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# The Economic Impact of a Higher Education Institution

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## Abstract

At present, the Portuguese government is trying to overcome the problem of the education level of the active population, one of the lowest registered in the OECD, and directly associated with the productivity rate.

For that purpose, granting a larger state's funding to the institutions with higher economic and educational impact is being considered. As such, the Higher Education Institutions (HEIs) need to prove their value, by accurately quantifying that impact, in order to enhance or secure their budget.

The main objective of this study is to determine how much the regions of Bragança and Mirandela benefit from hosting the Polytechnic Institute of Bragança. To calculate such benefits an economic impact model is being developed, based on Caffrey and Isaacs' model (1971), adjusted to the regions in analysis.

This paper describes the model and the conclusions of the first phase, which comprise a survey to the faculty, staff and students.

**Keywords:** Higher education - economic impact - regional development

## 1. Introduction

Currently, Portugal appears in the lowest ranks of the OECD regarding the number of school years of the active population. On the other hand, the rates of dropping school, before high school education is completed, are among the highest (in 2004 the dropping school rate was 39,4% while the average of the European Union was 15,9%, Guichard and Larre, 2006). Additionally, there are several studies that identify the situation of low educational level and consequent high rate of non specialized workers, as one of the main reasons for the portuguese low productivity and lack of innovation (Guichard and Larre, 2006).

The portuguese government acknowledges this and is trying to reverse it by selecting the institutions with larger economic and educational impact for a larger state's funding<sup>iii</sup>.

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<sup>iii</sup> Law n° 37/2003 August, 22<sup>nd</sup> changed by the law n° 45/2005 August, 30<sup>th</sup>.

As such, the Higher Education Institutions (HEI) need to prove their value to obtain a larger budget, or just maintain the present one.

Although HEIs are generally recognized, not only as learning, research and innovation centres, but also as important mechanisms of regional development and economic growth, it is essential that they can accurately quantify their impact<sup>iv</sup>.

The main objective of this study is to answer the following question: "*How much do the regions of Bragança and Mirandela benefit from hosting the Polytechnic Institute Bragança?*".

To achieve this, the activities and cash flows that are generated only due to the existence of a HEI were selected, and an economic impact model adjusted to the regions in analysis is being developed, based on Caffrey and Isaacs' model (1971). This paper describes the model and the conclusions of the first phase, which comprise a survey to the faculty, staff and students.

## 2. Analytical Frame

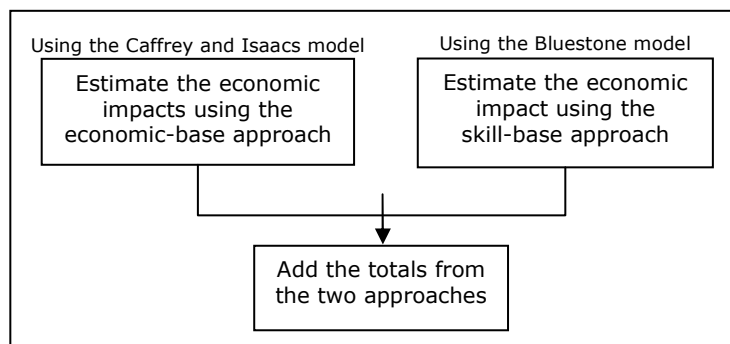
One way to measure the total economic impact that results from the existence of a HEI is to estimate the additional impact that occurs, above the regular economic activity level if there was no HEI in the region. The impacts can be identified as direct, indirect or induced. The direct impacts are the cash flow introduced in the region; while the indirect and induced impacts are obtained from the direct impacts after the application of a multiplier (Carr and Roessner, 2002).

In the empirical literature two main approaches can be identified: the traditional economic-base and the skill-base approaches (Brown and Heaney, 1997). The first one, measures the total impact in local employment and revenues from the total spending related to the institution, namely the institution, the faculty, the staff and the students spending in the region. The skill-base approach intends to measure the increase in productivity (due to acquired knowledge and skill from attending the HEI) and the enhanced lifelong revenues from the graduates that remain in the area (Brown and Heaney, 1997; Bluestone, 1993).

Levitt *et al.* (Brown and Heaney, 1997) proposed a model to estimate the economic impact of a HEI, combining the two approaches (figure 1).

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<sup>iv</sup> See, for example, Arik and Nsiah, 2004; FINHEEC, 2004; Ohme, 2004; Appleseed, 2003; Charney and Pavlakovich-Kochi, 2003; Healey and Akerblom, 2003; Gunderson, Eastwood, and Fox, 2003; University of California, 2003; Austrian and Sadowski, 2002; Duhart, 2002; Clinch and Gerlowski, 2002; Lantz, Brander, and Yigezu, 2002; Carr and Roessner, 2002; Macfarland, 2001; NASULGC, 2001; Emmett and Manaloor, 2000; Head, 1997.



**Figure 1** – New approach

**Source:** Adapted from Brown and Heaney (1997: 233).

Although several economic impact models can be found in the empirical literature, specifically concerning the economic impacts of Higher Education Institutions, the vast majority of the studies follows the guidelines of the model developed by Caffrey e Isaacs and presented in the American Council on Education (and so known as the ACE model) in 1971<sup>v</sup>.

The remaining models usually try to introduce a development or try to simplify this one, such as the Short-Cut Ryan model, the EACUBO, or the IMPACT model. But all the mentioned models follow the traditional economic-base approach<sup>vi</sup>.

Some authors criticize the ACE model because, being a typical economic-base approach, it does not identifies or even consider the non economic impacts that arise from the HEI existence, nor does it considers the lifelong earnings of the graduates and other benefits that the skill-base approach models, such as Bluestone's model do (Buchanan, 1994). Although the Bluestone model, that follows a skill-base approach is being more frequently use, MacFarland (1999) sustains that the ACE is still a valid and useful model. Brown e Heaney (1997) also recommended some caution in the selection of the model and state that the traditional ones give more reliable and conservative values than the new ones.

Another major critic is that the ACE model is a conservative model and underestimates the total impact due to its lack of consideration of other non economic impacts such as technology transfer, specialized workers, cultural and social benefits, or the use of the HEI infrastructures among others<sup>vii</sup>.

To overcome these critics, presently when the ACE model is used some adjustments are made, namely, some authors who do not use all the sources of spending and exclude the visitors spending. Also, the ACE model acknowledges that there are some non monetary benefits that are difficult to quantify and could bias the estimate, and usually are not considered, therefore, underestimating the real impact of the HEI in study. Nevertheless, they exist and should be identify and mentioned even if they cannot be measured.

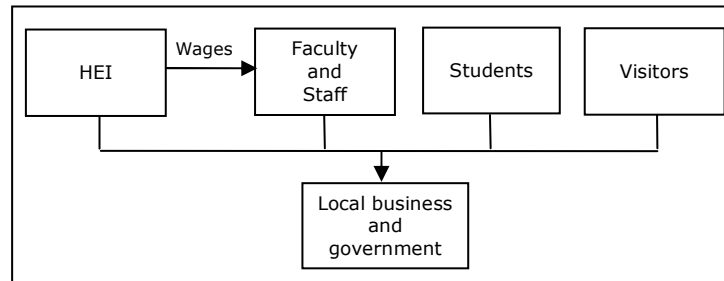
<sup>v</sup> See, for example, Ohme, 2004; Charney and Pavlakovich-Kochi, 2003; Gunderson, Eastwood, and Fox, 2003; Healey and Akerblom, 2003; Seybert, 2003; Lantz, Brander, and Yigezu, 2002; Austrian and Sadowski, 2002; Macfarland, 2001; Buchanan, 1994.

<sup>vi</sup> See, for example, Seybert, 2003; Carr and Roessner, 2002; Emmett and Manaloor, 2000; Head, 1997; Ryan and Malgieri, 1992.

<sup>vii</sup> See, for example, Sanders, 2003; Clinch and Gerlowski, 2002; Sudmant, 2002; Chatterton, 1997; Goddard, 1987.

### 2.1. The American Council on Education Model

The ACE model tries to identify who is spending, how much, in what, and where, so, basically, it intends to identify and quantify all the monetary flows that occur due to the existence of a HEI. A simple expenditure model can explain the cash flows in question, as shown in the following figure.



**Figure 2** – The monetary flows of the ACE model  
**Source:** Caffrey and Isaacs (1971: 7).

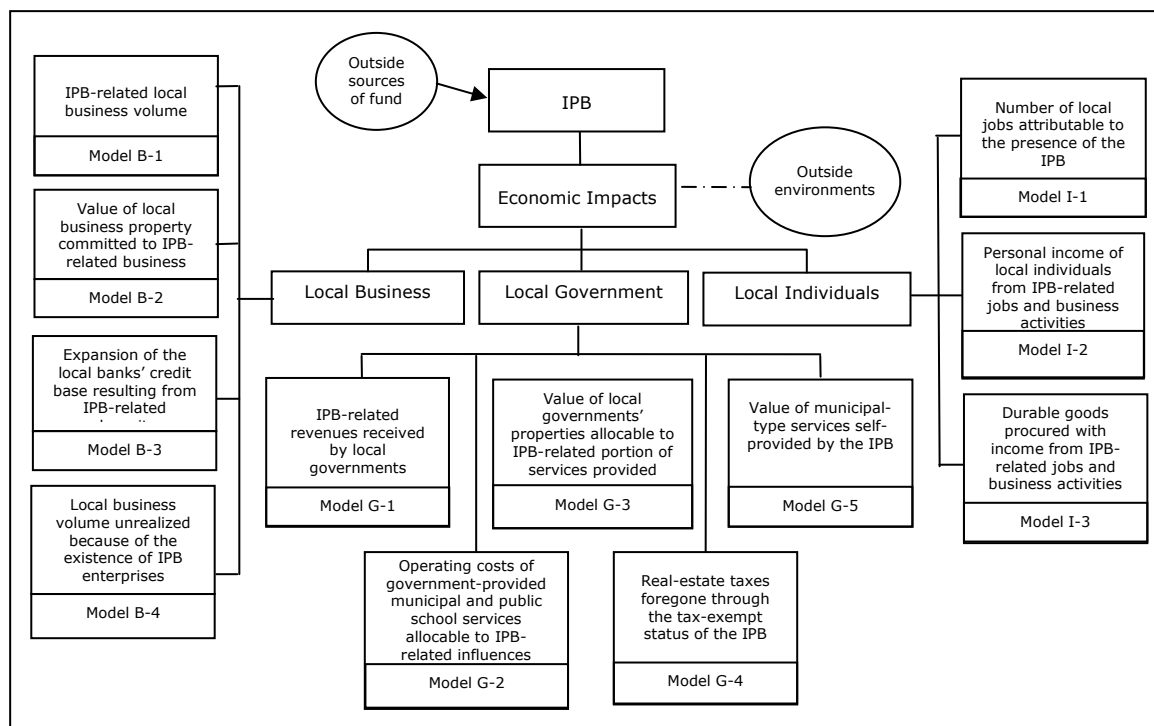
As is represented in figure 2, the ACE model is a simple and linear cash flow model, and the impacts that it intends to estimate are from the four sources represented in the figure: the institution, faculty and staff, students, and visitors. Their relationship to the economic impact can be translated in the following equation:

Direct impact of the HEI = 1+2+3+4,

where (1) is the local spending of the HEI, namely in equipments, material, communications, and so on; (2) concerns the local spending of the faculty and staff; (3) concerns the local spending of the students; and (4) concerns the local spending of the visitors (Caffrey e Isaacs, 1971).

This study was based in the ACE model of Caffrey and Isaacs (1971), through which, the economic impact of the HEI is estimated, by adding all the direct and indirect impacts that arise from the institution, faculty, staff, students and visitors spending.

The HEI economic impact is translated in an impact in local business, local individuals, and local government. The following figure shows a detailed and more complex representation of the ACE model that was used in this study.



**Figure 3** – Economic impact of the IPB on the business, government and individuals of the region  
**Source:** Adapted from Caffrey and Isaacs (1971: 10).

Figure 3 shows with detail how the impact will occur and what are the input data needed for this estimation. The total economic impact of the Polytechnic Institute of Bragança (IPB) is estimated by adding all the direct and indirect impacts that arise from the institution, faculty, staff, students and visitors spending. The adopted model translates this amount into impacts on the individuals, business and government, separated in different aspects, as shown in figure 3.

### 3. The Case of the Polytechnic Institute of Bragança

As previously mentioned, this paper describes the analysis that is being conducted in the Polytechnic Institute of Bragança (IPB). Since the IPB has five colleges, four located in Bragança and one located in Mirandela, these two cities are the region under analysis.

The study was based in the ACE model of Caffrey and Isaacs (1971). To estimate the spending of the institution, faculty, staff, students and visitors, a survey was conducted in the 1<sup>st</sup> semester of 2007. All the other data, obtained from the institution, was updated to December, 31<sup>st</sup> of 2006.

#### 3.1. Collecting the data

The faculty had access to the questionnaire that was made available in the intranet, where they could access it using their username and password, and so was guaranteed that they would only answer once. From the 396 faculty members, there were 166 responses.

For the staff, the questionnaire was sent by internal mail along with a return envelope and a letter from the president of the IPB to motivate them to cooperate. There are 233 staff members in the IPB, and there were 105 responses.

From both, the faculty and staff it was intended to obtain responses for the total population but it was not achieved, regardless of all the efforts made.

To obtain a higher and more reliable level of responses, the students answered the questionnaire in the classroom. To guarantee the randomness of the sample, the visited classrooms were selected in a random way from the on-line schedules. A total of 1343 responses from the population of 5119 students was obtained.

### **3.2. The faculty and the staff**

The faculty's sample shows a male preponderance (53.3%), an average age of 36.6 years and a work experience in the IPB of 9.9 years. The vast majority (80.6%) have, at least, a master degree, attaining 26.7% a doctoral degree.

The faculty's families have between 1 and 4 people (96.7%) and have 1 or 2 children (95.5%). The families have an average monthly revenue of 2,241.1 euros and spend every month in the region 1,717.4 euros.

The major expenses are with house and food, in this order. 48.8% changed residences because they work in the IPB, and their visitors spend 628.2 euros annually, on average. For the faculty elements that have a bank loan, in 47.0% of the cases, that loan was used to buy a house. Each faculty member spends, in average, a total amount of 793.1 euros per month.

The staff's sample is predominantly female (54.9%) and has an average age of 42.9 years, working for the IPB for 11.8 years, on average. The majority (67.9%) graduated from high school and 47.0% have, at least, a bachelor degree.

The families of the staff elements have between 2 and 4 people (80.8%) and have 1 or 2 children (88.1%). They receive an average monthly payment of 1,313.9 euros and spend in the region 1,334.9 euros every month.

The major expenses are with food and house, in this order. Only 21.2% changed residences because they work in the IPB, and their visitors spend 449.3 euros per year, on average. The staff elements that have a bank loan used it, in 68.8% of the cases, to buy a house. The expenses of the staff *per capita* are, in average, 526.8 euros per month.

The following table shows the average expenses that the faculty and staff's families have, monthly, by categories.



**Table 1 – Average monthly expenses from the families of the IPB faculty and staff members (in euros)**

	House	Food	Other expenses	Transport	Personal items	Children's education
Faculty	423.9	409.9	281.2	103.0	179.7	154.5
Staff	378.0	427.0	208.8	140.6	120.9	180.0

	Current expenses	School material	Health	Pleasure	Informatics' supplies
Faculty	140.6	104.4	98.3	76.8	68.1
Staff	109.7	67.4	77.4	43.4	48.5

**Source:** Faculty and staff questionnaire.

There are, in average, more staff elements with children than faculty elements, and they are older. The main difference relies in the average revenues, while 59.3% of the staff families only receive 1612 euros, this figure is achieved by only 13.8% of the faculty families, and none of the faculty families receives fewer than 806 euros. This difference is enhanced when one considers the place where they make their meals, almost twice of the staff elements has all the meals at home (40.0%) while only 20.7% of the faculty elements have all their meals at home.

The faculty families, in the majority of the analysed spending categories, spend more than the staff families, except in food, transport and with the children's education. The faculty families save almost three times (348.1 euros) what a staff family saves every month.

### **3.3. The students**

The average student is female (63.6%) with 23.5 years (this average is slightly lower when considering just the full time students - 21.8 years, and much higher when considering the working students - 34.5 years). The vast majority of the students are full time students (86.5%), while the working students only account for 13.5%.

The students are in average in the IPB for 2.4 years, but the data from the central services of IPB point out an average permanence of 3.9 years. The retaining rate of the students through out the degree is 10.4% in the first year, 38.5% in the second and 54.4% in the third. This rate varies according to the area of the degree, specifically, the humanities area is where they fail less and those that study science and engineering are the ones that fail more. This retention rate influences the efficiency of the institution, and the IPB efficiency rate equals 57.9%.

From the sample, it is visible that 73.5% of the students change their residence to attend the IPB and these students come mostly from within 200 km (almost 63.0%).

The families of the students have a working mother (54.3%) or a working father (67.9%), but only 41.6% have both their parents working. The unemployment rate is higher for females and almost 37.4% of the mothers are housewives.

The professional categories more represented are the non qualified ones, jobs that require low qualifications (74.9% of the fathers and 65.6% of the mothers), and the parents academic qualifications are also low - 35.0% have only the basic level 1 (primary school) and 23.2% have the basic level 2.

About 32.0% of the students belong to families that only receive 806 euros for month, i.e. two minimum national wages, and 88.2% to families that receive a maximum of 2418 euros a month (before taxes).

The students are mainly supported by their families (77.1% of the students) with a monthly average allowance of 370.8 euros, but 33.5% are also helped by a scholarship, that gives them an extra monthly amount of 102.1 euros, in average<sup>viii</sup>. From these last ones, 75.5% are female students.

The major expenses the students have are with house and food. They spend every month an average amount of 449.8 euros. The following table describes the monthly expenses by category.

**Table 2 – Average monthly expenses from the students of the IPB (in euros)**

House	Food	Transport	Other expenses	Tuition and other
124.4	117.6	98.3	80.1	63.2
Personal items	School material	Informatics' supplies	Health	Pleasure
56.8	48.2	42.0	26.5	30.2

**Source:** Student's questionnaire.

### **3.4. The direct economic impact from the faculty, staff and students**

The results obtained from the survey conducted in the IPB, with the faculty, staff and students, allowed to obtain a first estimate of the direct economic impact of the IPB in the amount of 24,201,867.5 euros. In fact, in the year 2007, the faculty, the staff and the students spent 4,256,304.6 euros, 822,458.3 euros, and 19,123,104.6 euros, respectively, in the regions under analysis.

The total amount becomes more significant when compared with the annual budget for the IPB, which reaches 22 million euros (22,293,335.0 euros). Roughly, one can state that the cash flows received from the state by the IPB are enhanced by 8.56%, in terms of cash flows for the region.

There should be noted that, in the amount estimated, is still not included the import substitution effect of the local students. This amount was not estimated yet due to delays from the official sources to provide the accurate figures. Although, the ACE model does not contemplate this group of spending, Blackwell, Cobb and Weinberg (2002) emphasised that this is an effect that does occur and, therefore, can and should be included in the estimate. These authors also claim that the technology transfer effects, when the institution is mainly for undergraduates, like the IPB, are not sufficiently important to change the results

<sup>viii</sup> Some students with a scholarship have a free room, or a low rent room, in the social services' houses, and this is not accounted in the monthly expenses.

and are very difficult to estimate, and hence can be neglected. Furthermore, the economy of the regions under analysis is mainly of the primary and tertiary sectors, and the manufacturing industry has a very low significance.

Another note should be added regarding the institution spending. These amounts were not added yet to the total economic impact because they were not available on time. However, it is certain that they will increase the total amount spent in the regions, which in any case has been estimated in a conservative perspective.

#### 4. Conclusion

The findings obtained in this paper clearly suggest that HEIs are major mechanisms of regional development. In fact, although not all of the amounts needed for the ACE model are already obtained, it was possible to obtain a first estimate of the direct economic impact of the IPB in the regions of Mirandela and Bragança of over 24 million euros. This amount is 8.6% higher than the state's budget available for the year 2007.

Some questions have arisen from the study, mainly concerning the difficulty to obtain data from official sources, either because it does not exist or because it is not available.

The next phase is to obtain the values to complete this part of the work, using the ACE model and readjust the comparison between the total amounts spent in the region by the individuals related to the IPB and the total amount the government gives to the IPB to operate every year. It is likely that in the end of that phase a much higher amount will be obtained and that it will be possible to present future and accurate estimates (due to the constant option for the conservative figures) of the impact of the IPB in the studied regions.

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