

The structure of information in the internationalization processes of universities

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Abstract — In this work we were interested in the relation between internationalization of universities and the information demands associated with it. The internationalization process of universities is accompanied by a process of dissemination of information, which fulfills several purposes. The aim of this work was to evaluate, in a systematic way, the international indicators and rankings that are proposed in the literature and that are used by the higher education institutions (HEI), and to propose an information model based on that analysis. The research methodology was based on a literature review, documental analysis, informal interviews and observation of events related to internationalization of universities. An exercise of compilation, analysis and synthesis of indicators of the internationalization process of universities resulted in the proposal of a structure of information that includes the most common used indicators, and that can be related to the various perspectives that drive the internationalization process. The structure can be used to guide the process of construction of models of information by universities, particularly in the process of design of web pages, which is nowadays a preferred vehicle of information dissemination from the part of the universities and of information gathering from the part of entities interested in universities.

Keywords—universities, internationalization, information, indicators, ranking, internet, strategy

I. INTRODUCTION AND CONCEPTUAL FRAMEWORK

Internationalization of universities reflects an adaptable process, the result of policy choices made along the way, which are then applied by academic institutions. It acknowledges the impact of globalization, a related but different concept, and it is partly a response to it. Internationalization is influenced by two sets of factors. On the one hand, there are specific local conditions, and on the other hand there are idiosyncratic factors related to national cultural traits. Both are framed by the influence of globalization [1][2].

Internationalization of higher education can be seen from several perspectives. One of those perspectives is “Activity” oriented, in which the internationalization process is pursued through several initiatives related either to formal academic ones or related to more informal non curricular activities. They can involve innovation at the

level of the syllabus or the curricula, cross exchanges with other non-national partners, training involving a cultural dimension and several types of alliances that are somehow pushed by globalization. The “Rational” approach is another perspective, which is triggered by a purpose or an intended outcome. The perspective translates itself into several practices, which can be more academic in nature and which increases the international visibility of research and teaching, institutional development, reputation and standards. There are also political motivations, with may involve themes such as international relations, foreign policy, national security and national identity. Economic motivations also have a place, and it may involve areas related to economic development, competitiveness, education and subsidies for governments and organizations. A third way of addressing internationalization is the “Competency” perspective which considers that internationalization must look at personnel development, including the provision of new skills and knowledge and the changing of attitudes. It gives prominence to a more humanistic side and not so much to the purely academic side. Finally we have the “Process” approach which emphasizes the need to embed and integrate the international dimension into the mainstream of the institution, namely into the three main missions of the university which are the teaching mission, the research mission and the service to community mission [3][4][5].

In this work we were interested in the relation between internationalization of universities and the information demands associated with it. An exercise of compilation, analysis and synthesis of indicators of the internationalization process of universities resulted in the proposal of a structure of information that includes the most common used indicators, and that can be related to the various perspectives that drive the internationalization process. Before addressing the issue of the indicators, a brief mention is made to generic approaches to internationalization.

II. METHODOLOGY

The research strategy was based on a case study approach and it involved a literature review, documental

analysis, informal interviews and observation of events related to international dimension of universities [6]. The study was performed during 2019 at an industrial engineering department of the University of Minho. It looked at the then current practices and approaches of the department related to internationalization. It also looked and analyzed international practices in departments of other universities which were described in the literature. The main objective was to develop and propose a structure to publish information related to the internationalization activities of the department.

III. EXAMPLES OF INTERNATIONALIZATION STRATEGY APPROACHES

With the purpose to have a general synopsis of different points of view on how to achieve internationalization, three models were taken into consideration. The first one is a model based on the data of a hundreds of HEIs across several European countries concerning country and university characteristics. This data was then examined with the use of regressions and distributional analysis to achieve a correlation between these aspects and the efficiency to appeal and employ academic staff. It was then concluded that HEI that have centralization on research and the country's attributes are the most impactful elements. This conclusion will serve as basis in order for an HEI to situate itself in the correct context and then apply the correct strategy according to their scenario. For example, an HEI without great distinction but located in a country with great natural parameters, such as high income or big investments into research, should look for accomplished international academic staff [7].

The second one, known as the Upsala Model, is a straightforward model used in the business context based on four phases, which can be explained as to first export in an intermittently manner in order to observe the market and gain renown. The following steps is to progressively set a sales division branch abroad and then the production itself. The adaptation of this model to the HEI context is to basically boost reputation by bringing foreign students, by incentivizing the mobility of the local students and concluding with a powerful cooperation with other countries and HEIs [8] [9].

TABLE I. CATEGORIES OF INDICATORS DEVELOPED BASED ON THE LITERATURE REVIEW AND ACADEMIC RANKINGS- ADAPTED AND COMPILED FROM [11]

Rank	Academic Categories	Shanghai	Times	CEST	Asian Week	Overall Score
1	Quality of Research	80.0	20.0	100.0	16.5	100.0
2	Reputation Surveys		50.0		20.0	32.3
3	Human Resources	10.0	25.0		15.0	23.1
4	Beginning characteristics		5.0		25.0	13.9
5	Material Resources				20.0	9.2
6	Outputs	10.0			3.3	6.1
7	Learning process					0.0

The final strategy model is based on a practical case that was made possible with the cooperation and adaptation of the entire university's staff, from professors/students to the executive department. This plan was set by attacking into different directions, such as by propelling Erasmus agreements and cooperating with the local associations. The idea is to actively advertise the regional aspects by actually boosting the region itself. This approach will not only give great insight to foreign students, as they will have a direct contact and interaction with the territory, as it will also be beneficial to the region by supporting the business, by stimulating the interest for the local culture and by giving comfort socially speaking, as many times these areas are mostly isolated [10].

IV. INDICATORS OF INTERNATIONALIZATION: A REVIEW OF THE LITERATURE AND A PROPOSAL OF ANALYTICAL CATEGORIES

After looking for some strategies to help achieve internationalization, the project proceeded by analysing the actual international rankings. Some groundwork concerning this topic was already done, namely the connection and consolidation between four well distinctive rankings by dividing and quantifying the weight of each correlated indicator. By analyzing each indicator and by extracting the weight value considered for each category via reverse engineering, the calculations that led to the results presented in Table I, it was possible to extract which indicators were considered for each classification of the specific ranking, as well as their individual weight on that same classification. The created set of categories was then used as the standard basis to understand and deduct indicators from other sources to be inserted in the same manner and order [11].

Even though it was made the exercise of the quantification of every weight, it is important to point out that the objective is not to strictly follow this sequence order, but to have a full picture of every aspect where an HEI can improve in terms of internationalization. Otherwise, the final product would be very biased by the major categories, resulting on an information disclosure model with missing information.

Therefore, every indicator and category was always treated as equal between them while working on the proposed model. The full list can be seen on table II [3][4] [11] [12][13][14][15].

TABLE II. CATEGORIES OF INTERNATIONALIZATION INDICATORS

Categories						
<i>Quality of Research</i>	<i>Reputation Surveys</i>	<i>Human resources</i>	<i>Beginning Characteristics</i>	<i>Material resources</i>	<i>Outputs</i>	<i>Learning Process</i>
Articles on international databases / Articles published in Science and Nature / Articles in peer-reviewed journals	Peer Review	Size of institution / Faculty-to-student ratio / International staff	Number of International students (incoming)	Median pay of teachers/research / Per-teacher University spending	Alumni of an institution winning Nobel prizes and Fields Medals	Student-oriented programs / Student exchange programs / Ph.D.-oriented programs / Study visits
Bibliometric citations per researchers on databases	Recruiters Review	Full-time teachers	First-year students accepted compared with total applicants	Total spending per student / Laboratory spending	Graduate students	Student mobility schemes / International and intercultural events /
Staff of an institution winning Nobel Prizes and Fields Medals	Global academic peer review	Multi-disciplinarily staff and support for another department course	Students enrolled compared with accepted students	Area and international theme centers / Joint research centres	Number of students who participated in an international mobility programme (outgoing)	Distance education programs / Virtual, electronic, or Web programs and institutions
Research development programs / Research funding / Number of International research projects		Researchers with PhD degrees	Median score of first-year students in university entrance test	Library spending per student / Internet bandwidth / Public computers and connection points	Global employ review (In this indicator, the articles uses surveys to question directly to the employers themselves, to find out the graduate employability)	Work-internship-study abroad / Development of postgraduate training programs for the international market / Career planning / International alumni programs
Citation per faculty / Published books		Full-time teachers/researchers with master's and PhD degrees	Number of students with international experience	Development of special profit-based courses and programs for international students		Curriculum development programs / Internationalization of the curriculum / Summer programs and universities
Papers presented in international conferences		Number of scientific staff that stayed abroad for at least 5 days	Recruitment of international students for economic reasons	Share of income from international funding sources		Staff-oriented programs / Faculty-staff mobility programs for teaching /
Number of international joint degrees/double degrees programmes		Number of staff who fulfil functions in scientific journals	Number of degree-seeking students with a foreign qualifying diploma as a share of total student enrolment	Overall budgets spent on international activities and received from international sources		Student clubs and associations / Community-based projects and activities, intercultural and international
Number of countries with collaborations developed		Number of staff who fulfil functions in scientific boards		Existence of dedicated budgets and/or a central internationalization unit to support international research activities		Foreign language study / Local language and culture training / Area and international thematic studies
Number of presentations at scientific conferences		Number of scientists employed abroad who completed a stay at the university				Scientific career / Cooperation with researchers / Effects on publications / Networking with overseas firms
Papers indexed in Science Citation Index Expanded and Social Science Citation Index		Number of faculty members in international conferences				Teaching-learning process / International teaching experience
		Number of international staff members as a share of total staff members				

V. RESEARCH AND MAPPING OF INTERNATIONALIZATION INFORMATION DISCLOSURE MODELS

When someone is implementing or improving internationalization in a private institution, the solution can involve changes in the organizational structure or even financial investments in new platforms or applications. By opposite, in this project, only a department was involved. Being this department a subunit from a school from the university, changes in the organization itself were not possible and also, any investment has to have a formal approval from all hierarchy.

Therefore a suitable method based on a combination of indicators and strategies already highlighted in Table II, was developed. The categories were ordered by its impact effect on the most renowned ranking indicators. The main idea is to quantify the quality of each parameter inside the department.

A second phase was to find the best way to diffuse this information without any order of importance. Taking into account the particular situation, with the limitations already highlighted, it was decided to change the department's website.

Although social networks are nowadays a very present tool and mean of information, this project chose to be focused on the website platform from the start, as the main purpose was to improve the department's website information structure, and the translation of such a structure to a social network platform is not straightforward and direct.

To design the best layout for the department information model it was decided to visualize and observe different websites from other departments of a similar area of studies. Also other websites from departments with the best positions in terms of university rankings were analyzed to get and explore new ideas. After some detailed exploration, four websites were selected and followed:

- Department of Engineering Science – University of Oxford
- Department of Management, Technology, and Economics – ETH Zurich
- Faculty of Economics & Business – University of Zagreb
- Department of Economics, Management, Industrial Engineering and tourism – University of Aveiro

These websites were considered the most complete examples of an information structure that could accommodate the informational categories defined previously, or the ones which could provide better clues on what to do or not to do. In terms of criteria for selecting the four websites, first it was considered the analysis of departments' websites from the same area or similar as the department under study (Industrial Engineering). Then it was considered to look up for two

international institutions on the top of the ranking system, which are the University of Oxford and ETH Zurich, one international institution of a similar level as the University of Minho in terms of position on the ranking which is the University of Zagreb and finally one institution in the same home country, with a similar department and with a close position on the ranking, which is the University of Aveiro.

From these websites, the layout and type of information were decided. In order to achieve a certain level of standardization, the analysis was implemented taking into account four main topics (categories, top and bottom and body structure), concerning the structure and the lay-out of the website. A quick definition is now given:

- Categories – consists on the main tabs when entering a website, usually occupying a central top position. It is the main connector of the website.
- Top – Occupying normally the right top corner, these tabs correspond essentially to the user interface, such as login to the personal account.
- Body structure – consists on the core presentation of the website, what is possible to see without leaving the main page.
- Bottom – Occupying normally the very end of the page, these tabs normally serve as a simple recap of what can be accessed throughout the website or shortcuts to useful and practical information, such as contacts.

The Universities of Oxford and Zurich, the institutions on the top ranking, show a structure that respects very well the standard defined. The University of Zagreb, despite being on a lower position of the ranking, it has also a structure that followed the considered standard. The University of Aveiro has deviated considerably from this standard structure. It might not be there a direct relation between the position on the ranking and the website structure, but it seems, to a certain extent, to exist some relation. It is possible to assume that the universities that want to rise on the ranking tend to adopt a standard structure. Recently the University of Aveiro has actually changed its website's structure to one that respects the standard. Even though, it is not possible to generalize these assumptions based on only four cases, and it would be necessary a more extensive research.

VI. DIAGNOSIS OF THE DEPARTMENT'S NEEDS

An exercise was made with the support of the technical informatics team from the department, in order to identify the main problems in the department's website, concerning the goal of an internationalization informational website.

The website seemed to be quite limited by the nature of its architecture design, which is attached to the website of the School of Engineering, to which the department belongs, being constrained by some technical rules

imposed from above, and an overwhelming quantity of unstandardized information.

One of the main problems concerning internationalization of the department website was the language used. The website is implemented mainly in Portuguese and even the so called 'English version' is very poor where just the categories Courses, Research and Internationalization are effectively in English. Inside the menus, the user is moved back to the Portuguese version, despite the present category.

Two steps were implemented in order to do the diagnostic of the department website. The first step consisted in verifying the content of each page. Here are highlighted the main conclusions and concerns:

Main page - contains the general information of the department.

Courses page – contains information about all the educational courses with department responsibility. In order to have a more up to date information, this website points to the official main pages of the University of Minho or the Repositorium (a data base of the university's research output) for further information.

Research page – after a short paragraph, the user is invited to visit the webpages of the Research centers where the research takes place and the research projects are allocated.

Services page – at the moment the department has very few services to the community and so a very short paragraph appears and it seems to have no practical use.

Staff page – this page is very poor. Apart from dividing teaching and non-teaching staff, there is no standard page or normalized information of each member of the staff. A search engine can help the search for a staff member in particular but as already said, the content is poor in terms of actual information.

Events page – although the page is maintained updated, it is very difficult to make the good and right use of this information because the events are just placed in chronological order, highlighting the last event. It is hard to find out a particular event, because there is no description of the events and just the name.

Internationalization page – this page gives some useful information to both incoming and home students, by making a mix of shortcuts with the main University and the Department pages and documents.

The second step implemented to conclude this diagnosis was the search for the main indicators of internationalization in the webpages of the department. The website, generally, fails in respect to the list of indicators described above in Table II, especially the ones from Quality of Research. It is hard to find references to the projects, articles and research work. The only list of indicators respected may be in terms of Human resources and Learning inputs and a small reference to Material resources.

Concluding, the diagnosis of the department has highlight most of the main fragilities and difficulties to publicize all the good and useful things that take place and mainly the positive results achieved in terms of teaching and research. The urgent need of English language and making the website more appealing and intuitive are the most important points to have in the new development of the website.

VII. PUBLICATION DISCLOSURE MODEL

After the diagnosis of the department and international websites correlated with the analysis of the approaches and indicators concerning internationalization, the disclosure model described on Table III was proposed. The purpose of this proposal is to create an user friendly and perceptive experience every time someone uses the website, while being informative at the same time. This proposal was inspired by the positive aspects from the websites analyzed on chapter V and it considered the international indicators defined on chapter IV.

The model was created recurring to the use of mockups, as shown on Figure 1 and on total there were seven of them. The mockup shown is one of the seven used for the proposal, and on each one there is a full representation of the correct scheme to apply, including descriptive information explaining the details on how the website should work in practice.

Some of the points to highlight are the complete organization and full introduction of the department characteristics and vision, the inclusion of the business/industry associates and job opportunities for new graduates and alumni for both inside and outside of the university. In terms of course programmes there's an intelligent path that gives options to the user that serves to guide him until it arrives to the desired information. This method allows to save mental space for the user and to achieve a better layout. This type of intelligent layout occurs not only on this section, but throughout the proposal. Another example is the direct connection between the website and the research centers' own websites as well as the university's archives, which includes all the documents and works produced at the university. Also, and perhaps the most interesting aspect concerning the topic of internationalization, is the existence of an easy to get to section that provides all the useful information and documentation for both incoming and outgoing students, such as details about cost of living at the local university's city or legal documents to fill in order to formally apply for an international mobility. Last but not least, the entire website will now have the option to change entirely the website's language to English, at any given time.

TABLE III. PROPOSED WEBSITE INFORMATIONAL STRUCTURE AND LAY OUT FOR INTERNATIONALIZATION PURPOSES. [16]

Website Structure			
<i>Categories</i>	<i>Top</i>	<i>Body structure</i>	<i>Bottom</i>
The Department (It has an introduction about what the department has to offer and contacts): Vision; Executive Board; Industry Commitment; Open Positions; Research; Code of Conduct; How to find us; International cooperation	For students: This section is supposed to be a collection of practical links and tools to be regularly used by students. Such as: Blackboard; Documents; Calendar; Timetables	Main news	It has the same topics presented in Categories, but written extensively
Study programmes and enrolment (intelligent menu that educates the user by giving options; ultimately it will lead the user to the correct desired information. It has all the details about the many courses, from Undergraduate; Postgraduate specialized studies programmes, advanced studies programmes.)	Alumni	Main events	Contact it serves as a shortcut to the many main contacts
Research (straightforward, small presentation): Connects with the research centres. Highlights academic publications and work.			
People personnel ordered alphabetically. Distinction between Academic staff and Research staff			
International cooperation (small presentation regarding international context and activities and what is being done to boost it): There is a connection to the International Office's website and to convenient documentation); There is also a direct link to curiosities and useful information about the local lifestyle and costs. It also shows the many partnerships, for both the industrial and academic context.			
News & events (news and events distinctly and ordered by date. There is an upper cap concerning the maximum number of published items. If surpassed the older items are sent into an archive)			
Search engine			

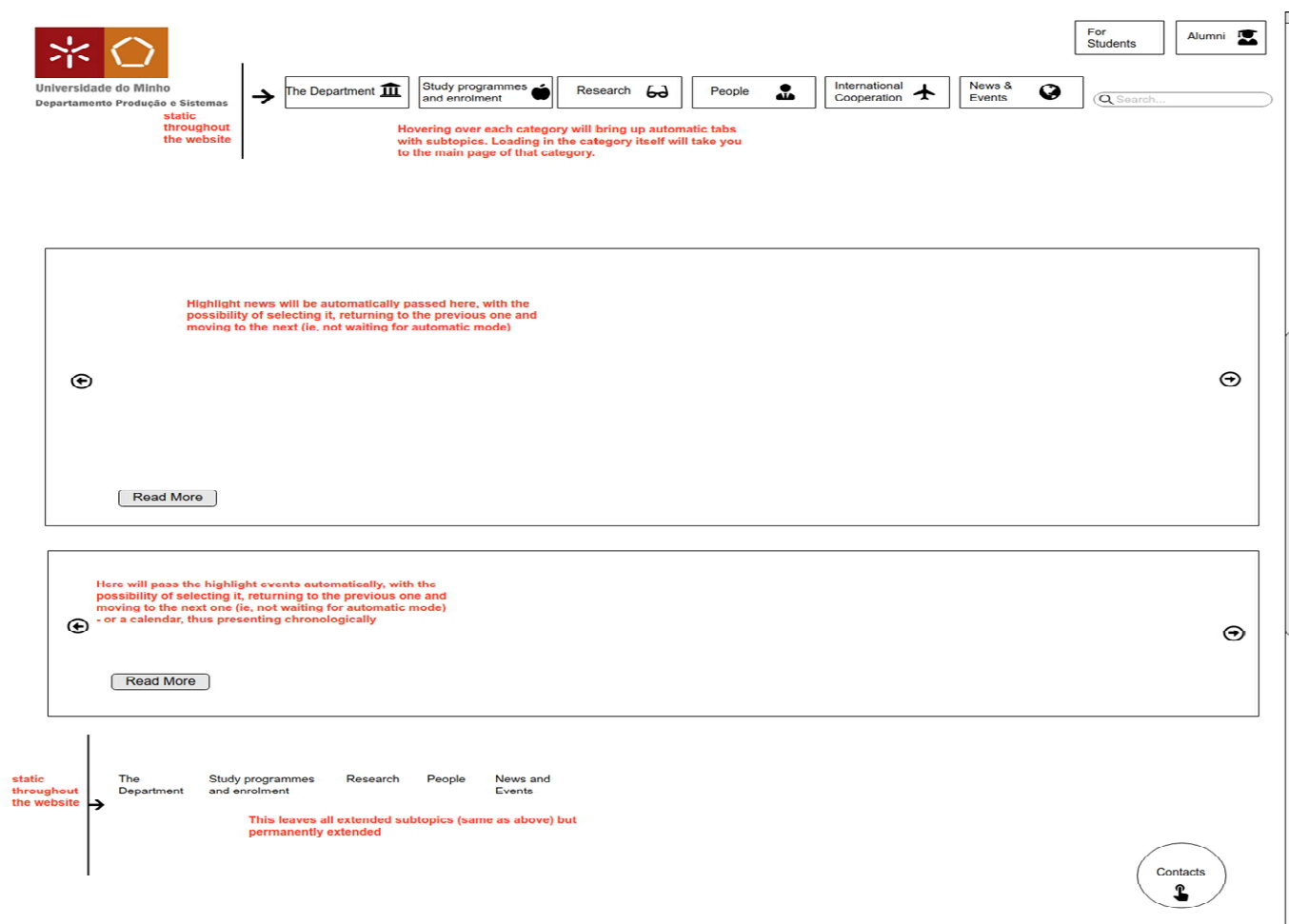


Fig. 1. Website Concept Main Page

In short, this project's main purpose was to achieve and propose a disclosure model by taking into consideration the internationalization aspects. Such objective was made possible by imposing a standard, not only on the design, but on the content as well. Despite being an abstract model, this will serve as a basis on how to manage information and on how to deal with internationalization, with the possibility to work as a guide for the future work to come. [16]

VIII.CONCLUSIONS

This research work highlighted the diversity of approaches that internationalization can take, either in conceptual terms, in policy terms and in applied terms. The concept proper is changing due to the several influences and implications that are attached to it. What probably is more essential in the process of internationalization is the capacity to adapt to changing conditions, which are considerably dynamic, without losing sight of the main missions of the university. There are important barriers to the process, related to financial and bureaucratic reasons. However, we believe that the main agent of change must necessary include the individual person, and that an individual commitment must permeate and involve all people, including

academics, researchers, all kinds of staff and students, accompanied by institutional support. Internationalization is also basically about communication and the ability to engage with other people, cultures and perspectives, and to have the necessary empathy to absorb but also to transmit and diffuse knowledge and values. The language must be a necessary factor to take into account in order to improve the communication capacities of the people and of the institution. The model of information presentation and disclosure that was proposed in this work is just a part of a greater process of engagement and adaptation, but it is an important one. Websites are nowadays privileged vehicles of information diffusion and, consequently, of attraction of academics' and students' attention to the virtues of the institution, and their structure and content must be seriously addressed and designed.

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