WEB SITE PROJECTS EVALUATION – A CASE STUDY OF ROMANIAN FACULTIES OF ECONOMICS WEB SITES

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Abstract: *In this paper, an evaluation of web sites regarded like projects is discussed. We give an overview of the Web Assessment Index (WAI), by presenting a web sites of Romanian Faculties of Economics case study. The WAI contains five categories: accessibility, access speed, navigability, content and reliability. We analyzed and presented a detailed report of the results coming out from this study. This study is important to understand the issues on which the faculties web sites are confronting.*

Key words: *web site; project; evaluation; Web Assessment Index (WAI)*

1. Introduction

Projects are temporary endeavors undertaken to create unique products or services. A project has settled start date, end date, milestones, scope and objectives; produces unique results and is characterized by a certain approach and a progressive elaboration

Nowadays, educational Web sites are considered as projects developed by Universities or other entities for their presentation, recruiting students and supplying different educational services. This is the reason why we have decided to evaluate the academic web sites of the most important Romanian Universities. For this assessment we need a flexible, engineering-based methodology that allows us to measure the degree of goal achievement of educational projects through the academic web sites.

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In order to evaluate this kind of projects it is necessary to analyze them from different aspects, such as: the way they are managed, the costs/benefits report, the upgrade possibility, the potential risks, but most of all, in our opinion, we should pay a special attention to the quality feature.

Along with the web technology development, the education institutes have chosen for their presence on the Internet, by means of web sites. These ones are developed to offer general information about the universities, to support the education process or to carry on the distance education process over the Internet, exclusively.

Information technology has been successfully combined with the learning process, resulting the e-learning technology, which provides new learning opportunities with less restriction on time and space. Academic e-learning initiatives aim at designing, implementing and introducing an e-learning system in a higher education institution [Mendling, 2004].

The purpose of this paper is to develop a web site assessment index that can be employed to estimate the current usage of the Internet by the most famous Romanian universities for their educational process support and at the same time the satisfaction of specific requirements from user's viewpoint. Web sites, as essential component in modern academic educational projects, necessitate continuous evaluation for supervising the fulfillment of learning objectives stipulated in these projects.

The web site quality assessment is necessary because the web is an increasingly important source of information and there is no way to control the quality of published content.

2. Web sites assessment methods

In order to achieve our goals, we have established the main necessary indicators for the web sites quality evaluation in education domain.

A review of the recent literature on web site reveals a lot of criteria for the web sites assessment. These elements are used in a quantitative evaluation, comparison, and ranking process [Pöllä, 2007; Shahin, 2004].

One of the most common method was proposed by Olsina et al. 1999 and can be considered as one of the main approaches. This method is the web site Quality Evaluation Method (QEM). There are four main factors analyzed in Olsina's study: functionality, usability, efficiency and site reliability [Olsina et al., 1999]. Currently, the results of the web sites evaluation are very subjective; thus, site evaluators should be given precise guidelines to rate every factor. In order to avoid this subjectivity problem, a Web Assessment Index (WAI) can be used. According to Evans and King, this index represents a web assessment tool and must have five main components: categories, factors, weights, ratings and total score [Evans and King, 1999].

In this paper, we have employed this assessment tool to compare the Internet usage from the five largest Romanian universities of the most famous

university centers of the province: Iaşi, Cluj-Napoca, Timişoara, Constanța, Braşov. Because of paper limited space, we have been reported only on Faculties of Economic Sciences of these universities (we mention that the Academy of Economic Sciences of Bucharest is constituted of 11 faculties and colleges, so we have not been reported on this one). The list below presents the faculties web sites of the first five Romanian universities.

Table 1. Classification of Romanian universities based on stuff's scientific results with international relevance in 2006

University Centre	Faculty of Economic Sciences web site
"Al. I. Cuza" University of Iassy	http://www.feaa.uaic.ro
"Babes-Bolyai" University of Cluj-Napoca	http://www.econ.ubbcluj.ro
"West" University of Timisoara	http://www.fse.uvt.ro
"Ovidius" University of Constanța	http://www.univ-ovidius.ro/stec
"Transilvania" University of Brasov	http://econ.unitbv.ro/ed/default.aspx

Source: Ad Astra Association, Topul universitatilor din Romania - Clasamentul general – 2006 (http://www.ad-astra.ro/universitati/universities.php?year=2006)

The WAI proposed by Miranda et al. (2006) employs four categories that are critical to web site effectiveness. These four categories are: accessibility, speed, navigability, and site content [Miranda, Cortés and Barriuso, 2006].

In order to complete our empirical study, we have extended Miranda's proposed index at five categories: accessibility, speed, navigability, content, reliability. In our opinion, these five categories are essential for web sites assessment. For each category, we have chosen some factors which reflect the most important components and features of web sites from the user's viewpoint.

The first category in the WAI is *accessibility*. This criterion is an influence factor of the site quality; that is, the identification and access facility (from user's viewpoint) is in direct proportion with the quality. The web accessibility can be evaluated analyzing two factors: link popularity and search engines presence.

The accessibility of a web site is increased by the search engines ranking. In order to establish the search engines ranking of the five web sites, we have chosen Google search engine, this one being the most frequently used in our country and considered the best in the world. The higher search engine ranking is, the higher degree of accessibility is.

Link popularity is the number of external links to the assessed web site. This has been measured using Google for counting the link occurrences of the reviewed sites in other different sites.

A significant issue for sites visitors is access time. In our paper, we analyzed the *access speed* from time viewpoint. The access speed was measured using a chronometer [Miranda, Cortés and Barriuso, 2006]. In order to eliminate any disagreements in access speeds measuring of the five web sites, we carried the access speed tests at the same hour with the same computer (Intel PIV 2,66 GHz, 512MB of RAM, 64MB graphic card) which has a 1MB optic fiber connectivity. We

used Internet Explorer 6.0, Opera and Mozilla Firefox 2.0 browsers. The access speed was calculated as the average between the three time values, reported at the number of pages for each web site. This procedure was repeated on consecutive days so that the averaged speed of access to be more representative.

The *navigability* is a very important factor from user's viewpoint because it refers to user's ability to reach the desired location in very short time. In this category, we analyzed: the presence of a permanent menu which allows a fast access to the different sections (at least the presence of a Home button) and the presence of a site map button which allows us to see the structure of the web site. Also, a search function is a very important factor.

The *content* is the most important category, in our opinion, because the presented information is the attraction key factor. That is why we have focused on the assessment of this category. In order to evaluate the content of the five web sites, we decomposed the content in attributes, in lower levels of abstraction, so as to be able to effectuate the measurement. Thus, we considered the following levels of content: informational level, services level, scientific research level, communicational level and miscellaneous level.

The first level – information – has a general descriptive character therefore we have followed the decomposition for assessment process. We were interested in the presence of: general faculty information (departments, management); entrance, educational forms; university degree; syllabus, timetable; announcements; financial information.

The second level takes into account the services available on the web, especially in student's self-interest: digital library (download courses, on-line reading and other on-line resources); on-line support services (view of the results centralization, using a login form); scholarship; symposiums, magazines.

The scientific research level addresses to anyone who wants to participate at conferences, to publish scientific articles or to gain scholarships. Generally, the academic personnel are the target of this level.

The communicational level refers especially to contact information, such as: headquarters address; telephone/fax; e-mail/web; form-based feedback.

Reliability is an important category both for visitors and for faculties because it highly affects their site assessment. This category is evaluated using two factors: link errors and miscellaneous errors. Link errors can be hyperlinks which do not work from different reasons, invalid links that are not correctly implemented and unimplemented links that are not implemented at all (they are measured through the number of links that are invalid, respective unimplemented reported to the total number of links).

Miscellaneous errors consist of three factors: deficiencies or absent features due to different browsers, deficiencies or unexpected results (e.g. non-trapped search errors, frame problems, etc.) independent of browsers and inactive nodes (unexpectedly under construction or dead-end Web nodes).

3. Data analysis

In order to evaluate these web sites, for each category was assigned a weight, established on according to importance degree (from a total of 100 points). Every factor in every category has been rated (from the total of category).

Table 2. Web Assessment Index with the five category and their weights

CATEGORIES	Weights	CATEGORIES	Weights
Accessibility	**10**	**Navigability**	**10**
Presence in search engine	5	Permanent menu	4
Link popularity	5	Site map	3
		Search function	3
Speed	**10**	**Reliability**	**10**
Access speed	10	Link errors	6
		Miscellaneous errors	4
Content	**60**		
Informational level	15	Services level	15
General faculty information	3	Digital library	6
Entrance, educational forms	3	Marks centralization	4
University degree	3	Scholarship	3
Syllabus, timetable	3	Symposium	1
Financial information	3	Magazines	1
Scientific research level	15	Communicational level	15
Conferences, symposiums	6	Address, telephone	4
Journals, magazines	6	E-mail	4
Scholarship	3	Form-based feedback	7
		TOTAL	**100**

For the first category, we have considered the *Position* attribute, which denotes the range number of the main site of the faculty (index) within results of Google *expression* search. The expression represents the faculty of each University, followed by the city name, such as: "facultatea de ştiinţe economice cluj-napoca" or "faculty of economic sciences cluj-napoca". The criterion function for determining the rating of the presence in search engine factor, is [Olsina, Rossi, 2000]:

case Position of
0: Rt = 0;   1: Rt = 5;
2: Rt = 4;   3: Rt = 3;
otherwise if (Position < =10) then Rt = 2 else Rt = 1.

For the evaluation of link popularity, we have employed an advanced search option of Google search engine. For every web site we have counted sites that contain links to the faculty web site, Lk_i ($1 \leq i \leq 6$), and we have calculated an average variable, Av. In order to establish the link popularity for each faculty site, we compared the Lk with the Av variable.

$$Av = (Lk_1 + Lk_2 + Lk_3 + Lk_4 + Lk_5 + Lk_6) / 6;$$

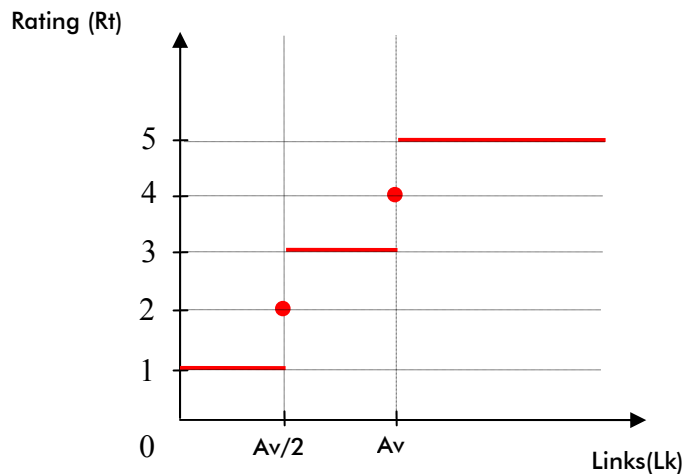**JAQM**

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Figure 1. Popularity link assessment

If the web site structure includes a functional permanent menu available in every location which allows us to navigate in the whole web site, the permanent menu factor gets 4 points rating (by permanent menu we understand the principal menu, which is present by his buttons in every section of the web site, in top of the page). Otherwise, it gets 0 points rating (if the menu doesn't exist) or 2 points rating (if it exists but is not functional).

If there is a tree permanent menu, the factor gets only 3 points if it is functional, 1 point if it is not functional or 0 points if it is not permanent.

If there is no permanent menu, but there is a permanent Home button, the points are 3, 1 and 0, corresponding the three cases (exists and is functional, exists but is not functional, doesn't exist). In the same manner, we have rated the site map and intern search function with 3 points, 1 point or 0 points (corresponding the three cases presented above).

The content's factors ponderability has been made depending on some aspects, as follows:

- for the first level – we have considered some aspects, regarding information, such as: quality, amount, enframming within page, last update;
- for the second level – we have focused on student services offer, especially on digital library service. We have rated these factors depending on the service complexity and functionality;
- for the scientific research level – we have analyzed the possibility of research activity development for the faculty's personnel and for others academics. We have rated this factor depending on amount of conferences symposiums, journals, magazines (like Acta Universitatis). We also consider very important (maybe more important than the amount characteristic) their bench mark (if there are international or national rated, if they are recognized by CNCSIS etc.).
- the feedback level (or the communicational level) implies the existence of contact information, such as address, telephone, e-mail. We have also

looked for the feed-back availability, meaning the presence of a form which allows the user to ask any questions about the faculty.

Link errors (*El*) have been measured through the number of links that are invalid, respective unimplemented (*Li*) reported to the total number of links (*Tl*). In order to establish the points for this factor (*Epi*), we have multiplied this coefficient El by 100 and we have truncated it to obtain natural numbers, named link errors index (*Eli*), which have been compare using a scale from 0 to 10 (we have chosen the upper limit at 10, because the bigger natural number was 9).

$$El = Li / Tl;$$
$$Eli = Trunc (El * 100);$$
$$if \ Eli = 0 \ then \ Epi = 6$$
$$else \ if \ Eli <= 2 \ then \ Epi = 5$$
$$else \ if \ Eli <= 4 \ then \ Epi = 4$$
$$else \ if \ Eli <= 6 \ then \ Epi = 3$$
$$else \ if \ Eli <= 8 \ then \ Epi = 2$$
$$else \ if \ Eli <= 10 \ then \ Epi = 1.$$

Miscellaneous errors (*Em*) have been measured through the number of specified attributes (*Sa*) considering a scale. In order to find out miscellaneous errors, we tested the five web sites using two browsers: Internet Explorer and Opera. Then we have calculated an average variable, *Avm* (the average of the *Sa* variables). The factor was rated with points (*Mp*) from 0 to 4, comparing with the 0, *Avm*/2 and *Avm* values.
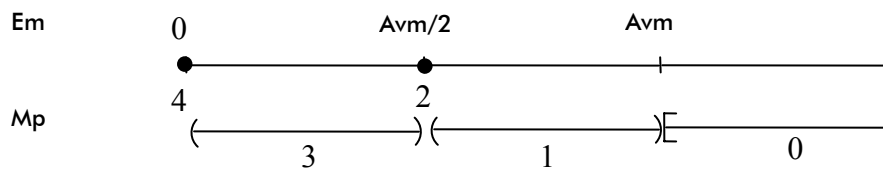

Figure 2. Miscellaneous errors assessment

After the settlement of these assessment criteria, we have started the evaluation of the five web sites – projects based on empirical case study. Using the above criteria, we calculated for each factor and each category, the rating and the weight, respectively. We present a table containing the five categories and their weights:

Table 3. Romanian Faculties of Economics Web Sites Assessment Index

Categories / Universities	Al.I.Cuza Iasi	Babes-Bolyai Cluj-Napoca	West University Timisoara	Ovidius Constanta	Transilvania Brasov
Accessibility	6	10	6	2	6
Presence in search engines	5	5	5	1	5
Popularity	1	5	1	1	1
Speed	10	10	10	10	10
Access speed	10	10	10	10	10

Categories / Universities	Al.I.Cuza Iasi	Babes-Bolyai Cluj-Napoca	West University Timisoara	Ovidius Constanta	Transilvania Brasov
Navigability	**10**	**4**	**7**	**7**	**3**
Permanent menu	4	4	4	4	3
Site map	3	0	0	0	0
Search function	3	0	3	3	0
Content	**51**	**36**	**32**	**28**	**32**
Informational level	14	13	9	11	12
Services level	9	6	3	8	7
Scientific level	13	9	12	3	9
Feedback level	15	8	8	6	4
Reliability	**4**	**9**	**1**	**10**	**9**
Link errors	4	5	1	6	6
Miscellaneous errors	0	4	0	4	3
TOTAL	81	69	56	57	60

4. Results analysis

Although we have synthesized the results of our work in a graphic which presents the best web sites according to the WAI, we are not interested on identifying the best web sites, but on analyze how each faculty web site is compared to related sites and how can they be improved for their educational goals achievement.

According to the WAI, the best web sites correspond to the Faculties of Economic Sciences of "Al. I. Cuza" University of Iasi and "Babes-Bolyai" University of Cluj-Napoca.
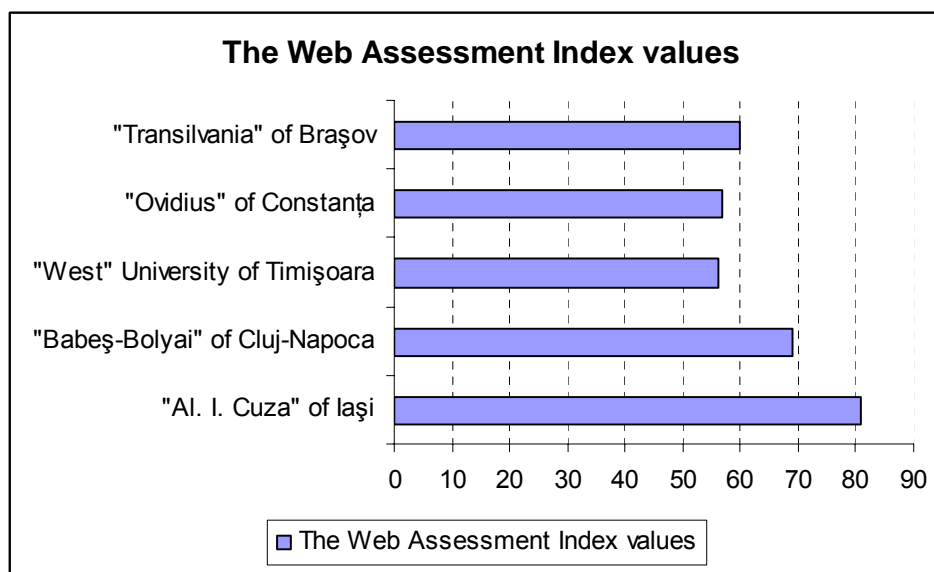

Figure 3. The WAI values for the five Romanian Faculties of Economic Sciences

From the accessibility viewpoint, it's obvious that the faculties of Iasi, Cluj-Napoca, Timisoara and Brasov hold the best presence in search engines, meaning their web sites are the first outputs of Google search engine. Related to the popularity, things are changed, meaning only the faculty of Cluj-Napoca has a popularity of 606 results for its web site (www.econ.ubbcluj.ro) while the others have a popularity of 2 results for their web sites.
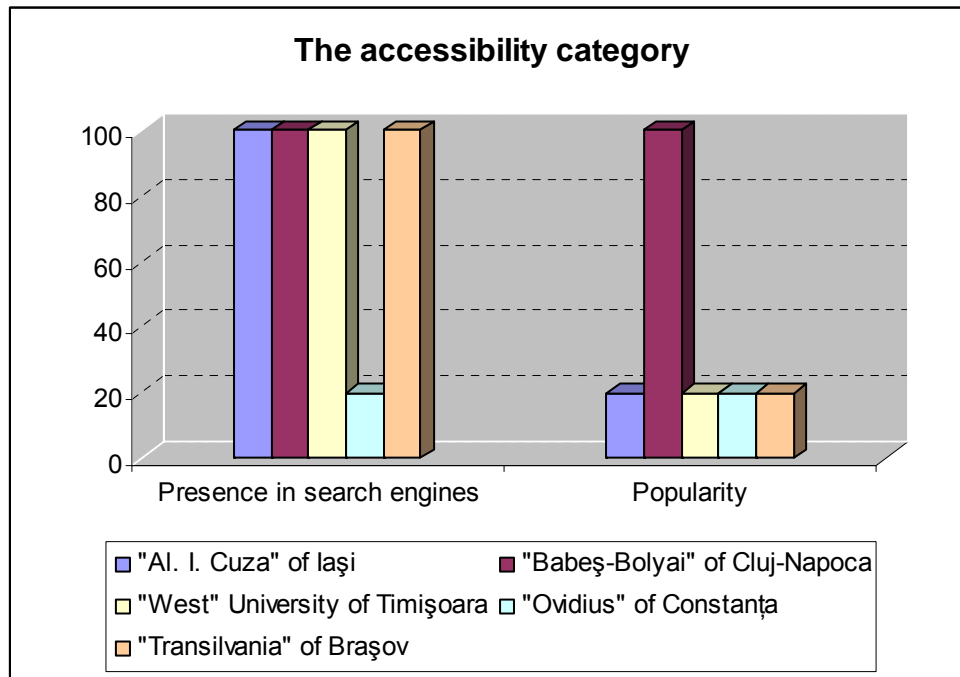

Figure 4. The two factors of the accessibility category

Regarding the five web sites access speed, we consider that all the web sites have an optimum access time reported to their number of pages and there are no lags in their access. So they all get a 100% percent, meaning they all get 10 points in the web assessment index.

Excepting the Faculty of Economic Sciences of Brasov which has a tree menu, difficult to use, the other faculties web sites hold a permanent menu tree, in top of pages, which is easy to use, permitting the navigability in every section of the web site. Only one of the five reviewed web sites has a site map, and this is Faculty of "Al. I. Cuza" University of Iasi. The site map is a very important element of the web structure, because it allows us to take a look at the entire site, simplifying the localization of the sections we are interested in. The search function is very important for the site, because it performs an intern search, within the web site. Only three of the five web site analyzed, own a keyword search function.

If we appertain to the entire category, we can notice that, considering the navigability, on the first place is the Faculty of Economic Sciences of Iasi, with a 100% percent, followed by the faculties of Timisoara and Constanta with a 70% percent, faculty of Cluj-Napoca with a 40% percent and the faculty of Brasov with a 30% percent. Even if the faculty of Cluj-Napoca is the second best web site of the

five sites analyzed, it has a lot of failings from navigability viewpoint and navigability elements could improve a lot this web site.
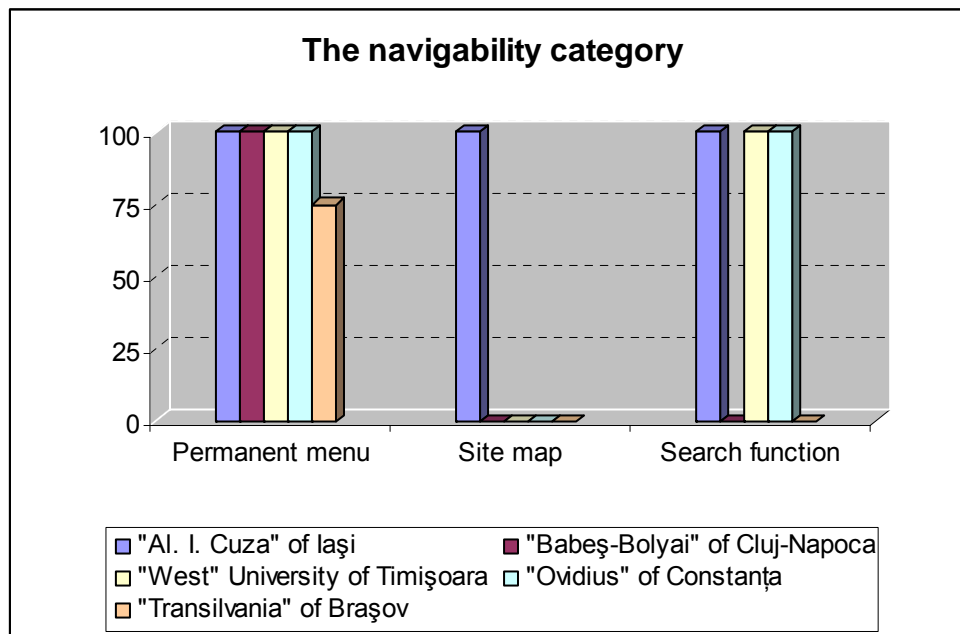

Figure 5. The factors of navigability category

The content category is the most important aspect in our study. As we can see, there is a various graphic for content category, meaning the five web sites are very different from this point of view. That is, their services are still deficient. At this category, the Faculty of Iasi offers the best services for their students and personnel with a 78,46% percent, followed by Cluj-Napoca with a 55,38% percent, Timisoara and Brasov with a 49,23% percent and Constanța with a 43,07% percent. The informational level is the only level where the all five web sites have a percent bigger then 50%, while the services level (services for students) is the level where the higher percent, 60%, is attained by Iasi and the lowest percent, 20%, is attained by Timisoara.

After this category study, we consider that this five web sites are designed for presentation, more than for education support. In our opinion, these web sites should be improved, so that they can be a real support for the students, namely it should be implemented a digital library and they should offer the students the possibility to find out information about their results centralization, based on an account with user and password for login on their personal page.

At scientific research level, the faculty of Iasi holds a 86% percent, followed by Timisoara with a 80% percent of scientific research information.

It is very important for a web site structure to contain a feedback establishment. Generally, the web sites hold a Contact button which allows to find out the address information, telephone (general information contact), but also there is a form that enables the feedback establishment by asking questions via the form. From the five web sites analyzed, only the faculty of Iasi settles a feedback with their users, the other faculties offering only general information contact.
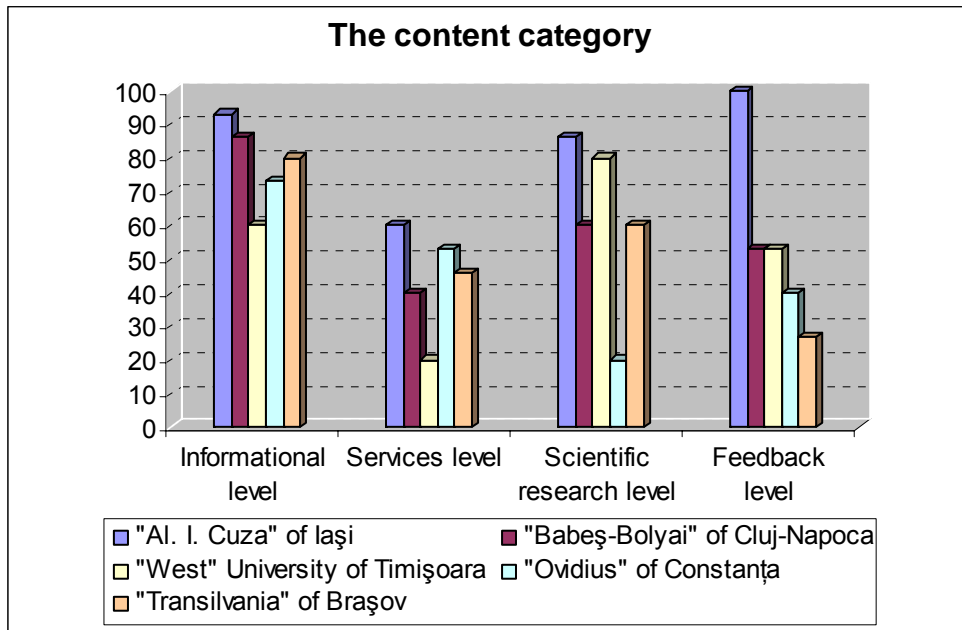
Figure 6. The levels of the content category

Regarding reliability, the most reliable web sites are the sites of the faculties of Constanța with a 100% percent, Cluj-Napoca and Brasov with a 90% percent compared with the site of Iasi with an only 40% percent and Timisoara with a 10% percent. The reliability is a very important aspect of a web site, meaning that no matter how complex the site is, it should not contain any link errors or any miscellaneous errors.
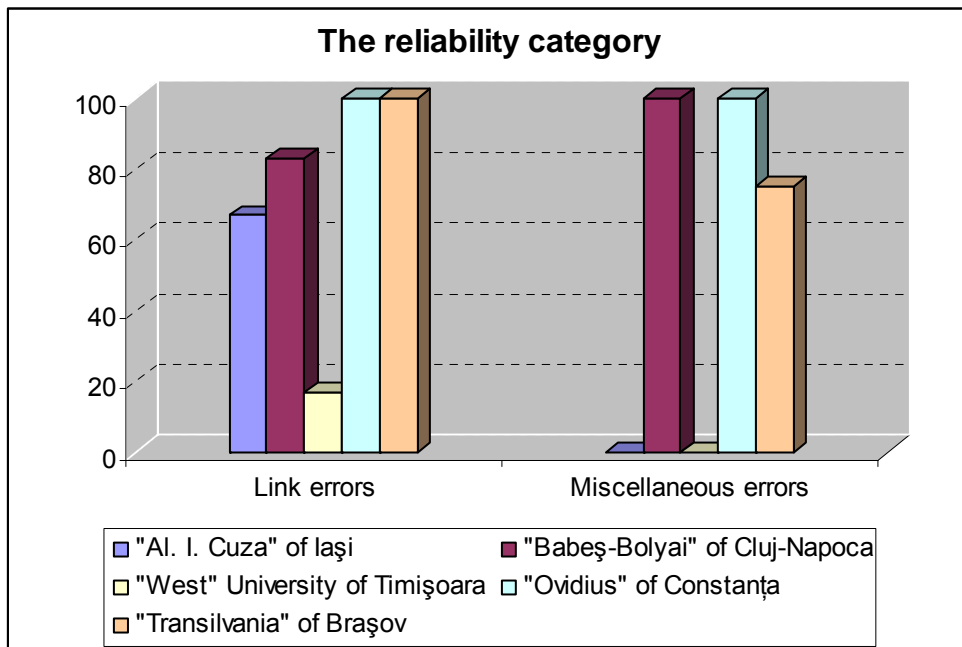

Figure 7. The analyzed factors of the reliability category

5. Conclusions and discussions

Although the Faculty of Economic Sciences from Iassy city has a best web sites (according to the WAI), its web site can be much improved regarding the reliability and the popularity of the web site. From the five web sites analyzed it offers the best students services and the higher possibility for scientific research.

The web site of the Faculty of Economic Sciences from Cluj-Napoca city, could be improved by adding a site map and a search function and by diversifying the services offered to the students.

The web site of the Faculty of Economic Sciences of Timisoara, has many link errors, which means that it is not functional enough. It could be improved by working at the reliability, at popularity and also diversifying the set of the services.

The Web site of the Faculty of Economic Sciences from Constanta city has a very bad presence in the search engines and popularity, although it has highest reliability of the five sites reviewed. It necessitates diversifying of the services offered and could be improved by adding a site map.

The last site analyzed is the web site of the Faculty of Economic Sciences from Brasov city. In our opinion, the tree menu should be changed by another easier to use (a menu containing submenus and options), it could be added a site map and a search function, but also it is recommended to diversify the services for the students.

We conclude that Romanian universities have partly accomplished the objectives of supporting their educational project by means of the academic web sites reviewed in this paper and they need improvement where the WAI indicator has recorded poor results or absent characteristics.

Although many firms and institutes have a web site which is intended to be their image, in many cases this web sites does not complete all the characteristics of the web site assessment. Many times, the only concern is the web design aspect, which is not enough for a site. There are more aspects on a web site than web design, aspects on which we have debated above.

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