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RESTYLING THE HIGHER EDUCATION LANDSCAPE: REGIONAL (A)SYMMETRIES ACROSS PORTUGAL

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Abstract

This work studies the disparities found in higher education institutions across Portugal - in terms of geographical location, being polytechnics institutes or universities, and operating in the private or public sector - in relation to their offering of 1st, 2nd and 3rd cycle study programmes and scientific areas.

Bearing in mind that, on the one hand, any education institution must adapt to the surrounding population, and that, on the other hand, the population also ends up adapting to the existing educational offer, there is always some synergy between the characteristics of higher education institutions and local population/social context. Therefore, it is of surmount importance to characterize the educational system and verify the presence of asymmetries, by evaluation of the way it relates and is related to the physical and social setting.

In Portugal, every study programme (newly submitted or running) is subject to evaluation by the Agency for Assessment and Accreditation of Higher Education - A3ES. At the initial stage of the evaluation process, Higher Education Institutions (HEIs) submit a proposal to A3ES. The analysis of the characteristics associated with both the study programme and HEI submitting it, held by A3ES, allow an indirect characterization of the national HE landscape.

Based on a descriptive analysis of the data associated with all the study programmes submitted to A3ES from 2009 to 2014 ($N = 2961$), it was possible to cross-tabulate several variables and to do a thorough discussion, highlighting the influence of different internal aspects of the Portuguese Higher Education System. This data-based reflection is a contribute for future works aiming to understand the underlying dynamics behind such asymmetries. Knowing the regional asymmetries may provide opportunities to find innovative solutions that foster education on disadvantaged regions.

Keywords: Higher education, Regional development, Scientific areas, (A)symmetries.

1 INTRODUCTION

Portuguese educational system is regulated by the Basic Law of the Educational System [1] and is developed in three levels: primary, secondary and higher education (or tertiary education). Portuguese higher education is organized in a binary system, integrating both universities and polytechnic institutes and is taught in public and private institutions. The private higher education institutions must acquire prior recognition of the Ministry in charge of the Higher Education.

University education is guided by a perspective of research promotion and creation of knowledge and aims to ensure solid scientific and cultural preparation and provide technical training to enable for the exercise of professional and cultural activities and promote the development of design capabilities, innovation and critical analysis. In the other hand, polytechnic education is guided by a perspective of applied research and development aimed at understanding and solving concrete problems and aims at providing a solid cultural and technical training at the higher level, developing the capacity for innovation and critical analysis and providing scientific knowledge of theoretical and practical nature and their applications for the exercise of professional activities [2].

Higher education institutions enjoy scientific, pedagogical, cultural and disciplinary autonomy.

In 2005, a reform of the Basic Law of the Educational System was started in order to implement the Bologna Process, with the introduction of the European Credit Transfer System (ECTS) in study cycles, mobility mechanisms, diploma supplement, among others [3].

Higher education began to have a new structure of three cycles of studies [4]: licenciado (undergraduate degree), mestre (master's degree) and doutor (PhD degree). This structure started in 2006 and was

fully implemented in Portugal in the 2009/2010 school year. Generic qualification descriptors were established for each cycle of studies, based on the acquired competences, as well as the definition of ECTS intervals for the first and second cycles.

The "Licenciado" degree (1st Cycle) is awarded to students that:

- a) Demonstrate knowledge and understanding in a training area in such a level that:
 - i) Based on the knowledge acquired in secondary education, may develop and expand upon it;
 - ii) Can work with advanced learning materials and relate to them;
 - iii) Have a state-of-the-art knowledge in some aspects of that area;
- b) Demonstrate know how to apply acquired knowledge and understanding capacity, in order to clearly demonstrate a professional approach to the work carried out in their vocational area;
- c) Have the capacity to solve problems within the field of their training area, based upon their own arguments;
- d) Have the capacity to collate, select, and interpret relevant information, particularly in their training area, which will enable them to consolidate the solutions they present and the opinions they put forward, including the analysis of relevant social, scientific and ethical aspects;
- e) Possess competences that enable them to communicate information, ideas, problems and solutions, both to experts and non-experts;
- f) Possess learning competences that will enable them to benefit from lifelong learning with a high degree of autonomy.

In polytechnic education, these degrees can be obtained after the conclusion of a 1st cycle of 180 ECTS credits and a normal length of 6 semesters, or, exceptionally, up to 240 ECTS credits and 7 or 8 semesters. In university education, these degrees can be obtained after the conclusion of a 1st cycle of 180 to 240 ECTS credits and a normal length between 6 and 8 semesters.

The degree of "Licenciado" is conferred to those who, through the approval in all the curricular units, have obtained the necessary number of credits. This undergraduate degree corresponds to level 7 of European Qualification Framework (EQF).

A "Mestre" degree (2nd cycle) is awarded to those who, having completed a 1st cycle - "Licenciado", demonstrate that:

- a) Possess such knowledge and capacity of understanding that:
 - i) Based on the knowledge obtained in the 1st cycle, manage to develop and expand that knowledge;
 - ii) Manage to develop and apply that knowledge to original situations often in the context of research;
- b) Know how to apply their knowledge, understanding and problem solving capacities to new and unfamiliar situations in wide multidisciplinary situations, although related to their area of studies;
- c) Possess the capacity to integrate knowledge, deal with complex matters, develop solutions or put forward opinions on situations of limited or incomplete information, including reflecting upon the implications and ethical and social responsibilities that result from both those solutions and opinions or indeed that condition them;
- d) Are capable of communicating their conclusions and the knowledge and reasoning that underly them, both to experts and non-experts clearly and unambiguously;
- e) Possess learning competences that will enable them to benefit from self-oriented or autonomous lifelong learning.

It is a cycle of studies which has 90 to 120 ECTS credits and a normal duration between 3 to 4 semesters, or exceptionally 2 semesters and 60 ECTS credits. In university education, it must ensure the acquisition of a specialization of academic nature, with the use of research, innovation or deepening professional skills, corresponding to level 7 of EQF. In polytechnic education, it should predominantly ensure the acquisition of a professional specialization, corresponding to level 6 of EQF.

The 2nd cycle - "Mestrado" comprises: (i) a specialization course, consisting of an organized set of curricular units, which corresponds to a minimum of 50% of the total credits of the study cycle and (ii) a dissertation of scientific nature or a project work, original and specially carried out for this purpose, or an internship of professional nature, which is the subject of a final report, according to the specific objectives envisaged and to the terms established by the respective regulatory standards, minimum of 30 credits. It is awarded to those who, through the approval in all the curricular units that integrate the study plan of the specialization course and the approval in the public act of defense of the dissertation, project work or internship report, have obtained the necessary number of credits. The competent body of each higher education institution is responsible to approve, among other subjects, the curricular structure and the syllabus and the rules on the component of dissertation, project or report of internship, including orientation, presentation, defense and jury.

The "Doutor" degree (3rd cycle) is awarded in the field of knowledge, or in one of its specialist subjects, to those who, after completing the study cycle, have demonstrated:

- a) The capacity of systematic understanding a scientific field;
- b) Competences, skills, and investigation methods associated with a scientific field;
- c) The capacity to conceive, project, adapt and perform significant research respecting the demands imposed by patterns of academic quality and integrity;
- d) Capacity to carry out a significant body of original research, contributing to challenging the boundaries of knowledge, part of which merited national or international dissemination in renowned publications;
- e) Being capable of critically analyzing, evaluating and synthesizing new and complex ideas;
- f) Being capable of communicating with their peers, the rest of the academic community and society in general, in their expert field;
- g) The capacity to promote technological, social or cultural progress in academic or professional terms in a knowledge-based society.

The 3rd cycle - "Doutoramento" comprises: (i) the drawing up of an original thesis especially for this purpose, appropriate to the nature of the branch of knowledge or specialty, or the compilation of a coherent and relevant set of research works or, in the field of the arts, a work or set of works or accompanied by a written statement of reasons and (ii) the eventual realization of curricular units directed to the formation for the investigation, when the respective regulatory norms foresee it.

The "Doutor" degree is conferred to those who have obtained approval in the public act of defense of the thesis. It is the responsibility of the competent body of each higher education institution to approve, among other subjects, the curricular structure, the syllabus and the rules on the component of dissertation, project or report of internship, including orientation, presentation, defense and jury.

The duration of either the study cycle or the corresponding ECTS credits is not legally defined. The usual is having a duration of 6 to 8 semesters and 180 to 240 ECTS credits. The "Doutor" degree corresponds to level 8 of EQF.

Following the recent development of quality assurance systems [5,6], namely those in the European space, the Portuguese state has decided to create the "Agência de Avaliação e Acreditação do Ensino Superior" (Agency for Assessment and Accreditation of Higher Education - A3ES), by Decree-Law no. 369/2007, of November 5th [7,8], with the purpose of promoting and ensuring the quality of higher education [9].

The Agency is a private law foundation, established for an indeterminate period of time, with legal status and recognised as being of public utility. The Agency is independent in its decisions which must consider the guidelines prescribed by the State. The mission of A3ES is to contribute to improving the quality of Portuguese higher education, through the assessment and accreditation of higher education institutions and their study programmes, and to ensure the integration of Portugal in the European quality assurance system of higher education [5].

The evaluation and accreditation criteria are those laid down in the legal systems of degrees and diplomas of higher education and evaluation of higher education.

In addition to the previous accreditation of study cycles to be created, that Agency also carries out regular accreditation of the study cycles that are in operation.

This work aims to make a general characterization of Portuguese higher education landscape and to ascertain the existence of asymmetries with respect to some variables (higher institution geographical location, operating subsystem and sector, as well as study program cycle and scientific area), giving particular emphasis to the scientific areas. In addition to the detailed description of the population, we hope that it brings a reflective contribution to the critical analysis of the observed asymmetries, confronting them with spectacle scenarios and / or governmental guidelines.

2 METHODOLOGY

The characteristics associated with a total of 2961 Portuguese Study Programmes (SPs) submitted to A3ES for accreditation from 2009 to 2014 were analysed using IBM SPSS Statistics v.25 and Microsoft Excel. These characteristics included the study programme's cycle (1st, 2nd or 3rd) and the main scientific areas (classified according to the Center for Research in Higher Education Policies – CIPES), as well as the geographical location, education subsystem (University/Polytechnic) and operating sector (Private/Public) of the HEI offering them. Data treatment and analysis was based on descriptive techniques, namely frequency analysis form tabulation and crosstabulation, and the respective graphical representations.

3 RESULTS

In this section, we aim at characterizing the HEIs submitting SPs during the period under analysis. We start by a general characterization in terms of education subsystem (University / Polytechnics), operating sector (Public / Private), geographical location (Littoral / Interior / Islands or, more specifically, Lisbon Metropolitan Area / North / Center / South / Islands), and study cycle degree (1st, 2nd or 3rd). Secondly, given its relevance, a more detailed analysis of the main scientific areas was made, by crosstabulation with the previous variables. In some points of the analysis, a connection was established between the observed results and the Portuguese reality, namely students' choices, higher education sustainability criteria, and governmental guidelines.

3.1 Higher Education Institutes Main Characterization

In Portugal, higher education is separated into two main subsystems¹: university (accounting for 67% of all the study cycles) and polytechnics, whose main purposes were explained in the previous section. Each HEI can be operated either by the public or private sector, with higher expression, as expected, in the public sector, holding 76% of the total study cycles (50% of which are universities and 26% are polytechnics, as shown in Fig. 1).

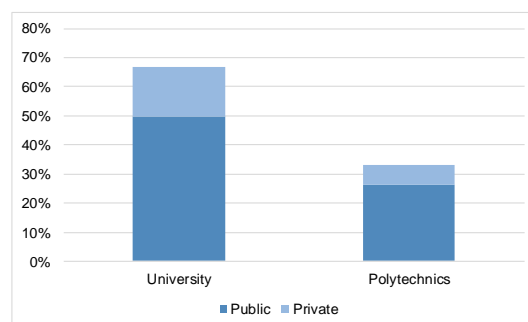


Figure 1. Submitted SPs by HEI subsystem (University/Polytechnics) and operating sector (Public/Private).

Geographically, considering only three regions² (littoral, interior and the islands), it is possible to say (see Fig. 2) that most of the submitted SPs are located on the coastal area of the country (72%), with the Lisbon Metropolitan Area (LMA) alone summing up 35% of the total offer.

¹ There are other education subsystems, namely military and police education, but these were not considered in this work due to their low expression.

² The category "Consortium" was not considered in this work because it doesn't always correspond to a single geographic region.



Figure 2. Submitted SPs by geographical location considering: (A) three main regions – Littoral, Interior and the Islands; (B) discriminating into Lisbon Metropolitan Area (LMA), North, Center, South and the Islands geographical areas.

In what concerns study cycle degrees, only the main 1st, 2nd and 3rd SPs (Bachelors – BSc, Masters – MSc, and Doctoral – PhD, respectively) were considered. It is noticeable that 51% of all study cycles are masters’ degrees. This makes sense after the Bologna process, considering that 1st cycle programmes are intended to give general formation, while 2nd cycle programmes complement and deepen the formation, splitting into several other more specific programmes. That is, for a given bachelor’s degree, several masters’ programmes are developed. Fig. 3(A) shows that the littoral HEIs concentrate the largest number of SPs, irrespective of their degree. It is worthwhile noticing that LMA alone holds a considerable part of all the cycle degrees SPs, with emphasis on PhDs (approximately half of all the PhD programmes), revealing a clear geographical asymmetry in the distribution of 1st, 2nd and 3rd cycle SPs. Fig. 3(B) shows that, while BSc’s degrees are equally distributed between polytechnics and universities (approximately 18% of all the submitted SPs), the same doesn’t occur for higher degrees (MSc and PhD). The parity in 1st cycle programmes is relevant attending at the fact that the number of SPs offered by universities is twice the number offered by polytechnics (according to Fig.1). Furthermore, in polytechnics the number of MScs (15,8%) is slightly lower than number of BScs, while there are no PhDs. Contrastingly, universities offer a much larger number of MSc programmes (48,8%).

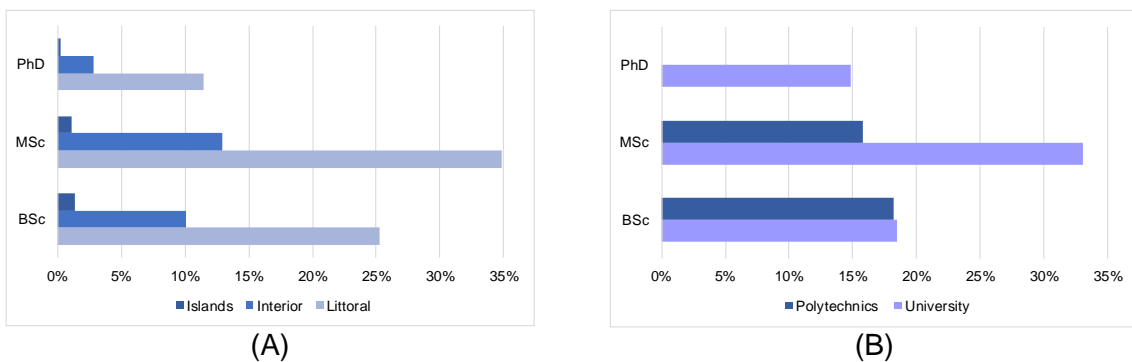


Figure 3. Submitted 1st, 2nd and 3rd cycle SPs (BSc, MSc and PhD, respectively) by: (A) geographical location considering the three main regions; (B) HE subsystem.

Some reflection on this topic sounds relevant. Considering that universities supply general abilities in the 1st cycle intended to prepare students to pursuit 2nd and 3rd cycle SPs, while polytechnics supply vocational skills preparing students for the labour market, it is no surprize that polytechnics are offering almost the same number of 1st and 2nd cycle programmes, reflecting the current market demands. Nowadays, most European students (Portugal included) consider important to start working holding a MSc degree, because they have more opportunities and better salaries. The observed difference can be the result of two reasons: on the one hand, the number of students attending the two education subsystems is quite different (much higher for universities); on the other hand, it is normal for a student attending a 1st cycle degree at the polytechnic to choose attending a 2nd cycle degree at the university.

The opposite is not usual. Thus, in case the polytechnic institutes broadened their 2nd cycle training offer, it would be very likely that they ended up running programs with very few students, which would not be sustainable for the institution.

3.2 Higher Education Institutes Scientific Area Cross-Analysis

The emphasis given to a certain scientific area is of foremost importance to fully characterize the Portuguese HEIs profile. The academic formation offered today should reflect our current beliefs, as well as how we envision the future. Today's students will be responsible for the country tomorrow. Thus, if we aim to characterize the HEIs, it will be crucial to do that analyzing the scientific areas offered by current SPs. Since this characterization is not straightforward, a more detailed analysis will be done, by crossing the scientific areas with the other variables under study. In this work, the scientific areas were classified by adaptation of the CIPES classification system.

In Fig. 4(A) we can verify that Business, Engineering and Exact Sciences account for almost half (48%) of the total Portuguese SPs' offer. Next, with approximately 10% each, appear Education, Services and Social Sciences, followed by Humanities with 6%. For all the other scientific areas the percentage of SPs is less than 5%.

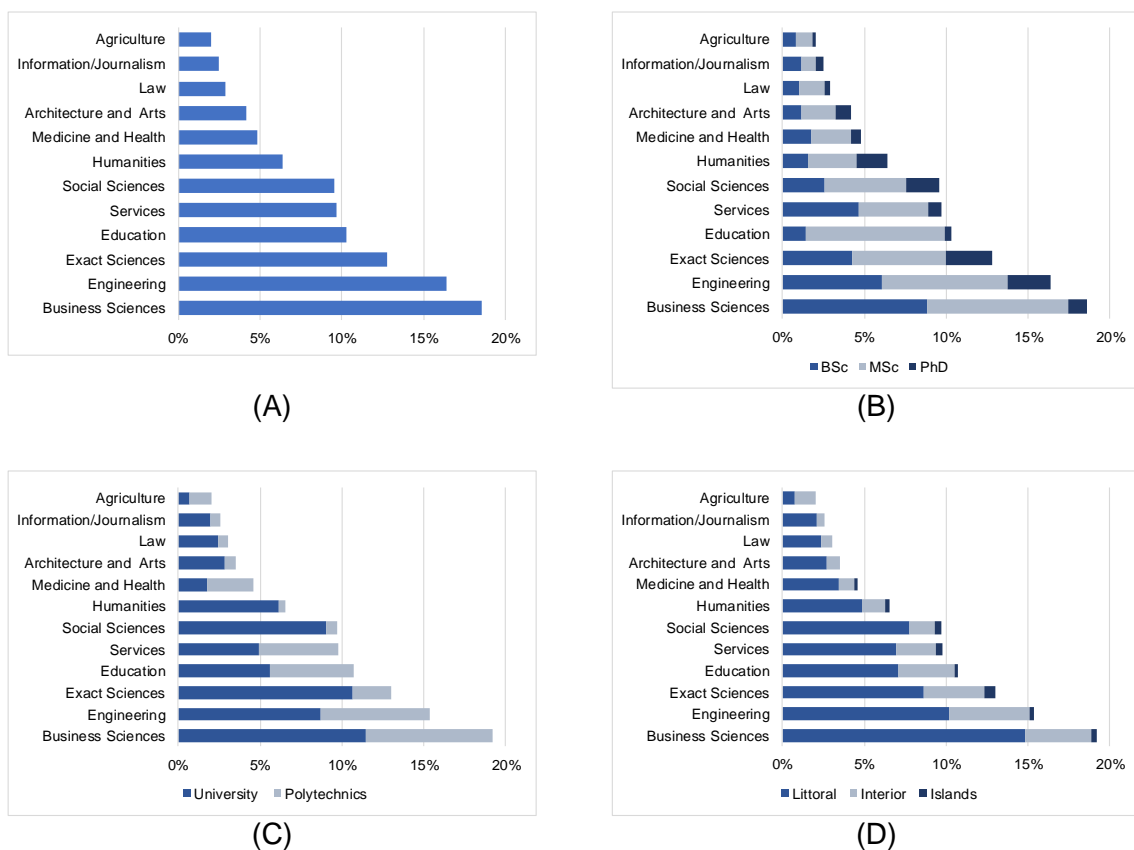


Figure 4. Submitted SPs by scientific area (A) and by scientific area crossed with study cycle (B), HEI subsystem (C) and geographic location (D).

Regarding the cross-analysis of the scientific areas with the different study cycles, in Fig. 4(B) we can observe also some asymmetries. Only in areas like Social Sciences, Humanities and Architecture and Arts, PhDs representativity is relatively close to the one of BScs. In all the other, PhDs appear in a reduced number and, generally, MScs contain the largest percentage (exceptions include the larger percentage of BScs in Business Sciences, Services and Information/Journalism programmes). The most asymmetric distribution can be observed for Education, where the percentage of MScs is almost 5 times higher than BScs and PhDs together. This is normal in Portugal, given that a MSc is a mandatory requirement to work as a teacher.

Considering the cross-analysis of the scientific areas with the HEIs subsystem, it is also possible to observe some asymmetries, although in some cases the observed data go oppositely to what was

expected. For instance, Fig. 4(C) corroborates how the expression of Business Sciences courses is noticeable in both education subsystems, distributing among 11,4% (for universities) and 7,8% (for polytechnics). The asymmetries between the two subsystems become evident when comparing their distribution on Exact and Social Sciences, Humanities and (besides their low expression) on Architecture and Arts, Law, Information/Journalism and, finally, Agriculture. Only in the last one (Agriculture), polytechnics prevail over universities. For all the other above mentioned, the percentage of university SPs is largely higher. However, for Engineering, Education and Services there is an even distribution in the two subsystems. These results are partially in agreement with the national government guidelines, according to which there should be differences in the formation offered by the two subsystems.

The graphical analysis crossing scientific areas with geographical location, shown in Fig. 4(D), does not allow to observe the existence of real asymmetries easily. A more careful analysis was made, by comparing the observed percentage of SPs of each scientific area in the three regions with the ones expected if their distribution among regions followed their relative importance (see Fig. 1), i.e. in case the two variables were independent. The results are presented in Table 1

Table 1. Observed number of SPs and respective expected number according to the geographical proportion.

	Littoral		Interior		Islands	
	Observed	Expected	Observed	Expected	Observed	Expected
Business Sciences	419	390	116	140	9	14
Engineering	321	347	154	124	9	13
Exact Sciences	249	269	107	96	19	10
Education	201	218	97	78	6	8
Services	206	205	70	73	10	7
Social Sciences	224	201	45	72	11	7
Humanities	138	133	39	47	8	5
Medicine and Health	101	95	28	34	4	3
Architecture and Arts	94	87	27	31	0	3
Law	67	61	18	22	0	2
Information/Journalism	60	52	13	19	0	2
Agriculture	21	42	37	15	0	2

Note: Larger differences are highlighted in the table.

Social Sciences, Business Sciences, Engineering, Education and Agriculture present values nonconformant with the expected (see highlighted values in Table 1). In the first two cases (predominantly for Social Sciences) it would be expected the existence of a higher number of SPs in the interior. Oppositely, in the other three cases, the number of SPs in the interior region is higher (predominantly for Agriculture) than expected. These values make sense bearing in mind that there are also Governmental guidelines stating that the formation offer must be adapted to each region and its necessities.

4 CONCLUSIONS

The mission of Higher Education is not merely the scientific formation of students, but a multidimensional task ranging from teaching and research to social commitment. Thus, all the "teachings" and values conveyed there, as well as the stimulation and contribution to "production / evolution of knowledge", are doubtlessly preponderant, regardless of the HEI subsystem, sector or even geographic location. Accordingly, the main goal of this work was the analysis, characterization and interpretation of the Portuguese HEIs landscape.

Summarizing the most relevant findings, it is easily perceived the valorisation of universities over polytechnics, as well as the prevalence of the coastal vis-a-vis interior areas of the country (the low representativeness of the islands was predictable). Besides, in the current conjuncture, with employees seeking better jobs and higher salaries, the MSc programmes offering naturally intensifies (regardless of geographical location or HEI's subsystem). This applies to both young first-job seekers and active mature workers returning to higher education to increase their qualifications.

Regarding scientific areas crossing with other variables, it is also important to retain some conclusions. Business, Engineering and Exact Sciences account for almost half (48%) of the total Portuguese SPs' offer, with higher representativity of MSc programmes in all scientific areas (corroborating the above mentioned) and where universities and the coastal region hold the larger number of SPs, with exception of Agriculture (with higher incidence in polytechnics located in the interior)

On the conclusions presented, a reflection is deserved. Some risks of the observed asymmetries include the desertification of the interior, and the massification and monopoly of the metropolis (LMA). On the positive side, it should be noted that there is a large intersection between the regional areas and the type of course (perhaps higher than expected and even desirable), since both subsystems confer identical BSc and MSc degrees in the same scientific areas. In some cases, there seems to exist the desired coordination between formative offer and the geographical area.

Perhaps aware of some of these risks, recent government policies aimed at reducing the number of available places for students in the coastal zone (particularly in the LMA). Such measures affect mainly universities, shifting the available places for the interior HEIs [10]. In addition, since there is a significant offer of polytechnic education in the interior, with the aforementioned measure, some of the objectives that are the basis of its creation can also be fulfilled: to foster the establishment of the young populations and to align the formative offering with its geographic location, (seeking to respond to the real needs of the region), increasing the regional know-how.

In terms of future work, it would be interesting to cross this work's results with a later study, where the differences resulting from the application of current government policies would be analysed.

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