of its outputs*, due to a low price and a large weight of the ENADE score, suggesting an acquisition by quality, within the parameters used. FAEL was acquired for a substantially higher value of 280 million, and the weight of efficiency modeling was totally concentrated on the number of students (90,000), that is, it is suggested that the high value of the acquisition is due to the large number of students and, even more, it was an efficient acquisition, based on the parameters.

We can soon see that, on average, the ENADE score was substantially more impactful for the efficiency of acquisitions, which indicates an estimate that these acquisitions may have been influenced by the quality of the institutions. However, we will see that when we visualize the efficiency in relation to these notes, we cannot clearly conclude this fact.

Graph 1 - Efficiency of acquisitions in relation to its price



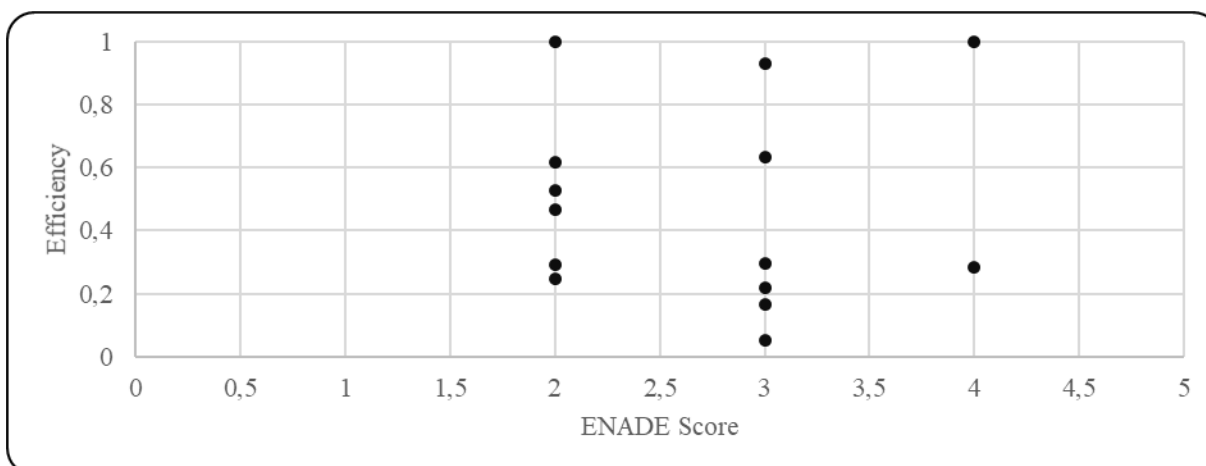
Source: Elaboration of the authors.

One of the points of interest is the relationship of efficiency with the ENADE score, where the highest weights attributed to the outputs were for these notes.

However, when we see the relationship of this quality with efficiency, we realize that the lower grades have better acquisition efficiency.

The justify its the same reason as the previous correlation with the purchase price, where lower values are more easily worked, because there is greater individual weight among the variables. Below we can see this assumption:

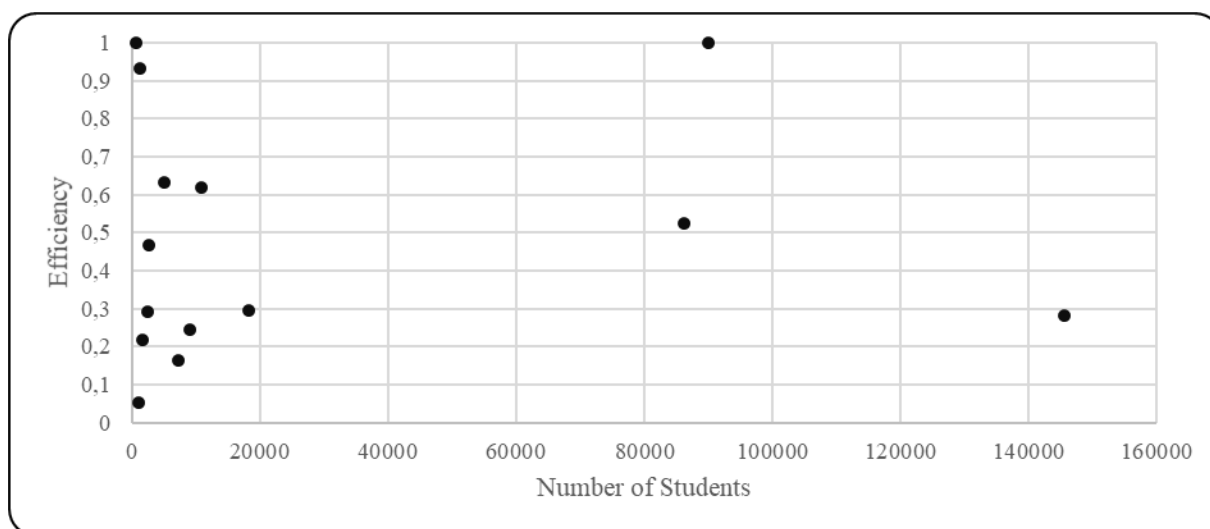
Graph 2 - Efficiency in relation to the ENADE score of the HEIs



Source: Elaboration of the authors.

In relation to the number of students, the trend is maintained, where the lowest values present the highest acquisition efficiencies. Even so, we call attention to values with the highest variance, such as FAEL (90,000 students) and Uniasselvi (86,200 students), which present efficiencies, respectively, of 1 and 0.52. We can consider that both run away from the curve of considerations, as we see below:

Graph 3 - Efficiency in relation to the number of students



Source: Elaboration of the authors.

As we can see, even with the dispersion, there is a set of samples acquired at low prices and with great efficiency (FACED, FAIS), and FAEL then, however, acquired for a substantially higher value. Even though the weights of ENADE scores have substantially higher averages than the number of students, we see that the trend of efficiency remains at lower grades, as is the case with the number of students. It is justified and it is considered, therefore, that the efficiency of the acquisition is better worked with outputs of lower values.

Final considerations

Using the DEA modeling, it was found that the acquired HEIs selected presented scattered values, but that follow means already considered subjectively by the authors previously. HEIs acquired at substantially high values, but with quality of teaching in grade 3

or below, together with low number of students, presented low efficiency, which can be justified for an acquisition aimed at high-level ticket courses, such as medicine. On the other hand, the HEIs that were acquired by lower values showed a tendency to a more efficient acquisition, due to the high weight of outputs in the input, however, the acquisition of SEAMA may lead to a discussion about this fact, since it is the third cheapest acquisition (21.7 million) of the sample presents an efficiency of 0.47, which is justified with the unsatisfactory score of ENADE in the acquired year (score 2).

We saw that the highest average weight of outputs is in the ENADE score, which may suggest that the quality of the institutions operated as an impacting factor in their pricing. We also see that even institutions that were at a slight "peak" in the year of its acquisition, such as UNOPAR, due to the high value of the acquisition, the model does not consider it as an efficient purchase. We assume that acquisitions considered inefficient in our analysis obtained a substantially high value due to the average ticket of their courses.

We also visualized that, even though the ENADE score is crucial in the acquisition weights, the best efficiency results were obtained in the HEIs with the lowest scores. This, together with the same result regarding the number of students, is justified in an interpretation of better practicality, and better ability to work with outputs of lower values. You see, an institution acquired at a median price, with a low ENADE score and, still, a small number of students, is significantly more efficient, in relation to acquisition, than HEIs acquired with higher prices and also higher outputs, as we concluded in our analysis.

Future studies suggest the efficiency ratio of the acquisition of HEIs along with the number of courses with high average ticket, such as medicine.

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