ESTIMATING THE PROMINENCE OF AHP IN SUBSCRIBED ONLINE DATABASES

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ABSTRACT

Subscribed online databases (ODB's) have become part of the standard infrastructure of library resources. For students and instructors of higher learning institutions in particular, availability of online access permits users to access the library resources remotely. The main objective of the study was carried out to determine which among the online databases subscribed by a public university library, i.e. International Islamic University Malaysia, contained the specific topics related to Analytic Hierarchy Process (AHP). The five databases used in this study were *Scopus, Taylor & Francis, EconLit, Emerald Management Xtra Plus* and *ProQuest Social Science Journals*. By resorting to the original terms supplied by the AHP 2013 conference organizers, the study has obtained validated terminology from the experts and readily overcame issues such as biasness in selecting the search terms. This study accessed the databases on 14 April 2013 from 12.15 a.m. to 2.15 a.m.**,** recorded the results or hits produced by the selected ODB's on the generic sub-theme and also those that were embedded with the acronym, AHP. Comparative hits from generic and AHP specific were computed using ratios to determine comparative availability of selected sub-themes across databases. The ratios were computed by dividing the results of each sub-theme for each ODB over the latter's total. The ratios are considered a convenient standard comparative measure for each sub-theme in each database. By knowing the ratios, one is able to approximate whether there are apparently enough articles about a sub-theme. Computed ratios indicate whether the AHP results are equal to, lower or higher than the general. Equality is reflected by 1.00; if AHP is higher than general then the ratio should be above 1.00, and if below 1.00 should be lower than the general. Results show that

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availability of AHP is equal to that of generic; higher in *Taylor & Francis*; lower in *EconLit* and *Emerald*; and higher in *ProQuest*. The paper declares limitations of study and provides suggestions for future research.

Keywords: Analytic Hierarchy Process, decision-making, online data bases, ratios

1. Introduction

While brick-and-mortar library facilities remain accessible to users, the latter can access to the electronic contents online conveniently and efficiently. Subscribed online databases (ODB's), however, have become part of the standard infrastructure of library resources.

The main objective of the study was to determine which among the online databases subscribed by a public university library, i.e. International Islamic University Malaysia, contained the specific topics related to Analytic Hierarchy Process (AHP).

This paper reviews some literature, discusses the method that it used to determine availability of materials on AHP in the subscribed databases, presents the results, draws some conclusions and highlights its limitations and suggestion for future research .

2. Literature review

There has been sizeable amount of literature on Analytic Hierarchy Process (AHP). AHP is described as the hierarchical process in giving a solution to a complex problem (Saaty, 1990). AHP decomposes a complex problem into a multi-level hierarchic structure of objectives, criteria, sub-criteria and alternatives in that order. It uses judgmental paired comparisons by means of a scale of absolute magnitudes. The technique derives a ratio scale of relative magnitudes expressed in priority units from each set of comparisons. Then AHP computes an overall ratio scale of priorities to obtain ranking of the alternatives. AHP provides the decision maker insight and rigor unavailable in a purely judgmental analysis (Wolfe, 1986).

Structured decision making process leads to the effectiveness in making a decision (Frishammar, 2003), which is reflected in AHP. Although understandably that not all information will be used in a decision making process (Zellman, Kaye-Blake and Abell, 2010). There are a number of characteristics attributed to AHP. The technique can incorporate the reality of uncertainty, i.e. the existence of multiple factors involved in a decision making process (see for example, Phillips, Martin, Dainty, & Price, 2007; Wu, Lee, Tah, and Aouad , 2007). AHP has been applied in multiple industry contexts, e.g. petroleum (Dey, 2001), construction (Phillips, Martin, Dainty, & Price, 2007), textile (Shyjith, Ilangkumaran, and Kumanan, 2008); bridge construction (Dabous & Alkass, 2010); and bidding evaluation (Sipahi and Esen, 2010).

One of the ways to ascertain whether an online database contains breadth and depth of information about a specific topic such as AHP is to mine the target source. Online databases shift the provision of entity like books or articles to the more abstract concept of providing and transferring information. They provide the electronic contents like traditional library (Levine 1981). The availability of the online data bases is useful to help improve one's competitive position (Wilson, 2003). For content providers of the databases, they need to ensure that the materials they maintain and update are relevant to searchers and end-users (Farber and Shoham, 2002).

3. Method

The study used five databases in its analysis. The data sources were Scopus, Taylor & Francis, EconLit, Emerald Management Xtra Plus and ProQuest Social Science Journals. They were chosen based on two criteria: subscribed by the university and their contents are related to the major academic disciplines offered by the university. The university library classified areas captured by the databases specified, which is reflected in Table 1 below. By resorting to the original terms supplied by the AHP 2013 conference organizers, the study has obtained validated terminology from the experts and readily overcame issues such as biasness in selecting search terms. This study accessed the databases on 14 April 2013 from 12.15 a.m. to 2.15 a.m. (Peninsular Malaysian Time)**,** recorded the results or hits produced by the selected online data bases (ODB's) on the generic sub-themes and those embedded with the acronym, AHP. The accessed results were copied from the database onto a columnar table of MS Excel. Next, the authors computed the ratios to help determine comparative availability of selected sub-themes across databases. The ratio is computed by dividing the results of each sub-theme for each ODB over the latter's total. The ratio is considered a convenient standard measure of comparison for each sub-theme in each database due to its universal property. A ratio can represent any measures without having to attach to its quotient any unit such as dollar, gram, etc.

Table 1 Academic areas captured by the online databases

Database	Economics	Human Science	Information & Communication Technology	Other
Scopus	-	Human Science	-	General, Medical, Science
Taylor & Francis Online	Economics	Human Science	Information & Communication Technology	Architecture & Environmental Design, Education, Engineering, General, Language, Law, Medical, Science
EconLit	Economics	-	-	-
Emerald Management Xtra Plus with Backfiles	Economics	Human Science	Information & Communication Technology	
ProQuest Social Science Journals	Economics	Human Science	-	Education, General

Resulting ratios would indicate whether the AHP results are equal to, lower or higher than the general. Equality is reflected by 1.00, if AHP is higher than general then the ratio should be above 1.00, and if below 1.00 should be lower than the general.

4. Results

For brevity, only total results for each sub-theme per database will be shown. However, the individual ratios for each sub-theme for each data base will be shown.

Table 2 shows the computed ratios of each of the five databases. For the sub-theme entitled "Utility Theory: A Comparison" the ratio is 0.001 (see column 2). The total result of all sub-teams under Scopus is 1654241. The boldfaced figures indicate the highest ratio for each category of sub-theme. For sub-theme "Utility Theory: A Comparison," PSS produced the highest ratio, i.e., 0.018 (see last column). In case of ties, e.g. **"**Environmental Applications and Sustainability," the authors referred to more decimal

places to determine the highest ratio. In this case, Emerald has produced a higher ratio, i.e. *0.0052 compared to PSS **0.0045. The information is provided at the bottom of Table 2.

Table 2 Results of sub-themes of five online databases

	SC	TF	EL	EM	PS
Utility Theory: A Comparison	0.001	0.001	0.000	0.014	**0.018**
Application in Healthcare Services	0.002	0.002	0.000	0.000	**0.012**
Behavioral Decision Making	0.007	0.014	0.000	0.000	**0.026**
Conflict Resolution	0.007	0.017	**0.043**	0.000	0.020
Decision Support Systems Aid	0.002	0.004	0.000	0.022	**0.029**
Disaster Management	0.014	0.009	0.000	**0.016**	0.009
Employee Recruitment	0.001	0.001	0.000	**0.017**	0.007
Engineering and Technological Applications	0.003	0.002	0.000	**0.019**	0.008
Entrepreneurship and Small Business Management	0.000	0.000	0.000	**0.017**	0.002
Environmental Applications and Sustainability	0.002	0.003	0.000	**0.005***	0.005**
Finance	0.040	0.086	**0.585**	0.089	0.050
Forecasting and Prediction	**0.056**	0.033	0.007	0.004	0.003
General Resource Allocation and Optimization	0.001	0.001	0.000	0.002#	**0.002##**
Generalization of Neural Firing	0.000	0.000	0.000	0.000@	**0.000@@**
Group Decision Making	0.035	0.055	0.001	**0.144**	0.072
Health Technology Assessment	0.002	0.011	0.000	0.030	**0.035**
Human Resources Management	0.041	0.028	0.001	**0.113**	0.048
Information Management	0.238	0.216	0.001	**0.266**	0.150
Integration of with Other Methods	0.012	0.018	0.001	**0.050**	0.046
Location Decisions	0.014	0.022	0.003	0.035	**0.042**
Marketing Decisions	0.010	**0.047**	0.000	0.032	0.016
Medical Decision Making	**0.074**	0.034	0.000	0.028	0.046
Military Applications	**0.018**	0.008	0.000	0.002	0.015
Performance Measurement/Management	0.011	0.000	0.000	0.001	**0.027**
Production Planning and Management Safety	0.000	0.000	0.000	**0.019**	0.007
Project Management	**0.114**	0.078	0.001	0.011	0.064
Projects Prioritization	0.001	0.001	0.000	**0.007**	0.002
Purchasing and Supply Chain	0.001	0.002	0.000	**0.005**	0.003
Risk/Uncertainty	0.021	0.000	0.000	**0.037**	0.024
Social Issues and Applications	0.004	0.005	0.000	0.008	**0.043**

Sports	**0.079**	0.124	0.052	0.000	0.053
Strategic Management	**0.037**	0.036	0.005	0.000	0.027
Tender Evaluation	0.001	0.001	0.000	**0.003**^	0.003^^
Total Quality Management	0.033	0.037	0.001	0.002	0.053
Transportation	0.118	0.102	**0.296**	0.000	0.030
Total results	**4081**	**1662**	**1**	**5198**	**35659**

Notes:
*0.0052 **0.0045; #0.0019 ##0.0024; @0.0000 @@0.0004; ^0.0032 ^^0.0029
SC=Scopus, TF=Taylor & Francis, EL=EconLit, EM=Emerald Management Xtra Plus and *PS=ProQuest Social Science Journals*

After reviewing Table 2, the authors found that the five online databases that produced the highest ratios (dominant frequencies) for the specified sub-themes are as follows: Scopus (6), TR (1), EL (3), Emerald (14) and PSS (11).

More crucial results are shown in Table 3 because the latter contains information about availability of materials related to AHP. The table displays the computed ratios of each of the five databases. For the sub-theme "Utility Theory: A Comparison" the ratio is 0.033 (see last column). The total result of all sub-teams under PSS is 35659. The boldfaced figures represent the highest ratio for each category of sub-theme. For sub-theme "Utility Theory: A Comparison," PSS produced the highest ratio, i.e., 0.033 (see last column). In case of ties, e.g. "Utility Theory: A Comparison", the authors referred to more decimal places to determine the highest ratio. In this case, PSS has produced higher ratio, i.e. 0.0330 compared to Scopus 0.0030. Clarification is noted at the bottom of Table 3. Ties for "AHP Projects Prioritization" between Emerald and PSS were resolved by referring to the one with higher frequency, i.e., Emerald produced n=68, whereas PSS n=450.

Table 3 Results of AHP sub-themes of five online databases

	SC	**TF**	**EL**	**EM**	**PS**
AHP and Utility Theory: A Comparison	0.003*	0.011	0.000	0.019	**0.033****
AHP Application in Healthcare Services	0.001	0.001	0.000	0.011	**0.013**
AHP Behavioral Decision Making	0.005	0.007	0.000	0.003	**0.027**
AHP Conflict Resolution	0.006	0.007	0.000	0.003	**0.017**
AHP Decision Support Systems Aid	0.012	0.029	0.000	0.003	**0.037**
AHP Disaster Management	**0.020**	0.006	0.000	0.008	0.011
AHP Employee Recruitment	0.000	0.001	0.000	0.000	**0.006**
AHP Engineering and Technological Applications	0.002	0.000	0.000	0.000	**0.022**
AHP Entrepreneurship and Small Business Management	0.000	0.000	0.000	0.000	**0.003**
AHP Environmental Applications and Sustainability	0.007	0.010	0.000	0.010	**0.015**
AHP Finance	**0.030**	0.013	0.000	0.005	0.015
AHP Forecasting and Prediction	0.009	0.006	0.000	0.005	**0.010**

AHP General Resource Allocation and Optimization	0.000	0.000	0.000	0.005	**0.017**
AHP Generalization of to Neural Firing	0.000	0.000	0.000	0.000	**0.003**
AHP Group Decision Making	0.136	0.252	**1.000**	0.000	0.064
AHP Health Technology Assessment	0.007	0.005	0.000	0.000	**0.037**
AHP Human Resources Management	0.031	0.020	0.000	0.000	**0.049**
AHP Information Management	**0.207**	0.155	0.000	0.142	0.075
Integration of AHP with Other Methods	0.008	0.007	0.000	**0.063**	0.060
AHP Location Decisions	0.050	**0.077**	0.000	0.039	0.051
AHP Marketing Decisions	0.025	**0.102**	0.000	0.054	0.025
AHP Medical Decision Making	0.016	0.014	0.000	0.016	**0.031**
AHP Military Applications	0.006	0.005	0.000	0.010	**0.016**
AHP Performance Measurement/Management	0.025	0.000	0.000	**0.087**	0.041
AHP Production Planning and Management Safety	0.001	0.000	0.000	**0.031**	0.021
AHP Project Management	**0.129**	0.083	0.000	0.093	0.060
AHP Projects Prioritization	0.011	0.011	0.000	0.013#	**0.013**##
AHP Purchasing and Supply Chain	0.006	0.013	0.000	**0.033**	0.010
AHP Risk/Uncertainty	0.026	0.000	0.000	**0.035**	0.034
AHP Social Issues and Applications	0.005	0.005	0.000	0.040	**0.044**
AHP Sports	0.009	0.004	0.000	0.005	**0.013**
AHP Strategic Management	0.078	0.079	0.000	**0.110**	0.037
AHP Tender Evaluation	**0.006**	0.004	0.000	0.003	0.004
AHP Total Quality Management	0.014	0.012	0.000	**0.114**	0.057
AHP Transportation	**0.106**	0.060	0.000	0.044	0.033
Total results	**4081**	**1662**	**1**	**5198**	**35659**

Notes: * 0.0030 **0.0330; five decimal places: # 0.01300 (n=68), ## 0.01300 (n=450)
SC=*Scopus*, TF=*Taylor & Francis*, EL=*EconLit*, EM=*Emerald Management Xtra Plus* and PS=*ProQuest Social Science Journals*

There are three possible interpretations for the ratios: AHP results are equal to, lower or higher than the general. Equality is reflected by 1.00, if AHP is higher than general then the ratio should be above 1.00, and if below 1.00 should be lower than the general. Results (Table 4) show that availability of AHP is equal to that of generic; higher in Taylor & Francis; lower in EconLit; lower in Emerald; and higher in ProQuest.

Referring to the second last row of Table 4, one can see the dominance of AHP vs. General as follows: Scopus (1.00), TR (2.00), EL (0.33), Emerald (0.57) and PSS (1.64). In terms of rank (see the last row), the order of availability will be as follows: TR (1), PSS (2), Scopus (3), Emerald (4) and EL (5).

Table 4 Availability of AHP vs. Generic materials among databases

		SCOPUS	TR	EL	EM	PSS
a	Dominant frequency: AHP	6	2	1	8	18
b	Dominant frequency: General	6	1	3	14	11
c	Ratio: a/b	1.00	2.00	0.33	0.57	1.64
d	Rank	3	1	5	4	2

Note: SC=Scopus TR EL=EconLit EM=Emerald PSS

Both the generic and AH sub-themes correlated well within and among the databases as can be sighted in Table 5 below. Useful observations can be seen among four databases with the exception of EL. Table 5 shows that statistically correlations exist among the four databases – Scopus, TR, Emerald and PSS; their coefficients vary from .381to .827 at .05 and .01 significant levels. For EL, it only has statistically significant correlation (α=.381, p=.05) with Generic Emerald.

Table 5: Pearson Correlations: Generic vs. AHP Specifics

	G: Scopus	G: TR	G: EL	G: Emerald	G: PSS	**Ahp:** Scopus	**Ahp:** TR	**Ahp:** EL	**Ahp:** Emerald	**Ahp:** PSS
G: Scopus	1	.925**	.198	.629**	.801**	.827**	.495**	.023	.562**	.504**
Sig. (2-tailed)		.000	.254	.000	.000	.000	.003	.894	.000	.002
N	35	35	35	34	34	35	35	35	35	35
G: TR	.925**	1	.357*	.658**	.820**	.779**	.550**	.102	.492**	.450**
Sig. (2-tailed)	.000		.035	.000	.000	.000	.001	.562	.003	.007
N	35	35	35	34	34	35	35	35	35	35
G: EL	.198	.357*	1	.121	.124	.128	-.007	-.044	-.079	-.109
Sig. (2-tailed)	.254	.035		.495	.485	.462	.968	.803	.652	.533
N	35	35	35	34	34	35	35	35	35	35
G: Emerald	.629**	.658**	.121	1	.803**	.705**	.648**	.381*	.295	.576**
Sig. (2-tailed)	.000	.000	.495		.000	.000	.000	.026	.090	.000
N	34	34	34	34	34	34	34	34	34	34
G: PSS	.801**	.820**	.124	.803**	1	.784**	.616**	.258	.571**	.798**
Sig. (2-tailed)	.000	.000	.485	.000		.000	.000	.140	.000	.000
N	34	34	34	34	34	34	34	34	34	34

Note: G = General sub-themes; AHP = General sub-themes and AHP

5. Limitations of study

The concept of ratios is appealing; ratios attempt to relate between two variables. The standardized measures produced by quotients could be misleading because they do not reflect the impact of magnitude. For instance, Scopus produced a ratio of 0.003 with 14 results for the sub-theme "AHP and Utility Theory: A Comparison." For the same sub-theme, PSS produced the same ratio, i.e. 0.033, but with 1194 results. If one were to rely solely on the ratio he would be tempted to conclude that Scopus and PSS are at par which is of course misleading! In order to circumvent this issue, the influence of magnitude, i.e. results, have to be taken into account. This can be done by incorporating the concept of weight into the basic ratio formula.

6. Conclusion

Results based on ratios suggest that availability of AHP materials is equal to that of Generic. Most abundant AHP materials may be sourced from *Taylor & Francis*, followed by *ProQuest* and tailed by EconLit. In terms of overall rank of AHP related materials among the five databases, the order will be as *Taylor & Francis*, *Proquest Social Science*, *Scopus*, *Emerald*, and *EconLit*. Ratios could be used as a preliminary indicator for users to do literature search. However, the measure must be verified against the magnitude before one makes a decision to rely on a database. Ratios should be adjusted with proper weights to make them more meaningful.

REFERENCES

Dabous, S.A. & Alkass, S. (2010). A multi-attribute ra.nking method for bridge management. *Engineering, Construction and Architectural Management* Volume: 17 Issue: 3 pp.282 – 291.

Dey, A.K. (2001). Understanding and Using Context. *Personal and Ubiquitous Computing Journal*, Vol. 5 (1), 2001, pp. 4–7.

Farber, M. and Shoham, S. (2002). Users, end-users, and end-user searchers of online information: a historical overview, *Online Information Review*, Vol. 26 Iss: 2, pp.92 – 100.

Frishammar, J. (2003). Information Use in Strategic Decision-making. *Management Decision,* 41(4): 318-326.

Levine, GR. (1981). Developing databases for online information retrieval." *Online Information Review, Vol. 5 Iss: 2, pp.109 – 120.*

Phillips, S, Martin, J, Dainty, ARJ, and Price, ADF. (2007). Uncertainty in best value decision making, *Journal of Financial Management in Property and Construction*, Volume 12 No 2, pp.63-72.

Saaty, T.L. (1990). The Analytic Hierarchy Process in Conflict Management. *International Journal of Conflict Management* Volume: 1 Issue: 1 pp.47 – 68.

Sipahi, S and Esen, O. (2010). A multi-criteria model for bidding evaluation: An alternative selection of the best firms for the presentation of Istanbul 2010. *Management Decision,* Volume: 48 Issue: 2 pp.296 – 313.

Wu, S, Lee, A, Tah, J.H.M. and Aouad, G. (2007). The use of a multi-attribute tool for evaluating accessibility in buildings: the AHP approach. *Facilities*, Volume: 25 Issue: 9/10 pp.375 - 389.

Wilson, R.D. (2003). The use of an online commercial database as a source of competitive advantage for developing marketing strategies and tactics. *Competitiveness Review: An International Business Journal incorporating Journal of Global Competitiveness*, Vol. 13 Iss: 1, pp.35 – 43.

Zellman, E, Kaye-Blake, W, and Abell, W. (2010). Identifying consumer decision-making strategies using alternative methods. *Qualitative Market Research: An International Journal*, Vol. 13 Iss: 3, pp.271 – 286.