A comparative analysis of Greek universities' presence on the World Wide Web using an analytical MCDM methodology

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Abstract: Greek universities are currently in a transition state, as a new bill has been voted by the parliament trying to focus on lasting problems tormenting Greek higher level education; the implementation of the new law creating a strong reaction from part of the academic community. What is more, globalisation has increased competition and academia is now called upon to operate in an international environment facing other well established and prestigious institutions. It is in this context that Web 2 technologies widely available today offer a framework that allow academic institutions to increase their extraversion and reach a wider public; wikis, forums and e-learning platforms to name a few of these technologies. This paper attempts to offer a convincing answer to the ability of the Greek universities, operating in an unfavourable environment with many obstacles, to exploit what Web 2 has to offer; to also assess their readiness to integrate the new technologies and face the competition directly. The analytic hierarchy process (AHP) was used for a comparative analysis of the online presence of Greek universities, and the results can prove to be a helpful tool for website creators and academia administration in order to improve their services.

Keywords: Greek universities; website evaluation; criteria weights assessment; multicriteria decision making; analytic hierarchy process; AHP.

Reference to this paper should be made as follows: Kostoglou, V., Papathanasiou, J., Moschidis, O. and Ladopoulou, P. (xxxx) 'A comparative analysis of Greek universities' presence on the World Wide Web using an analytical MCDM methodology', *Int. J. Multicriteria Decision Making*, Vol. X, No. Y, pp.000–000.

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1 Introduction

The analytic hierarchy process (AHP) is a multi criteria decision making method developed by Saaty (1980, 1994) and is based on a hierarchy structure to represent the relationships of importance elements (criteria, activity, etc.) in a given decision situation. For each element the weight of a given hierarchy level represents the relative importance (weight) of that element in comparison to another element in the next higher level. Table 1 presents the scale for the comparison according to Saaty (2008). AHP is well documented and practiced for a long period, therefore more reference to the procedure here is redundant.

Table 1 Scale for AHP comparison

*Intensity of importance**	*Definition*	*Explanation*
1	Equal importance	Two criteria contribute equally to the objective Two activities contribute equally to the criteria
2	Weak or slight	
3	Moderate importance	Experience and judgment slightly favour one criterion or activity over another
4	Moderate plus	
5	Strong importance	Experience and judgment strongly favour one over another
6	Strong plus	
7	Very strong or demonstrated importance	Criteria or activity is strongly favoured and its dominance is demonstrated in practice
8	Very, very strong	
9	Extreme importance	The evidence favouring one activity over another is of the highest possible order of affirmation

Note: *If criterion or activity *i* has one of the above non-zero numbers assigned to it when compared with criteria or activity *j*, then *j* has the reciprocal value when compared with *i*.

Over the years, AHP has proven popular among practitioners and the academia (Vaidya and Kumar, 2006) despite much criticism (Bana e Costa and Vansnick, 2008; Belton and Stewart, 2002), which in some cases proved to be justified enough. The AHP method has a broad application in many different disciplines, ranging from the selection of sustainability criteria and partnership models for agriculture (Poursaeed et al., 2010) to the evaluation of websites (Lee and Kozar, 2006; Ngai, 2003; Hwang et al., 2004) as is the case of this paper. The authors felt that AHP is the proper procedure in order to rank the Greek universities' websites, despite its limitations, as it allows their experience in web developing and web using to be properly utilised. The 23 Greek universities and their acronyms are presented in Table 2.

The rational behind this research is to assess whether the Greek universities have integrated the Web 2 technologies in order to compete in modern globalised academia. The current financial crisis in Greece makes the task even more difficult; budgets are severely cut and the educational and research processes are hampered; the number of active universities and departments is also due to decrease through closures and merges.

However, other institutions in other countries do not seem to lag behind and have fully integrated Web 2 technologies improving their comparative advantage among the academia world. It is interesting in that context to check whether the Greek universities, all public bodies but enjoying the benefits of self-governance, have managed to implement, conceptualise and develop their websites in a manner that can stand up to international standards. It is in this context the authors took the initiative and decided to undertake this study; analytical multi criteria methodologies are ideal in order to produce rankings of alternatives and comparing them with each other; thus revealing each one strong and weak points.

The research methodology we used can be viewed in Figure 1. Firstly we defined the criteria and the relevant subcriteria for the evaluation, afterwards we weighted them using goal programming techniques and then we implemented the AHP and produced the results. All the steps are described in more detail in the following parts of the paper.

Figure 1 Research methodology

A specialised software package was used in this paper, namely the Expert Choice v. 11 (www.expertchoice.com); a well known system dedicated to the analysis, synthesis and decision support with multiple criteria according to the AHP methodology. Comparisons can, depending on the type of criteria or alternatives being compared, to be 'verbal', 'graphical' or 'numerical', and it is possible to exchange data with integrated databases of Microsoft Access or SQL Server.

Table 2 Names and acronyms of the Greek universities

No.	*University name*	*Acronym*	*No.*	*University name*	*Acronym*
1	National and Kapodistrian University of Athens	UOA	13	University of Peloponnisos	UOP
2	National Technical University of Athens	NTUA	14	University of Ioannina	UOI
3	Aristotle University of Thessaloniki	AUTH	15	Democritus University of Thrace	DUTH
4	Athens University of Economics and Business	AUEB	16	University of Crete	UOC
5	Agricultural University of Athens	AUA	17	Technical University of Crete	TUC
6	Athens School of Fine Arts	ASFA	18	University of Aegean	AEGEAN
7	Panteion University	PANTEION	19	Ionian University	IONIO
8	University of Piraeus	UNIPI	20	University of Thessaly	UTH
9	University of Central Greece	UCG	21	Harokopio University	HUA
10	University of Macedonia	UOM	22	Hellenic Open University	EAP
11	University of Western Macedonia	UOWM	23	International Hellenic University	IHU
12	University of Patras	UPATRAS			

2 Criteria selection for ranking universities' websites

An educational website and its content need a number of criteria for proper evaluation. The selected criteria were screened bearing in mind both of the primary functions of a University, which are education and research activities. Five major criteria including totally 43 of sub-criteria were selected in order to apply the AHP methodology (Table 3). Generally speaking, 'coverage and content' is about the information available at the website, 'web services' is about how the site can interact with its viewers, present feedback and respond to triggers and 'Technical and aesthetic completeness' is about the technical background of the site and the aesthetic result. As previously stated, Universities are not only teaching but also research entities, so a criterion titled named 'presentation of research activities' has been added which estimates the way research results are pictured. Finally, the 'objectivity' criterion checks whether the website is true on its declared purpose, i.e., its content is consistent with the specific university only and does not contain irrelevant data and that it is without a particular political, gender, commercial or racial bias.

Table 3 Selected criteria and their detailed contents (sub-criteria)

	Criterion name	*Sub-criteria*
1	Coverage/content	• Author information • Courses' curricula (undergraduate-postgraduate) • Guidelines for students and others • Independent websites for every faculty/department • Individual staff websites • Links • News/announcements • Other languages available • Photographic and video material • University history and profile • University maps • Website traffic information
2	Web services	• Connections to academic databases • Connections to departments' secretariats • E-learning platforms • FAQs • Job vacancies • Law and regulatory documents • Links • Search engines • Staff telephonic, e-mail and webpage directory • Teaching materials • User feedback enabled • Website has options to accommodate visually or hearing impaired users

Table 3 Selected criteria and their detailed contents (sub-criteria) (continued)

	Criterion name	*Sub-criteria*
3	Technical and aesthetics completeness	• Any special software requirements to view website's content is stated clearly • Compatibility with browsers • Connections with social media • Ease of navigation • Free of grammatical and typographical errors • Frequently updated content • Non-existence of dead links • Password protected areas • Web2 elements (wikis, blogs, forums and flash elements) • Website usability
4	Presentation of research activities	• Research collaborations with other Universities/bodies • Research laboratories • Research projects • Webpage of research committee
5	Objectivity	• Affiliations with other educational organisations/companies are stated • Content contains a neutral or positive tone • Content is free from commercial, political, gender, or racial bias • Website's stated curricular goals, objectives, and motives should match its content

3 Assessment of criteria weights

The assessment of the importance of the selected criteria has been considered as a key factor regarding the reliability of the University websites' comparison. Thus, the direct assessment according to the authors' experience of the relative importance of the criteria was been excluded from the beginning of this research as it was considered as arbitrary and subject to the significant bias of personal opinion.

Two well known and tested methods have been selected for the assessment of criteria weights:

a the Simos method

b the indirect assessment through pairwise comparisons.

3.1 Simos method

The Simos criteria assessment method was initially developed for environment management problems and is based on a practical procedure for criteria classification through a set of cards (Simos, 1990a, 1990b). One card is assigned to each selected criterion and there can be used identical white cards set optionally between the criteria cards.

Table 4 Determination of criteria weights with Simos method

Class	*No. of cards*	*Positions*	*Non-normalised weight*	*Normalised weight*	*Total*	*Final weights*
(w_4, w_5)	2	1, 2	(1 + 2) / 2 = 1.5	(1.5/17) * 100 = 8.82 → 9	9 * 2 = 18	$w_4 = w_5 = 0.09$
(w_3)	1	3	3/1 = 3	(3/17) * 100 = 17.64 → 18	18 * 1 = 18	$w_3 = 0.18$
White card	1	4				
(w_1, w_2)	2	5, 6	(5 + 6) / 2 = 5.5	(5.5/17) * 100 = 32.35 → 32	32 * 2 = 64	$w_1 = w_2 = 0.32$
Total	6	17				

Note: Use of three criteria classes and one white card

Table 5 Determination of criteria weights with Simos method

Class	*No. of cards*	*Positions*	*Non-normalised weight*	*Normalised weight*	*Total*	*Final weights*
(w_4, w_5)	2	1, 2	$(1 + 2) / 2 = 1.5$	$(1.5/20) * 100 = 7.5 \rightarrow 8$	$8 * 2 = 16$	$w_4 = w_5 = 0.08$
White card	1	3				
(w_3)	1	4	$4/1 = 4$	$(3/20) * 100 = 20 \rightarrow 20$	$20 * 1 = 18$	$w_3 = 0.20$
White card	1	5				
(w_1, w_2)	2	6, 7	$(6 + 7) / 2 = 6.5$	$(6.5/20) * 100 = 32.5 \rightarrow 32$	$32 * 2 = 64$	$w_1 = w_2 = 0.32$
Total	7	20			100	

Note: Use of three criteria classes and two white cards

The concept of the method is the classification of the selected criteria in successive classes according to their importance. Initially the considered as less important criteria are classified, then the next criteria, and so on until all criteria cards are used. The decision maker can interpose one or more white cards between the criteria cards in order to increase the distance between successive criteria classes.

Several models of the Simos method have been considered and measured regarding the weights' assessment of the five selected criteria. Two of them, both including three criteria classes and one or two white cards respectively, have been considered as the most appropriate for the Universities websites' comparison criteria. The corresponding analyses and detailed calculations of criteria weights are presented in Table 4 and Table 5.

The results using one or two white cards have been considered as very compatible, the only worth mentioning difference being the small increase, by 2%, of the importance of criterion 3, when using two white cards.

3.2 Indirect assessment using pairwise comparisons

In this assessment method the decision maker is initially called to compare two by two the importance of individual criteria or criteria groups. In the yielded system of the pairwise comparisons, the relative criteria weights verifying the system are searched. As the pairwise inequalities may not converge to a solution, goal programming is used, aiming to minimise the total convergence deviation of the linear system (Siskos, 2008).

The considered relationships among the criteria weights are the following:

- The weight of criterion 1 is higher than that of criterion 3. The latter is higher than that of criterion 4, which in turn is higher than the weight of criterion 5. That is:

  $w_1 > w_3 > w_4 > w_5$

- Similar relationships have been considered for the weight of criterion 2. That is:

  $w_2 > w_3, w_2 > w_4, w_2 > w_5$

- The weight of any criterion should not be more than a third of the total. That is:

  $w_i \leq 0.33$, for $i = 1, 2 \ldots 5$

- The weight of criterion1 should be higher than the sum of weights of criteria 4 and 5. That is:

  $w_1 > w_4 + w_5$

- The same exactly is considered for the weight of criterion 2, i.e.,

  $w_2 > w_4 + w_5$

- The weight of criterion 5 should be no more than 10% of the total, i.e.,

  $w_5 \leq 0.1$

- The weights of the principal criteria 1 and 2 are about equal;

  $w_1 = w_2$

- The sum of all weights is equal to 1; that is:

$$w_1 + w_2 + w_3 + w_4 + w_5 = 1$$

The pure inequalities require the introduction of a minimum difference threshold, named ε ($\varepsilon \leq 0.01$). As the system may not be compatible, one or two deviation variables, named s, are introduced in each constraint (one deviation variable is introduced in each equality, whereas two deviation variables are introduced in each equality). Thus, a linear goal programming model with 13 main constrains and 18 non-negativity constraints is yielded, the aim being the minimisation of the total deviation (sum of the s_i).

$$Min\ Z = s_1 + s_2 + s_3 + s_4 + s_5 + s_6 + s_7 + s_8 + s_9 + s_{10} + s_{11} + s_{12} + s_{13}$$

subject to

$$w_1 - w_3 + s_1 \geq 0.01$$

$$w_3 - w_4 + s_2 \geq 0.01$$

$$w_4 - w_5 + s_3 \geq 0.01$$

$$w_2 - w_3 + s_4 \geq 0.01$$

$$w_2 - w_4 + s_5 \geq 0.01$$

$$w_2 - w_5 + s_6 \geq 0.01$$

$$w_1 + s_7 \leq 0.33$$

$$w_2 + s_8 \leq 0.33$$

$$w_1 - w_4 - w_5 + s_9 \geq 0.01$$

$$w_2 - w_4 - w_5 + s_{10} \geq 0.01$$

$$w_5 + s_{11} \leq 0.1$$

$$w_1 - w_2 + s_{12} - s_{13} = 0$$

$$w_1 + w_2 + w_3 + w_4 + w_5 = 1$$

and non-negativity constraints

$$w_i \geq 0, \text{ for } i = 1, 2 \ldots 5,$$

and

$$s_i \geq 0, \text{ for } i = 1, 2 \ldots 13$$

The linear programming model has been solved with optimisation solver LINGO v.11 (http://www.lindo.com) and gave the following results: $w_1 = 0.33$, $w_2 = 0.33$, $w_3 = 0.125$, $w_4 = 0.115$, $w_5 = 0.10$, and $s_i = 0$, for $i = 1, 2 \ldots 13$, minimising thus the total deviation (value of objective function Z) approximately to zero.

3.3 Determination of final criteria weights

The final determination of the criteria weights has been based on the three models used. The weights used for the subsequent analysis are approximately equal to the average values of the specified values, and are presented in Table 6.

Table 6 Final criteria weights

No.	*Criterion*	*Weight*
1	Coverage/content	0.32
2	Web services	0.32
3	Technical and aesthetics completeness	0.16
4	Presentation of research activities	0.10
5	Objectivity	0.10

4 AHP implementation

Website evaluations and pairwise comparisons took place during the time period October to December 2011. Table 7 depicts the relative importance of each criterion with respect to each of the rest of the criteria according to the findings of Section 3.3. 'Coverage/content' and 'web services' have equal weights (0.32), 'technical and aesthetics completeness' has a weigh of 0.16 and 'presentation of research activities' and 'objectivity' have again equal weighs (0.10). The inconsistency produced by the software is CI = 0, less than 0.10 denoting that the judgments in Table 7 can be considered reliable (Forman and Selly, 2002). Consistency means that both the transitivity condition and the intensity condition are satisfied; perfect consistency is not usually achieved in practice, since making consistent value judgments is difficult, however Table 7 is of small size. Therefore, it is important to know the degree of deviation from consistency in every judgment (Keeney, 2002; Saaty, 1980). Table 8, Table 9, Table 10, Table 11 and Table 12 show the results of the comparison of the relative preference with respect to each of the five criteria.

Table 7 Comparison of the relative preference with respect to each criterion

	Web services	*Technical and aesthetics completeness*	*Presentation of research activities*	*Objectivity*
Coverage/content	1	2	3.2	3.2
Web services		2	3.2	3.2
Technical and aesthetics completeness			1.6	1.6
Presentation of research activities				1

Table 8 Comparison of the relative preference with respect to 'coverage/content'

	NTUA	*AUTH*	*AUEB*	*AUA*	*ASFA*	*PANTEION*	*UNIPI*	*UCG*	*UOM*	*UOWM*	*UPATRAS*	*UOP*	*UOI*	*DUTH*	*UOC*	*TUC*	*AEGEAN*	*IONIO*	*UTH*	*HUA*	*EAP*	*UHI*
UOA	1	2	3	3	5	1	1	5	2	4	3	3	1	5	5	5	5	2	3	2	4	1
NTUA		1	2	3	5	1/2	1	5	1	3	2	2	1	4	7	3	5	1	2	2	3	1
AUTH			2	2	4	1/2	1	5	1	3	2	2	1	3	4	3	4	1	2	1	3	1
AUEB				1	3	1/3	1/2	3	1/2	2	1	1	1/2	2	3	2	3	1/2	1	1	2	1/2
AUA					2	1/4	1/3	3	1/2	1	1	1	1/3	2	2	1	2	1/2	1	1/2	1	1/3
ASFA						1/2	1/3	4	1/2	1	2	1	1	3	2	1	4	4	1	1/2	1	1
PANTEION							2	5	2	5	3	3	2	5	5	5	5	2	3	3	5	2
UNIPI								5	1	3	2	2	1	4	5	3	5	1	2	2	3	1
UCG									1/5	1/2	1/3	1/3	1/5	1/2	1	1/2	1	1/5	1/3	1/3	1/2	1/5
UOM										3	2	2	1	3	4	3	4	1	2	1	3	1
UOWM											1/2	1/2	1/3	1	2	1	2	1/3	1/2	1/2	1	1/3
UPATRAS												1	1/2	2	3	2	3	1/2	1	1	2	1/2
UOP													1/2	2	3	2	3	1/2	1	1	2	1/2
UOI														4	5	3	5	1	2	2	3	1
DUTH															1	1	1	1/3	1/2	1/3	1	1/4
UOC																1/2	1	1/4	1/3	1/3	1/2	1/5
TUC																	2	1/3	1/2	1/3	1	1/3
AEGEAN																		1/4	1/3	1/3	1/2	1/5
IONIO																			2	1	3	1
UTH																				1	2	2
HUA																					2	1/2
EAP																						1/3

Table 9 Comparison of the relative preference with respect to 'web services'

	NTUA	*AUTH*	*AUEB*	*AUA*	*ASFA*	*PANTEION*	*UNIPI*	*UCG*	*UOM*	*UOWM*	*UPATRAS*	*UOP*	*UOI*	*DUTH*	*UOC*	*TUC*	*AEGEAN*	*IONIO*	*UTH*	*HUA*	*EAP*	*IHU*
UOA	4	3	4	5	3	4	3	6	3	1	4	5	4	5	5	3	5	4	3	5	1/2	1
NTUA		1	2	3	1	1	1	5	1	1/4	1	3	1	2	3	1/2	2	2	1	3	1/4	1/3
AUTH			2	3	1	2	1	5	1	1/3	1	3	1	3	3	1/2	3	2	1	3	1/4	1/3
AUEB				2	1/2	1	1/2	4	1/2	1/4	1/2	2	1/2	1	2	1/3	1	1	1/2	2	1/5	1/4
AUA					1/3	1/2	1/3	3	1/3	1/5	1/3	1	1/3	1	1	1/4	1	1/2	1/3	1	1/6	1/5
ASFA						2	1	5	1	1/3	1	3	1	3	3	1/2	3	2	1	3	1/4	1/3
PANTEION							1/2	4	1/2	1/4	1	2	1	2	2	1/3	2	1	1/2	2	1/5	1/4
UNIPI								5	1	1/3	1	3	1	3	3	1/2	3	2	1	3	1/4	1/3
UCG									1/5	1/6	1/5	1/3	1/5	1/4	1/3	1/6	1/4	1/4	1/5	1/3	1/6	1/6
UOM										1/3	1	3	1	3	3	1/2	3	2	1	3	1/4	1/3
UOWM											4	5	4	5	5	3	5	4	3	5	1/2	1
UPATRAS												3	1	2	3	1/2	2	2	1	3	1/4	1/3
UOP													1/3	1	1	1/4	1	1/2	1/3	1	1/6	1/5
UOI														2	3	1/2	2	2	1	3	1/4	1/3
DUTH															1	1/3	1	1	1/3	1	1/6	1/4
UOC																1/4	1	1/2	1/3	1	1/6	1/5
TUC																	3	3	2	4	1/3	1/2
AEGEAN																		1	1/3	2	1/6	1/4
IONIO																			1/2	2	1/5	1/4
UTH																				3	1/4	1/3
HUA																					1/6	1/5
EAP																						2

Table 10 Comparison of the relative preference with respect to 'technical and aesthetics completeness'

	NTUA	*AUTH*	*AUEB*	*AUA*	*ASFA*	*PANTEION*	*UNIPI*	*UCG*	*UOM*	*UOWM*	*UPATRAS*	*UOP*	*UOI*	*DUTH*	*UOC*	*TUC*	*AEGEAN*	*IONIO*	*UTH*	*HUA*	*EAP*	*IHU*
UOA	1/3	1/2	1/2	1/4	1/3	1/3	1/3	1/3	1/3	1/2	1/3	1/2	1/3	1	1/2	1/3	1/2	1	1/3	1/5	1/3	1/2
NTUA		2	2	1	1	1	1	1	1/2	2	1	2	1	3	2	1	2	3	1	1/3	1	2
AUTH			1	1/3	1/2	1/2	1/2	1/2	1/3	1	1/2	1	1/2	1	1	1/2	1	1	1/2	1/5	1/2	1
AUEB				1/2	1/2	1/2	1/2	1	1/3	1	1	1	1	2	1	1	1	2	1/2	1/5	1/2	1
AUA					1	1	1	2	1	2	2	3	2	3	3	2	3	3	1	1/3	1	2
ASFA						1	1	1	1/2	2	1	2	1	3	2	1	2	3	1	1/3	1	2
PANTEION							1	1	1/2	2	1	2	1	3	2	1	2	3	1	1/3	1	2
UNIPI								1	1/2	2	1	2	1	3	2	1	2	3	1	1/3	1	2
UCG									1/2	1	1	2	1	2	2	1	2	2	1	1/4	1	1
UOM										3	2	3	2	4	3	2	3	4	2	1/2	2	3
UOWM											1	1	1	2	1	1	1	2	1/2	1/5	1/2	1
UPATRAS												2	1	2	2	1	2	2	1	1/4	1	1
UOP													1/2	1	1	1/2	1	1	1/2	1/5	1/2	1
UOI														2	2	1	2	2	1	1/4	1	1
DUTH															1	1/2	1	1	1/3	1/5	1/3	1/2
UOC																1/2	1	1	1	1/5	1/2	1
TUC																	2	2	1	1/4	1	1
AEGEAN																		1	1/2	1/5	1/2	1
IONIO																			1/3	1/5	1/3	1/2
UTH																				1/3	1	2
HUA																					3	5
EAP																						2

Table 11 Comparison of the relative preference with respect to 'presentation of research activities'

	NTUA	*AUTH*	*AUEB*	*AUA*	*ASFA*	*PANTEION*	*UNIPI*	*UCG*	*UOM*	*UOWM*	*UPATRAS*	*UOP*	*UOI*	*DUTH*	*UOC*	*TUC*	*AEGEAN*	*IONIO*	*UTH*	*HUA*	*EAP*	*IHU*
UOA	1	2	1/3	1	4	1/3	1	2	1/2	1/2	1/3	5	1/3	5	3	2	1/2	3	1/2	3	2	8
NTUA		2	1/3	1	3	1/3	1	2	1/2	1/2	1/3	5	1/3	5	3	2	1/2	3	1/2	3	2	8
AUTH			1/4	1/3	2	1/4	1/3	1	1/4	1/3	1/4	3	1/4	3	2	1	1/3	1	1/4	2	1	6
AUEB				2	6	1	2	4	1	2	1	7	1	7	5	4	2	5	1	5	4	8
AUA					4	1/2	1	2	1/2	1	1/2	5	1/2	5	4	3	1	3	1/2	4	3	8
ASFA						1/6	1/4	1/3	1/5	1/5	1/6	2	1/6	2	1	1/2	1/5	1/2	1/5	1	1/2	5
PANTEION							2	4	1	2	1	7	1	7	5	4	2	5	1	5	4	8
UNIPI								2	1/2	1	1/2	5	1/2	5	4	3	1	3	1/2	4	3	8
UCG									1/3	1/3	1/4	4	1/4	4	2	1	1/3	2	3	2	1	7
UOM										1	1	6	1	6	5	4	1	4	1	5	4	8
UOWM											1/2	6	1/2	6	4	3	1	4	1	4	3	8
UPATRAS												7	1	7	5	4	2	5	1	5	4	8
UOP													1/7	1	1/2	1/3	1/6	1/3	1/6	1/2	1/3	4
UOI														7	5	4	3	5	1	5	4	8
DUTH															1/2	1/3	1/6	1/3	1/6	1/2	1/3	4
UOC																1/2	1/4	1	1/5	1	1/2	5
TUC																	1/3	1	1/4	1/2	1	6
AEGEAN																		4	1	4	3	8
IONIO																			1/4	1	1	6
UTH																				5	4	8
HUA																					1/2	5
EAP																						6

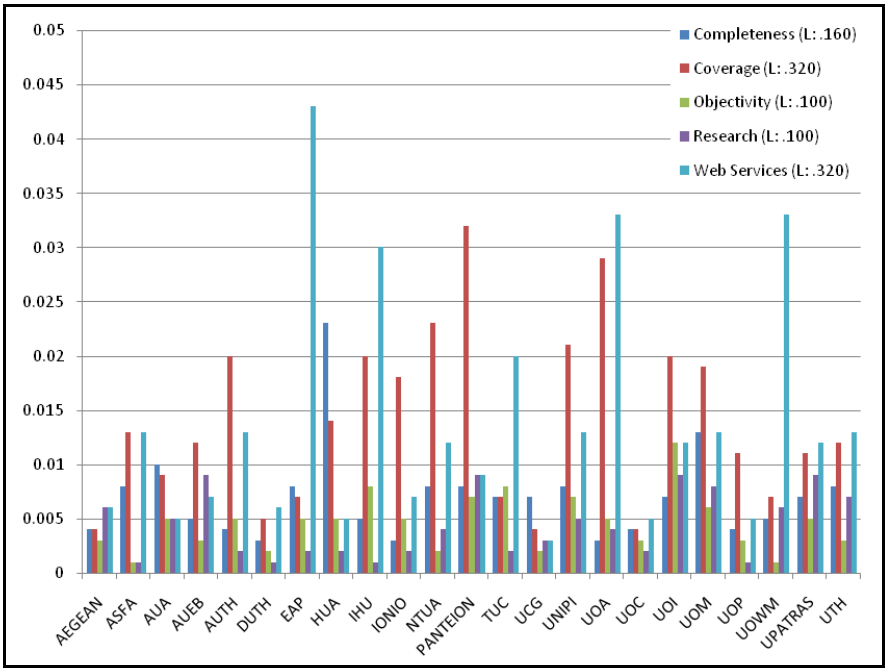
Table 12 Comparison of the relative preference with respect to 'objectivity'

	NTUA	AUTH	AUEB	AUA	ASFA	PANTEION	UNIPI	UCG	UOM	UOWM	UPATRAS	UOP	UOI	DUTH	UOC	TUC	AEGEAN	IONIO	UTH	HUA	EAP	IHU
UOA	3	1	2	1	4	1/2	1/2	3	1	4	1	2	1/3	3	2	1/2	2	1	2	1	1	1/2
NTUA		1/3	1/2	1/3	2	1/4	1/4	1	1/3	2	1/3	1/2	1/5	1	1/2	1/4	1/3	1/3	1/2	1/3	1/3	1/4
AUTH			2	1	4	1/2	1/2	3	1	4	1	2	1/3	3	2	1/2	2	1	2	1	1	1/2
AUEB				1/2	3	1/3	1/3	2	1/2	3	1/2	1	1/4	2	1	1/3	1	1/2	1	1/2	1/2	1/3
AUA					4	1/2	1/2	3	1	4	1	2	1/3	3	2	1/2	2	1	2	1	1	1/2
ASFA						1/5	1/5	2	1/4	1	1/4	1/3	1/5	1/2	1/3	1/5	1/3	1/4	1/3	1/4	1/4	1/5
PANTEION							1	4	1/2	5	2	3	1/2	4	3	1	3	2	3	2	2	1
UNIPI								4	1/5	5	2	3	1/2	4	3	1	3	2	3	2	2	1
UCG									1/3	2	1/3	1/2	1/5	1	1/2	1/4	1/2	1/3	1/2	1/3	1/3	1/4
UOM										4	1	2	1/3	3	2	1/2	2	1	2	1	1	1/2
UOWM											1/4	1/3	1/6	1/2	1/3	1/5	1/3	1/4	1/3	1/4	1/4	1/5
UPATRAS												2	1/3	3	2	1/2	2	1	2	1	1	1/2
UOP													1/3	2	1	1/3	1	1/2	1	1/2	1/2	1/4
UOI														5	4	2	4	3	4	3	3	2
DUTH															1/2	1/4	1/2	1/3	1/2	1/3	1/3	1/4
UOC																1/3	1	1/2	1	1/2	1/2	1/3
TUC																	3	2	3	2	2	1
AEGEAN																		1/2	1	1/2	1/2	1/3
IONIO																			2	1	1	1/2
UTH																				1/2	1/2	1/3
HUA																					1	1/2
EAP																						1/2

5 AHP results and discussion

The results for each criterion and each alternative (university website) are presented in Figure 2.

Figure 2 Results for each criterion and each alternative (see online version for colours)

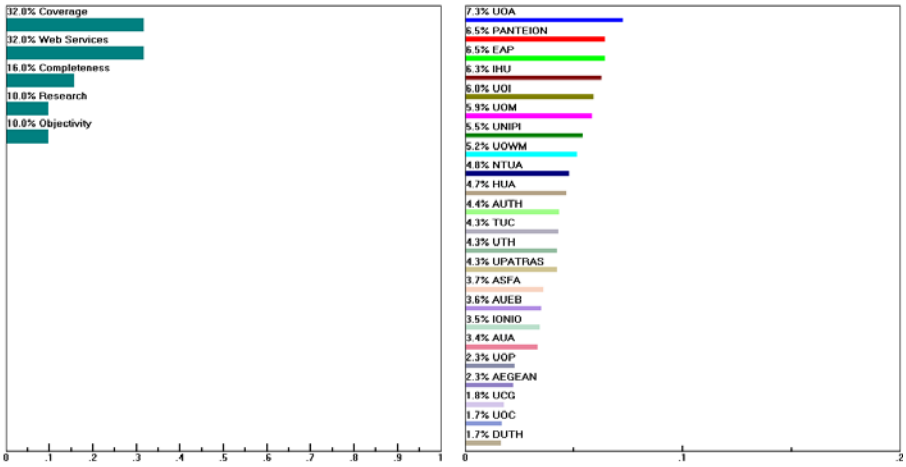


The Hellenic Open University (EAP) excels in the web services ranking first; something expected due to the nature of this particular university. Figure 3 includes the overall evaluation of the sites (in descending order in the right panel) and the influence of each criterion in the final selection (left panel). According to the above figure, the 3 top ranked universities' websites are the UOA, the Panteion and the EAP equal at the second place, EAP being here not surprising again due to its different operations model and IHU ranks fourth (a surprisingly good position for such a small and relatively new university). Large Universities like the AUTH and the UPATRAS, with long history, traditions, good international reputation and many successful research activities did not score so well ending in the middle of the ranking list. Those two specific websites fail to present in an adequate way the research initiatives and relevant success stories in the first case and scores in all criteria are mediocre in the latter. Other cases like the DUTH and UCG websites are mainly comprised of static web pages with very little to offer more than that; some of them have also not been updated for some time now.

A limit result (score) for the characterisation of a website as a good was set at 5% (0.05). A result between 3% and 5% characterises a webpage to be sufficient enough, while pages with a score below 3% are considered inadequate and need re-design. The software used, provides the possibility of calculating the total inconsistency of the model;

the index of inconsistency for the model is very close to zero. This percentage is far below 10%, which is set as the threshold for review of the judgments made and an indication of the quality of the judgments. Figure 3 is also based on the 'distributive' mode and not the 'ideal' one, as the decision situation in this mode is viewed mainly as prioritising among all the alternatives based on their relative worth. In the 'distributive' mode, criteria weights are depending on the degree to which each distinctive criterion differentiates between the alternatives being evaluated. This favours, meaning assigns higher weights, to alternatives that are both unusual among the alternatives and better than other alternatives on important criteria.

Figure 3 Final ranking of the Greek university websites (see online version for colours)



6 Conclusions

This paper evaluates the websites of the 23 Greek universities utilising five major criteria and using the AHP method; the result is a ranked list of all the websites, from the best case to the worst. As a general remark, it seems that the Greek universities' websites have not yet reached a level of maturity that would allow them to be used as everyday 'tools' by the academic and the administrative staff, not to mention the students. There is enough diversity among the websites; some are offering only basic services, avoiding interactive content, while others are much more efficient; however none are yet to a comparable level to highly prestigious international Universities. There are also questions that still need answering; for example should educational websites such as those be completely free from advertising? Greek universities are all still public bodies and as such have no current need for that, but this situation seems to be about to change. Also noted is a tendency to overlook the need to make the websites accessible to the visually or hearing impaired – very few score good grades in this aspect.

A lot of efforts and funding have been allocated in national research projects regarding e-learning activities – this was also not so evident in the current research, proving that this specific research is fragmented and not fully applied in the Greek

academia. Also, the academic staff does not seem to be using Web 2 technologies; most Universities have a single static webpage that is not always updated frequently. Regarding this issue, there does not seem to be a demand for implementing such technologies from the academia; the Ministry of Education though has promoted some actions to that goal, especially regarding the distribution of academic books to the student population.

Concluding, there is much room for improvement and at various levels. Apart from website capabilities and services, the attitudes of the academia and the administration must change as well; they both need to increase their demand for reliable and continuous e-services and use to a greater extent what is already available. Greek universities as a whole must also adapt as quickly as possible and get used to the idea of operating in a globalised world with intense competition at all levels.

Regarding forthcoming suggested research it would be interesting to implement simultaneously some analytical and/or hierarchical MCDM methodologies on a certain set of data, and to compare subsequently the yielded results. The authors of the present paper work towards this direction, aiming to draw conclusions concerning the compatibility and the differences of the various MCDM methods. The thorough assessment of criteria weights with the use of more existing methodologies would also present significant research interest.

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