



Presenting a model for identify of agile capabilities and ranking advertisement sites: real case study of Iran advertisement websites

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ABSTRACT

Nowadays, due to global competition the growing, e-commerce is faced with increasingly complex challenges. E-commerce has been greatly influenced by online advertising sites. Online advertising is a form of promotion that uses the Internet and World Wide Web for the expressed purpose of delivering marketing messages to attract customers. However, the question is, do the IT managements know how to choose the best advertising site to introduce products and services? To answer this, it is necessary to recognize influential factors on choosing the best advertising site and current competition position based on agile capabilities. They have to, because managers cannot expect to find the method to achieve this goal, if they don't have accurate data about the ranking of advertising sites. The goal of this paper is identify of agile capabilities and ranking advertisement sites by presenting a model based on the knowledge of multi criteria decision making. After determining criteria, weight devoting was performed by using the expert's views in the IT departments. Ultimately, ranking of advertisement sites was done by applying the algorithm of PROMETHEE II.

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1-Introduction

According to competitors in business and following the use of efficiency and effectiveness, Online Advertising is one of the most suitable tools in this matter because of the increasing number of online users. Advertising on the Internet is almost a necessity for modern businesses, especially those that do business outside of their local community. Consumers use the Internet for more than simply being entertained or gaining information, as they do with radio, television, magazines and newspapers. Consumers use the Internet to assist them in nearly every aspect of life, creating countless opportunities to place relevant, targeted ad messages.

The Internet's vast capacity can allow advertisers to reach significantly more people than traditional advertising media at a fraction of the cost. Internet advertising is ideal for businesses with a national or international target market and large-scale distribution capabilities. As a rule, the more people your business serves, the most cost-efficient internet advertising can be. Internet advertising can also be more targeted than some traditional media, ensuring that your messages are seen by the most relevant audiences.

In this regard, selection of the best advertising site among the others with the least limitation and the highest speed will attract more users to the presented products and services for people, companies and organizations. According to effectiveness attributes in this selection, the offered model in this article pays attention to the ranking of several advertising sites which are working in electronic industries and information technologies.

The aim of this paper is presenting a model for ranking advertisement sites and evaluating of agile capabilities and was performed in three phases:

- 1) Verifying the criteria for evaluating of agile capabilities in advertising sites
- 2) Criteria weighting
- 3) Ranking advertisement sites and evaluating agile capabilities

2-What is the sites ranking?

Traditionally sites ranking is based on a static snapshot of the Web graph, which is basically the link structure of the Web documents. The visitor's browsing activities is directly related to importance of the document. However in this traditional static model the document importance on account of interactive browsing is neglected. Thus this model lacks the ability of taking advantage of user interaction for document ranking.

3-Agile capabilities

Generally speaking agile capabilities in the appliance of internet and IT in advertisement sites means, improvement of organization agility condition the measurement of available capabilities and finding lost abilities should be places on the agenda. It requires identification and classification of changes and organizing online pressures and also analysis of the effects of those changes on sites. Final step in this conceptual model is finding agility facilitating factors, their performance and determination of obtained agility level by function evaluation Process and performing corrective actions.

4. Verifying the Criteria and Weighting Process

4.1. Verifying the Criteria for Ranking Advertisement Sites Based on Being

Managerial Criteria-content, structure related:

After studying advertisement sites, the main criteria extract (based on Standard models). Each of these criteria has some subsets and focus on some issues, and in this paper (because

there are lot of sub criteria and they can cover main criteria) each sub criterion have been studied. Each factor is coding and become one of the main criteria of this study (Table 3).

Table 2 . Advertising Site Ranking Taxonomy

Attributes Type	Definition
Content	Every web page has the potential to rank well in search engines and draw traffic from other sources, like social media sites and the blogosphere. Of course, whether a page draws traffic (and links) depends on whether it's optimized and how remarkable (useful, interesting, etc.) it is. But in general, most pages do "ok" and contribute to the cause, so it's both a quality and a quantity game.
Optimize	Optimizing that content is a key step, however, to ensure you give your valuable content the best chance possible of drawing traffic from the web. In essence, this section is about maximizing your ROC - return on content.
Communication	In touch with the benchmark site visitors and trying to attract more visitors and keep previous visitors, for site improvements and the increased popularity is very important

Table 3. Main attributes and sub-attributes of the conceptual model

Attributes Type	Sub-Attributes
Content	<ul style="list-style-type: none"> • Relevant website • Content update • New Content • Readability Level
Optimize	<ul style="list-style-type: none"> • site speed • Google Rank • Domain Info • Linking Domains • Metadata • Google Indexed Pages
Communication	<ul style="list-style-type: none"> • Traffic Rank • Conversion Form • RSS feed

4.2. Criteria Weighting

In decision making sciences, there are different methods for criteria weighting that can be used in decision making problem. In this paper, according to the number of criteria and considering all of experts' votes, "Group Method" (Toloie, 2007), based on geometric mean, is used. In this step, IT experts, express their ideas about each of the criteria, in a questionnaire based on Semi Metric Scale Presenting a Model for Ranking Advertisement sites Real Case Study of The Advertisement sites Which Are Working In Electronic Industries And Information Technologies (between 0 to100). Indeed, each of these experts expresses their idea about the level of influence of each measure in understudy sites, by presenting a number between 0-100

4.3. Creating Decision Making Matrix

Before starting the ranking algorithm, decision making matrix should get shaped. So that, every expert expressed his or her idea about the significance of each criterion, in every understudy sites, by a percent by using Semi Metric Scale (between 0 to100) in a format of a questionnaire. Because of using the geometric mean in weighting process, it should be used in forming the final decision making matrix so we, gained percent for each criterion are turned in to a unit percent for that criterion by using Geometric mean and the equation(1).

$$w_j = \frac{(\prod_{j=1}^n W_j)^{1/n}}{n} = \sqrt[n]{\prod_{j=1}^n W_j}$$

Indeed, by applying this method, gain a constant percent W_j for every criterion. So, the weight of each criterion is obtained by using normalization with the equation (2).

$$W_j = a_{ij} / \sum_{k=1}^n a_{kj} \quad \forall i = 1, 2, \dots, n$$

5. Ranking Advertisement Sites Based on PROMETHEE II

Basically, there are two general compensatory and non - compensatory approaches, to rank options in multi criteria decision making. Compensatory models include methods in which exchange is allowed among criteria. Non compensatory models include methods in which exchange is not allowed among criteria, therefore every criterion is not dependent on the others and comparisons are done based on the criteria one by one.

The PROMETHEE method (Preference Ranking sites Method for Enrichment Evaluations) is one of the most recent MCDA methods that was developed by Brans (1982) and further extended by Vincke and Brans(1985), (Behzadian et al, 2009). PROMETHEE is amount ranking method for a finite set of alternative actions to be ranked and selected among criteria, which are often conflicting.

PROMETHEE is also a quite simple ranking method in conception and application compared with the other methods for multi-criteria analysis (Brans et al., 1986). Regarding the circumstances of the problem, in this study, the algorithm of PROMETHEE II that is used, is counted as a compensatory model. So, the stages of this method will be described briefly.

5.1. Determining the Threshold Value for Each Criterion

First, a threshold value is determined for every criterion in the decision matrix, by using equation (3).

$$\text{Threshold Value} = \max_i = 1r_ - \min_i = 1r_ /2 \quad (3)$$

5.2. Calculation of the Difference between the Elements of the Decision Matrix to the Threshold

The difference between the values of both elements of the decision matrix to the related threshold is calculated in this step.

5.3. Applying Preference Function with 0

According to the status of criteria being positive or negative, one of Preference Functions 4 or 5 is used for all elements of the matrix:

For Positive Criteria,

$$\text{if } \pi(i, j) < 0 \rightarrow 0$$

$$\text{Else } \rightarrow \pi(i, j)$$

For Negative Criteria,

$$\text{if } \pi(1, j) < 0 \rightarrow - \pi(1, j)$$

$$\text{Else } \rightarrow 0$$

5.4. Applying Preference Function With 1

Preference function with 1is applied on this step (equation 6):

$$\text{if } \pi(i, j) > 1 \rightarrow 1$$

$$\text{Else } \rightarrow \pi(i, j)$$

5.5. Creating Weighted Matrix

Now the weighted matrix must be shaped by using the weighting vector from criteria weighting step.

So that, each column of the matrix is weighted by the weight of its related criterion.

5.6. Formation of Collective Utility Function

In this step, the collective Utility function is calculated by the equation (7):

Table 1: Various Models and Reports for Ranking Websites

Model	Author	Date	Description	Focus
Linear Regression Models for Assessing the Ranking of Web Sites Based on Average Numbers of Visits*	DOWMING YEH, RAY TSAI+, PEI-CHEN SUN AND JIA-WEN LEE	2008	In this model, stepwise regression method is applied to assess the ranking of web sites in two different	Categories based on the average number of visits per day. Such ranking represents, in Part, user satisfaction, and therefore, the quality of a web site.
A Semantic Web Approach for Improving Ranking Model of Web Document	G.Charles Babu ,PVRD Prasada Rao ,N.Sandhya V.Sujatha, Dr A Govardhan	2010	This model is based on semantic web to improve the local ranking of the Web documents.	Unicode / URI XML/Name Spaces / XML Schema RDF/RDF Schema Ontology Vocabulary Logic Proof Trust
A Dynamic Bayesian Network Click Model for Web Search Ranking	Olivier Chapellet ,Ya Zhang	2009	This model shows that the proposed click model outperforms other existing click models in predicting Both click-through rate and relevance.	Information Search and Retrieval, Online Information Services, Learning; Miscellaneous
Damping Functions for Link-Based Ranking Algorithms	Ricardo Baeza-yates , Paolo Boldi , Carlos Castillo	2006	. In these algorithms there is a damping function that decreases with distance, so a direct link implies more endorsement than a link through a long path	Page rank, link

$$\rho = \sum_{j=1}^n \pi(i,j) \sum_{i=1}^n \pi(j,i)$$

In fact, the collective Utility function will have created for every option.

5.7. Ranking of Alternatives

In the final step, alternatives (three Advertisement sites) are ranked based on the seventh equation Utility function. Which one that has the highest Utility is ranked higher. In the other word, the studied sites are ranked, based on different agile capabilities, by using the algorithm of PROMETHEE II. Table 4 is declaring the result of performing this model in three studied sites:

www.istgah.com, www.irtabligh.com, www.iran-tejarat.com and rank these three sites.

1- www.istgah.com

2- www.iran-tejarat.com

3- www.irtabligh.com

6. Conclusion

Nowadays, sites should attain essential factors to adopt with new online business methods, by creating or re-engineering in business process and use IT as a tool to achieve competitive advantages and improve business efficiency.

The main question in this research was: "How can sites attain essential factors, to adopt with appliance of IT?" The answer is, identify agility of sites.

Indeed, in the research, rather than finding this answer, following results achieved:

Table 4 is declaring the result of performing this model in three studied sites:

www.istgah.com, www.iran-tejarat.com, www.irtabligh.com sites.

As it is observed in table 4, after ranking the sites www.istgah.com has the most e-agility alternative than the others. That shows that the level of the electronic readiness is higher than the other sites. www.iran-tejarat.com has also better position in the e-agility levels than www.irtabligh.com.

This research is careful classification of criteria that is mentioned in the fourth step (Table3).

These criteria are obtained by the agile capabilities, based on the Presenting a Model for Ranking Advertising Sites Based on the agile capabilities: Real Case Study of Advertisement sites Which Are Working In Electronic Industries And Information Technologies 49 studies upon the available Advertisement sites on countries and also are consolidated by using the expert's views so everyone can be used as references in practical researches.

This research tries to join multi criteria decision making concepts to the recognition

Advertisement sites problems by a different approach and models and using mathematics.

In fact the experts of IT can consider the criteria in the Advertisement sites according to their value and importance and by entering the weighting element.

It has given an appropriate approach for investment in IT to managers with the help of weights specified to each criterion. So that, it makes it preference to recognize each of criterion weight based on investing preferences and then introduce the related strategies that addresses how exactly agile capabilities will be improved Advertisement Sites .

By studying literature review section about the agile capabilities, it was understood that any research has not performed yet about ranking Advertisement sites based on the agile capabilities.

This ranking will help decision makers adopt strategic information technology with agile capabilities of Advertisement sites and edit strategic plans of information systems.

7-References

- [1] .E. Huizingh, "The content and design of web sites: an empirical study," *Information & Management*, Vol. 37, 2000, pp. 123-134.
- [2] .P. Katerattanakul and S. Siau, "Measuring information quality of web sites: development of an instrument," in

- Proceedings of the 20th International Conference on Information Systems, 1999, pp. 279-285.
- [3] .G. L. Wilkinson, L. T. Bennett, and K. M. Oliver, "Evaluating criteria and indicators of quality for internet resources," *Educational Technology*, Vol. 37, 1997, pp. 52-59.
- [4] .P. Zhang and G. von Dran, "Expectations and rankings of website quality features: results of two studies on user perceptions," in *Proceedings of 34th Annual Hawaii International Conference on System Sciences*, Vol. 7, 2001, pp. 7019.
- [5] .Van Hoek, R.I. Epilogue : Moving forward with agility , *IJOPDLM*, 31(4), 2001,290-300 Van Hoek, R.I., Harrison, A., Christopher, M: Measuring agile capabilities in the supply chain, *IJOPM*, 21(1/2),2001,126-147
- [6] .Vastag, G., Kasrda, J.D., Boone, T: Logistics support for manufacturing agility in global market, *IJOPM*, 14 (11)(1994) 73-85.
- [7] .Weiss, J.W: *Organizational Behavior and Change: Managing diversity, cross-cultural dynamics, and ethics* (2nd edition, South-Western College Publishing 2001)
- [8] .Youssef, M.A: Editorial, *IJOPM*, 14 (11) (1994), 4-6.
- [9] .Yusuf, Y.Y., Sarhadi, M. and Gunasekaran, A; *Agile Manufacturing: the rivers, Concepts and Attributes*, *IJOPE*, 62, 1999, 33-43
- [10] .Brown, J. R., 2000. "Does the Internet make markets more competitive? Evidence from the life insurance industry". *Research Working Papers Series (RWP00-007)*, Harvard University.
- [11] .Choucri, N., Maugis, V., Madnick, S., Siegel, M., Gilet, S., O'Donnel, M., et al., 2003, "e-readiness for what?" Cambridge: MIT [online]. Available at: http://papers.ssrn.com/so13/papers.cfm?abstract_id.
- [12] .CID 2007. "Readiness for the Networked World A Guide for Developing Countries, Information Technologies Group", Center for International Development (CID), Harvard University, USA.
- [13] .Donaldson, Lufkin, & Jenrette, 2000. *Swiss Re economic research & consulting. Swiss Re Sigma*.
- [14] .EIU 2009. "The e-readiness rankings 2009 The usage Imperative, Economist Intelligence Unit (EIU)" *Research Reports and IBM Institute for Business Value*.
- [15] .Iacocca Institute, 1991, "21st century manufacturing enterprise strategy", Lehigh university, Bethlehem, PA.
- [16] .Gould, P., 1997, "What is agility?", *Manufacturing Engineer*, 76(1), pp. 28-31.
- [17] Cho, H., Jung, M.Y. and Kim, M., 1996, "Enabling technologies of agile manufacturing and its related activities in Korea", *Computers & Industrial Engineering*, 30, pp. 323-334.
- [18] .DeVor, R., Graves, R. and Mills, J.J., 1997, "Agile manufacturing research: accomplishments and opportunities", (Special Issue of *Design & Manufacturing on Agile Manufacturing*), *IIE Transactions*, 29(10), pp. 813.
- [19] .Goldman, R.N. and Nagel R.A., 1993, "Management, technology and agility: the emergence of a new era in manufacturing", *International Journal of Technology Management*, 8, pp. 18-38.
- [20] .Goldman, R.N. and Nagel R.A., 1995, "Agile competitors and virtual organizations: Strategies for enriching the customer", *Van Nostrand Reinhold*, Newyork, NY.
- [21] .Yusuf, Y.Y., Sarhadi, M.S. and Gunasekaran, A., 1999, "Agile manufacturing: the drivers, concepts and attributes", *International Journal of Production Economics*, 62(1-2), 23-
- [22] .S.S.Ja, V.G.Kulkarni, A.Mitra, & J.G.Patankar. (2002), "warranty reserves for nonstationary sales process". *Naval Research Logistics*, 49, 499-513
- [23] A.J.Rolfe. (1971), "A note on marginal allocation in multiple-server service systems ". *Management Science*, 17, 656-658
- [24] .M.E.Dyer & L.G.Proll. (1977), " On the validity of marginal analysis for allocating servers in M/M/c queues". *Management Science*, 23, 1019-1022
- [25] .J.G.Shanthikumar & D.D.Yao. (1987), "Optimal server allocation in a system of multi-server station". *Management Science*, 33, 1173-1180
- [26] .J.G.Shanthikumar & D.D.Yao. (1988), "On server allocation in multi center manufacturing systems". *Operational Research*, 36, 333-342
- [27] .Brans JP, Vincke Ph, Mareschal B. (1986), "How to select and how to rank projects: The PROMETHEE method". *European Journal of Operational Research*, 24, 228-238.
- [28] .Brans, J.P. and Mareschal, B. (2005), "PROMETHEE methods", in Figueira, J., Greco, S. and Ehrgott, M. (Eds), *Multiple Criteria Decision Analysis: State of the Art Surveys*, Springer, New York, NY, pp. 163-198, Ch. 5.
- [29] .Cathy Macharis, Johan Springael, Klaas De Brucker, Alain Verbeke. (2004), "PROMETHEE and AHP: The design of perational synergies in multicriteria analysis: Strengthening PROMETHEE with ideas of AHP". *European Journal of Operational esearch*, 153, 307-317
- [30] .Goumas M, Lygerou V. (2000), "An extension of the PROMETHEE method for decision making in fuzzy environment: ranking of alternative energy exploitation". *European Journal of Operational Research*, 123, 606-613
- [31] .Sharifi, H., Colquhoun, G., Barclay, I., Dann, Z., (2001). *Agile manufacturing: a management and operational framework*,