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Evaluation criteria for blog design and analysis of causal relationships using factor analysis and DEMATEL

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ABSTRACT

The purpose of this study is to find the key factors influencing blog design, and explore the causal relationships between the criteria for each factor. Since design is a multiple criteria decision-making (MCDM) problem, this study adopts a model which is a hybrid of factor analysis and the Decision Making Trial and Evaluation Laboratory method (DEMATEL). The DEMATEL method is used to simplify and visualize the interrelationships between criteria in making a decision. This study found five core factors that influence blog design: visual clarity, interface and usability, content and searchability, programming, and sociability. In addition, the key criteria for each factor were identified and the impact-relation maps obtained. The results of this study can provide useful guidance to blog designers for developing better blog platforms.

1. Introduction

The phenomenal universality of the Internet has catalyzed the adoption of blog culture into popular culture. Advancements in technology in the form of an abundance of innovative user-friendly applications have allowed it to continuously transform. These applications are of such simplicity, that the growth in popularity of blogging among keen trendsetters is unstoppable. A "blog" or "weblog" is a web page that displays a short journal. An important characteristic of a blog is that its entries are time-stamped and arranged in chronological order (Blood, 2000). The term "weblog" was coined by John Barger in 1997, and later contracted to "blog" by Peter Merholz in 1999. Those who write blogs are called "bloggers", and "blogging" refers to the act of writing a blog. Another popular term, "blogosphere," describes the collection of the world's blogs, often connected to each other in hyperlinked chains. It also collectively refers to blogs, bloggers and online communities in their entirety, and as such is a community or social concept. Four characteristics of blogs are: (1) they are personalized by individuals, and usually informal in style; (2) are web-based, facilitating fast updates, easy management, and viewed with web browsers; (3) they are built using platforms which allow interconnection to form communities; and (4) they are automated without the use of HTML scripting languages, allowing the blogger to concentrate on the blog content (Du & Wagner, 2006).

In the context of the Internet era, "human–computer interaction" has become an important topic in both research and practice. In the past, research focused on the functionality of web pages, but has expanded to include exploration of user's emotional experience. Furthermore, many studies have demonstrated the relative importance of users' emotional involvement in websites comparison with usability. Mullet and Sano (1995) suggested that the utilization of graphical elements in visual interface design enhances the attractiveness of websites, and makes them more enjoyable to use. Tractinsky, Cokhavi, Kirschenbaum, and Sharfi (2006) indicated that users' emotional enjoyment positively influences users' responses to an interface design, and makes them more tolerant of problems with usability, for example being more willing to wait for web pages to download (Preece, Rogers, & Sharp, 2006).

Most evaluation models do not evaluate blog designs from an overall perspective and ignore the interrelationships between criteria. Designed to address problems in the field of decision-making, the Decision Making Trial and Evaluation Laboratory method (DEMATEL) uses the knowledge of experts to lay out the structural model of a system. It not only provides a way to visualize causal relationships between criteria through an impact-relationship map but also indicates the degree to which criteria influence each other (Liou, Tzeng, & Chang, 2007). This study uses a combination of factor analysis and DEMATEL to map out the complex relationships between criteria and to identify key criteria in blog design.

The goals of this research are as follows: (1) identify the determinant criteria influencing blog design; (2) find the causal relationships between the evaluation criteria for each factor and degrees of interrelatedness. The remainder of this study is

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organized as follows. In Section 2, the literature review is presented. In Section 3, the research methods are discussed. In Section 4, an empirical study analysis is provided. Finally, Section 5 contains the conclusion and possible directions for future development of the research.

2. Literature review

This study aims to integrate design evaluation into a decision-making cause and effect model. A thorough literature review is conducted, mainly focusing around two central themes. The first theme involves studies on webpage and blog design, while the second involves the utilization of hybrid models in the field of decision-making.

2.1. Web and blog design evaluation

Numerous research efforts have explored this multifaceted discipline, proposing research methods that can be divided into several types. The simplest method is to conduct a quality evaluation survey such as a service satisfaction survey while a more complex research method would involve utilizing the proposed models to scrutinize the relationships between variables; such a method would probably apply the Technology Acceptance Model (TAM). Guo and Salvendy (2009) studied Chinese online shopping websites, using a survey to pinpoint 15 key elements that determined users' degree of satisfaction. These elements included quality content, service content, and appearance description. Through identifying these key elements, they sought to assist web designers in preparing content for e-business websites that enhances the user's experience. Nielsen and Tahir (2002) approached the problem from the usability perspective, and suggested 113 criteria for webpage design.

Furthermore, in considering the application of the Technology Acceptance Model (TAM) in explaining intranet usage, Horton, Buck, Waterson, and Clegg (2001) found that factors such as usefulness, ease of use, and intention determined user acceptance. Lee and Kim (2009) went further by including external factors in examining which elements influence users' acceptance of a website. They identified external factors such as technical support, web experience, task equivocality, and the perceived ease of use as influencing intranet use.

Numerous studies have paid much attention to webpage design, but in comparison, studies on blog design and its visual elements are lagging far behind. Existing researches such as Guan and Liu (2007) have evaluated the usability of blog designs and advised the urgent need for improvement. Hsu and Lin (2008) affirmed the importance of technology and design in blogs, adding that the degree to which bloggers interact is positively associated with the enjoyment they derive from using appropriately designed interfaces. Such intrinsic motivation is an important consideration.

In order to narrow the scope of this research, it is necessary to restrict it solely to personal blogs to prevent ambiguity in its findings. It explores which key design factors bloggers believe to be important in blog design. On one hand it refers to evaluation criteria for web page design, while on the other it applies DEMATEL for the first time to analyze blog design.

2.2. Hybrid model for decision-making

In recent years, many scholars have favored the application of a multiple criteria decision-making (MCDM) approach to problem-solving in the discipline such as social science. This is to overcome inherent limitations that are inevitable in single method models. The multifaceted approach provided by MCDM can often help identify ingenious resolutions to complex problems and offer ample explanations and suggestions. For example, Tzeng, Chiang, and Li (2007) applied the hybrid MCDM model to analyze the effectiveness of e-learning programs. This hybrid MCDM model they used was based on factor analysis, DEMATEL, fuzzy theory, and the analytic hierarchy process (AHP) method. In concluding their study, the interrelationships between independent criteria and the weights of these criteria were identified, providing developers with a useful reference for the design of e-learning program websites. Tseng (2009) used fuzzy measure and the extension of DEMATEL to integrate hotel service quality perceptions. Chen and Chen (2010) developed an innovation support system for evaluating the operative performance of Taiwan's tertiary education institutions. They used a methodology based on DEMATEL, the fuzzy analytical network process (FANP) and the technique for order preference by similarity to an ideal solution (TOPSIS). The results of the analysis served as benchmarks guiding these institutions towards maximizing innovation and creativity in structuring better education systems.

DEMATEL was developed in 1971 by the Science and Human Affairs Program at the Battelle Memorial Institute's Geneva research center (Lee, Li, Yen, & Huang, 2010). It has been widely applied to complex problems in scientific disciplines such as technology, environmental science, and anthropology. Conventional quantitative analyses rely more on statistical analysis and applications of linear structure models. A good example of this is factor analysis, which extrapolates the degree of user satisfaction from surveys and interviews (Tzeng et al., 2007). Many prior studies focusing on blogs used factor analysis technique, but did not employ methodologies that comprehensively examined the interrelationships between influential criteria. DEMATEL, however, is able to compensate for these insufficiencies. It allows the causal relationships between evaluation criteria to be determined and a value structure established. DEMATEL is useful in applications in which appropriate decisions must be made (Lin & Tzeng, 2009).

Liou et al. (2007) proposed a hybrid model that combined ANP with DEMATEL to extrapolate the weighted significance of organizational and managerial factors in the evaluation of airline safety management systems. This study found that although traditional airline safety management systems emphasize incident investigation and analysis, the key determinants that influence the management of airline safety are in fact strategic and policy factors. Similar research conducted by Wu (2008) also proposed a hybrid model that could be used to analyze how a business could effectively utilize and transform knowledge into a competitive advantage, and also help it evaluate and choose better information management strategies.

Recently, DEMATEL has been much praised for its invaluable application in the realm of decision-making. In practice decision makers face both decisions that have independent criteria and those that have interacting criteria. Thus, isolating which criteria are key is beneficial in practice. However as DEMATEL has rarely been used as an analytical tool in the design field, this research seeks to reveal the potential applicability of DEMATEL to blog design and development by proposing a hybrid model that combines factor analysis with DEMATEL, in order to identify the key factors and their interrelationships of criteria within each factor.

3. Method

This study proposes a hybrid model that combines factor analysis with the DEMATEL method to conduct a comprehensive analysis in order to gain a complete understanding of blog design. The factor analysis method is commonly used to separate criteria into groups and identify the key factors. Additionally, the DEMATEL

method is used to map out the interrelations between criteria (Tzeng et al., 2007).

In this section, the steps and procedures in the factor analysis and DEMATEL analysis are briefly outlined as follows.

3.1. Factor analysis: finding factors and criteria

By identifying just a few key influential factors, factor analysis can be used to illustrate the complex interrelationships that exist among variables while preserving the majority of the data. This research adopts the exploratory factor analysis (EFA) method for finding the structural frameworks of factors without imposing any constraints, and also the principal component analysis, which is commonly used for factor analysis. Only those factors having eigenvalues greater than 1 are selected in this study. This is to ensure that the extracted factors can explain at least a specified amount of variance. In practical terms, to be satisfactory, the total amount of variance explained by factors should be at least 95% in the natural sciences, and 60% in the social sciences (Hair, Anderson, Tatham, & Black, 1998; Kaiser, 1958; Tzeng et al., 2007).

3.2. DEMATEL: clarifying the interrelations between criteria of a factor

In the initial phase of this study, factor analysis is carried out to simplify and categorize factors. The second phase seeks to apply DEMATEL to gain insight into the causal relationships between the identified factors and their degrees of influence. The three basic assumptions of DEMATEL are: (1) clarity in setting research questions: at the research planning stage, researchers must ensure that the research questions they set are clear; (2) clear association in the relatedness between factors: the weighted association between factors of the research question must be indicated by allocating them rankings in magnitude; (3) understanding of the characteristics of each factor arising out of the research question followed by supplementary conclusions after analysis (Wu, 2008). Below is a detailed description of the DEMATEL's structural frameworks and calculation procedures.

Step 1: find the average matrix. Assume the questionnaire has n criteria and Q test subjects. A pairwise comparison between criteria must be made to establish the measurement scale. The Likert-scale is often utilized which ranges from 0 to 4, representing "no influence", "little influence", "medium influence", "strong influence", and "very strong influence", respectively. Thus, the influence matrix of the qth respondent between total criteria n is given as:

$$Z^q = \left[z_{ij}^q\right]_{n\times n} \tag{1}$$

Furthermore, the total average influenced value from all respondents when considering the score from criteria $i(a_i)$ to $j(a_j)$ is given as:

$$z_{ij} = \frac{\sum_{q=1}^{Q} z_{ij}^q}{Q} \tag{2}$$

Hence, the resulting total average matrix is given as:

$$\boldsymbol{Z} = \begin{array}{c} \\ a_1 \\ \vdots \\ a_i \\ \vdots \\ a_n \end{array} \begin{array}{c} \begin{array}{cccccc} a_1 & \cdots & a_j & \cdots & a_n \end{array} \\ \begin{bmatrix} z_{11} & \cdots & z_{1j} & \cdots & z_{1n} \\ \vdots & & \vdots & & \vdots \\ z_{i1} & \cdots & z_{ij} & \cdots & z_{in} \\ \vdots & & \vdots & & \vdots \\ z_{n1} & \cdots & z_{nj} & \cdots & z_{nn} \end{bmatrix} \end{array} \tag{3}$$

Step 2: calculate the normalized initial direct-relation matrix. The normalized initial direct-relation matrix is obtained by normalizing the average matrix Z in the following way:

$$S = Max\left[\max_{1\leqslant i\leqslant n}\sum_{j=1}^{n} z_{ij}, \max_{1\leqslant j\leqslant n}\sum_{i=1}^{n} z_{ij}\right] \tag{4}$$

$$Z_{nor} = \begin{bmatrix} z_{11}/S & \cdots & z_{1j}/S & \cdots & z_{1n}/S \\ \vdots & & \vdots & & \vdots \\ z_{i1}/S & \ldots & z_{ij}/S & \cdots & z_{in}/S \\ \vdots & & \vdots & & \vdots \\ z_{n1}/S & \cdots & z_{nj}/S & \cdots & z_{nn}/S \end{bmatrix} \tag{5}$$

where Eq. (4) represents the maximum values out of the sums of all the rows, and the sums of all the columns. Eq. (5) represents the normalized initial direct-relation matrix.

Step 3: compute the total relation matrix. After step 2, the total relation matrix can be obtained by using simple numerical calculation. The total relation matrix, T, is given by:

$$\begin{aligned} T &= Z_{nor} + (Z_{nor})^2 + \cdots + (Z_{nor})^p = Z_{nor} \times (I - Z_{nor})^{-1} \\ &= [t_{ij}]_{n\times n}, \quad p \to \infty \end{aligned} \tag{6}$$

where p represents the power. Hence when p tends to infinity, the matrix T will converge. Furthermore, I is the identity matrix. The totals for each row and each column in Eq. (5) can be obtained as follows:

$$r_i = \sum_{j=1}^{n} t_{ij}, \quad i = 1, 2, \ldots, n \tag{7}$$

$$c_j = \sum_{i=1}^{n} t_{ij}, \quad j = 1, 2, \ldots, n \tag{8}$$

where r_i represents the direct influence value which is given by the factor a_i; c_j represents the indirect influence value which is given by the factor a_j. Similarly, if the lth factor is used, the direct–indirect value is displayed as:

$$r_{il} = t_{l1} + t_{l2} + \cdots + t_{l(n-1)} + t_{ln} \tag{9}$$

$$c_{jl} = t_{1l} + t_{2l} + \cdots + t_{(n-1)l} + t_{nl} \tag{10}$$

Hence, through the evaluation of Eqs. (9) and (10), the total relation matrix T can be represented in Table 1. From Table 1, if the value of $r_{il} - c_{jl}$ is positive and has greater value, it means that the criteria a_l is of the positively-affected type and has more impact on other criteria.

Step 4: set a threshold value and obtain the impact-relation map. Finally, in order to explain the structural relation between the factors, it is necessary to decide a threshold value to remove the some unsuitable effects from consideration in matrix ***T***. At this stage, experts will discuss how to decide each factor's threshold to make the rational decisions.

In the following section, more in-depth discussion involving findings from case analyses of practical examples of blog design are included. Key determinant factors are identified from the criteria, followed by a DEMATEL analysis, tracing the directions of existing causal relationships displayed by these factors to identify the exact elements of blog design that correspond with the main concerns of bloggers and blog users.

4. Empirical study and results

In this section, the design evaluation criteria for each factor were identified. There are three subsections in this section.

Section 4.1 describes the questionnaires and the expert interview. Section 4.2 describes the results of factor analysis, including the key factors. Section 4.3 describes the results of the DEMATEL analysis, including the influence matrix and the impact-relation maps.

4.1. Materials

To develop the design evaluation criteria, eight blog experts were consulted. The experts were all experienced blog users, all of whom read blogs regularly and have managed a blog for at least three years. After conducting the literature review and the expert interview, 23 criteria were identified (Table 4).

In the first phase of this study, a factor analysis was conducted to obtain independent criteria clusters. The questionnaires in survey were distributed to 202 undergraduate students from National Chiao Tung University who were experienced in blogging. The respondents' data were analyzed using the windows software package SPSS version 12. Following the factor analysis, the factors were then named by the researcher of this study.

In the second phase, DEMATEL analysis was used to identify the interrelationships between the criteria. The results from the first phase of the study were incorporated into a questionnaire, which was then given to 30 experts. These experts included experienced bloggers and website-related scholars. The experts ranked each criterion using the Likert 5 point scale.

Table 1
The total relation matrix (T).

	a_1	$\cdots$	a_j	$\cdots$	a_n	
a_1	t_{11}	$\cdots$	t_{1j}	$\cdots$	t_{1n}	r_{i1}
$\vdots$	$\vdots$		$\vdots$		$\vdots$	$\vdots$
a_n	t_{n1}	$\cdots$	t_{nj}	$\cdots$	t_{nn}	r_{in}
	c_{j1}	$\cdots$	c_{jj}	$\cdots$	c_{jn}	

Table 2
Reliability analysis results.

Source of variance	Sum of sq.	d.f.	Mean square	F-test	Probability
Between people	2878.965	192	14.995		
Within people	4726.087	4246	1.113		
Between measures	883.653	22	40.166		
Residual	3842.434	4224	0.910	27.717	0.000
Total	7605.052	4438	1.714		
Grand mean	4.5443				
Alpha	0.939				
Standardized element Alpha	0.943				

Table 3
K.M.O and Bartlett test.

Kaiser–Meyer–Olkin		0.918
Bartlett test	Approach Chi.	2990.373
	d.f.	253
	Significance	0.000

4.2. Results of factor analysis

Before the questionnaires were given out, a reliability analysis was carried out. The findings of this analysis indicated a Cronbach's α value 0.939, higher than 0.8, and a standardized element α value of 0.943 (Table 2) which demonstrated questionnaire reliability to be significant and effective. In order to understand whether respondents responses in the questionnaire were suitable for factor analysis, the KMO value and α value were calculated. The values were found to be 0.918 and 2990.373, respectively (Table 3), indicating that the data was suitable.

This research applied factor rotation and principal component analysis to extract factors in ways that ensured better interpretation for extrapolation and hence derive appropriate subjective findings. According to Hair et al. (1998), when the sample size is between 200 and 300, the loading should be 0.384. Through conducting statistic analysis on the figures extracted, five factors were then identified (Table 4). Table 4 shows the criteria under each factor and offers explanations for the magnitudes of accumulated variances as a whole. These five factors were named as follows: visual clarity (F1), interface and usability (F2), content and searchability (F3), programming (F4), and sociability (F5).

The following subsection will discuss the observations derived from the impact-relation maps based on the DEMATEL analysis, where the criteria under each factor and their factorial interrelationships were examined.

4.3. Results of the DEMATEL analysis

The purpose of this study is to find the relationships between these design criteria. After identifying the five factors, DEMATEL analysis was used to calculate the weighted significance of each criterion under each factor based on the interrelationships shown on the impact-relation maps.

Table 4
Factor analysis results: factors and criteria.

Factors	Criteria	Eigenvalue	Percentage of variance	Cumulative %
Visual clarity (F1)	Color arrangement (C1), Simplicity of layout (C2), Font arrangement (C3), Text and ground contrast (C4), Stylistic consistency (C5), Readability (C6), No advertisement banner (C7)	10.479	45.563	45.563
Interface and usability (F2)	Aesthetic layout (C8), Multiple layout style choice (C9), Ease of management (C10), Ease of registration (C11), Storage capacity (C12), System stability (C13), Friendliness to beginners (C14)	1.834	7.972	53.535
Content and searchability (F3)	Specialized field or professional content (C15), Content richness (C16), Fluency of writing (C17), Customized website address (C18), Ease of searching (C19)	1.451	6.307	59.842
Programming (F4)	Open CSS (C20), Open JavaScipt (C21)	1.125	4.893	64.736
Sociability (F5)	Popularity of the blog platform (C22), Friends' Hyperlinks (C23)	1.063	4.62	69.356

Extraction methods: principal component analysis. Rotation method: Varimax with Kaiser normalization.

4.3.1. Total relation matrix and causal influence table

Based on the responses of 30 experts, the total relation matrixes were calculated (Tables 5–9). Take factor one (F1) for example (Table 5), color arrangement (C1) will directly impact simplicity of layout (C2) with an impact level of 0.994; color arrangement (C1) will directly impact font arrangement (C3) with an impact level of 0.839. Besides this, color arrangement (C1) will impact itself with an impact level of 0.783.

The $r_{il} + c_{jl}$ and $r_{il} - c_{jl}$ values can be calculated from the total relation matrix (Tables 10–14). The $r_{il} + c_{jl}$ value indicates how important a criterion is, while the $r_{il} - c_{jl}$ value indicates the size of the direct impact of this criterion on other criteria. However, if this value is negative and large, it implies that this criterion is highly influenced by other criteria (Lee & Kim, 2009).

4.3.2. Impact-relation maps

This research proceeded further by carried thorough discussion with eight experts where appropriate threshold values were derived in accordance with the identified five factors. The threshold values for visual clarity (F1), interface and usability (F2), content and searchability (F3), programming (F4), and sociability (F5) were 0.73, 0.55, 0.80, 12.81 and 42.92, respectively. Only values above these thresholds were considered, otherwise the relationships would be too complex. The threshold values have not standard settings. The thresholds are decided through expert options in this field.

After deciding the threshold values, the DEMATEL impact-relation maps could be obtained (Fig. 1). By drawing the impact-relation maps for the criteria of each factor, the complicated causal relationships could be visualized. These are summarized below:

Visual clarity (F1): color arrangement (C1) ($r_{il} - c_{jl} = 0.084$), font arrangement (C3) ($r_{il} - c_{jl} = 0.247$), text and ground contrast (C4) ($r_{il} - c_{jl} = 0.394$), and no advertisement banner (C7) ($r_{il} - c_{jl} = 0.284$) were the positively-affected criteria of factor F1. Simplicity of layout (C2) ($r_{il} - c_{jl} = -0.016$), style consistency (C5) ($r_{il} - c_{jl} = -0.064$), and readability (C6) ($r_{il} - c_{jl} = -0.93$) were the nega-

Table 5
The total relation matrix for the factor of visual clarity (F1).

F1	C1	C2	C3	C4	C5	C6	C7
C1	0.783	0.994	0.839	0.888	0.729	1.004	0.639
C2	0.981	0.88	0.898	0.924	0.766	1.049	0.69
C3	0.871	0.946	0.679	0.825	0.695	0.953	0.574
C4	0.923	0.986	0.847	0.728	0.728	0.996	0.608
C5	0.713	0.765	0.659	0.666	0.48	0.773	0.484
C6	0.844	0.893	0.79	0.802	0.669	0.775	0.588
C7	0.677	0.738	0.586	0.589	0.537	0.739	0.392

Table 6
The total relation matrix for the factor of interface and usability (F2).

F2	C8	C9	C10	C11	C12	C13	C14
C8	0.366	0.557	0.507	0.461	0.422	0.46	0.6
C9	0.562	0.446	0.571	0.517	0.473	0.512	0.687
C10	0.504	0.548	0.441	0.5	0.458	0.501	0.69
C11	0.446	0.487	0.521	0.377	0.417	0.472	0.665
C12	0.45	0.489	0.509	0.457	0.335	0.5	0.592
C13	0.502	0.544	0.561	0.525	0.51	0.409	0.67
C14	0.529	0.6	0.649	0.597	0.511	0.568	0.583

Table 7
The total relation matrix for the factor of content and searchability (F3).

F3	C15	C16	C17	C18	C19
C15	1.055	1.403	1.324	0.827	1.171
C16	1.244	1.11	1.269	0.807	1.148
C17	1.224	1.339	1.017	0.779	1.109
C18	0.646	0.733	0.649	0.391	0.73
C19	0.741	0.793	0.725	0.571	0.595

Table 8
The total relation matrix for the factor of programming (F4).

F4	C20	C21
C20	12.556	12.556
C21	13.556	12.556

Table 9
The total relation matrix for the factor of sociability (F5).

F5	C22	C23
C22	42.667	42.667
C23	43.667	42.667

Table 10
The causal influence levels for the visual clarity factor (F1).

Criteria	$r_{il} + c_{jl}$	$r_{il} - c_{jl}$
Color arrangement (C1)	11.668	0.084
Simplicity of layout (C2)	12.385	−0.016
Font arrangement (C3)	10.84	0.247
Text and ground contrast (C4)	11.237	0.394
Style consistency (C5)	9.142	−0.064
Readability (C6)	11.652	−0.93
No advertisement banner (C7)	8.233	0.284

Table 11
The causal influence levels for the interface and usability factor (F2).

Criteria	$r_{il} + c_{jl}$	$r_{il} - c_{jl}$
Aesthetic layout (C8)	6.734	0.013
Multiple layout style Choice (C9)	7.437	0.097
Ease of management (C10)	7.401	−0.115
Ease of registration (C11)	6.819	−0.051
Storage capacity (C12)	6.458	0.205
System stability (C13)	7.143	0.3
Friendliness to beginners (C14)	8.526	−0.449

Table 12
The causal influence levels for the content and searchability factor (F3).

Criteria	$r_{il} + c_{jl}$	$r_{il} - c_{jl}$
Specialized field or professional content (C15)	10.688	0.87
Content richness (C16)	10.955	0.2
Fluency of writing (C17)	10.451	0.482
Customized website address (C18)	6.524	−0.225
Ease of searching (C19)	8.178	−1.328

Table 13
The causal influence levels for the programming factor (F4).

Criteria	$r_{il} + c_{jl}$	$r_{il} - c_{jl}$
Open CSS (C20)	51.222	−1
Open JavaScipt (C21)	51.222	1

Table 14
The causal influence levels for the sociability factor (F5).

Criteria	$r_{il} + c_{jl}$	$r_{il} - c_{jl}$
Popularity of the Blog Platform (C22)	171.667	−1
Friends' Hyperlinks (C23)	171.667	1

tively-affected criteria. The key criterion of factor F1, i.e. that criterion which influences the other criteria most and so be taken into consideration, was found to be "text and ground contrast (C4)."

Interface and usability (F2): Aesthetic layout (C8) ($r_{il} - c_{jl} = 0.013$), multiple layout style choice (C9) ($r_{il} - c_{jl} = 0.097$), storage capacity (C12) ($r_{il} - c_{jl} = 0.205$), and system stability (C13) ($r_{il} - c_{jl} = 0.3$) were the positively-affected criteria of factor F2. Ease of management (C10) ($r_{il} - c_{jl} = -0.115$), ease of registration (C11) ($r_{il} - c_{jl} = -0.051$), and friendliness to beginners (C14) ($r_{il} - c_{jl} = -0.449$) were the negatively-affected criteria. The key criterion of factor F2 was found to be "system stability (C13)."

Content and searchability (*F3*): specialized field or professional content (C15) ($r_{il} - c_{jl} = 0.87$), content richness (C16) ($r_{il} - c_{jl} = 0.2$), and fluency of writing (C17) ($r_{il} - c_{jl} = 0.482$) were the positively-affected criteria of factor F3. Customized website address (C18) ($r_{il} - c_{jl} = -0.225$) and ease of searching (C19) ($r_{il} - c_{jl} = -1.328$) were the negatively-affected criteria. The key criterion of factor 3 was found to be "specialized field or professional content (C15)."

Programming (*F4*): open JavaScipt (C21) ($r_{il} - c_{jl} = 1$) was a positively-affected criterion, and open CSS (C20) ($r_{il} - c_{jl} = -1$) was a negatively-affected criterion. The key criterion of factor 4 was found to be "open JavaScipt (C21)."

Sociability (*F5*): friends' hyperlinks (C23) ($r_{il} - c_{jl} = 1$) was a positively-affected criterion, and popularity of the blog platform (C22) ($r_{il} - c_{jl} = -1$) was a negatively-affected criterion. The key criterion of factor 5 was found to be "friends' hyperlinks (C23)."

5. Discussion and conclusion

5.1. Discussion

Based on the results of the empirical study, the researchers make the following suggestions regarding blog design: firstly, there are five important factors that influence blog design: visual clarity (F1), interface and usability (F2), content and searchability (F3), programming (F4), and sociability (F5).

Secondly, there are some important messages and implications to be drawn from the impact-relation maps (Fig. 1). In considering the first factor, if a designer wishes to enhance the visual clarity of a blog, then the criteria of color arrangement (C1), font arrangement (C3), and text and ground contrast (C4) should be the most important considerations, because they influence the other criteria most and are influenced by the other criteria least. These three criteria demonstrate the importance of readability, where readability is defined as the degree of ease and comfort in interpreting the lay-

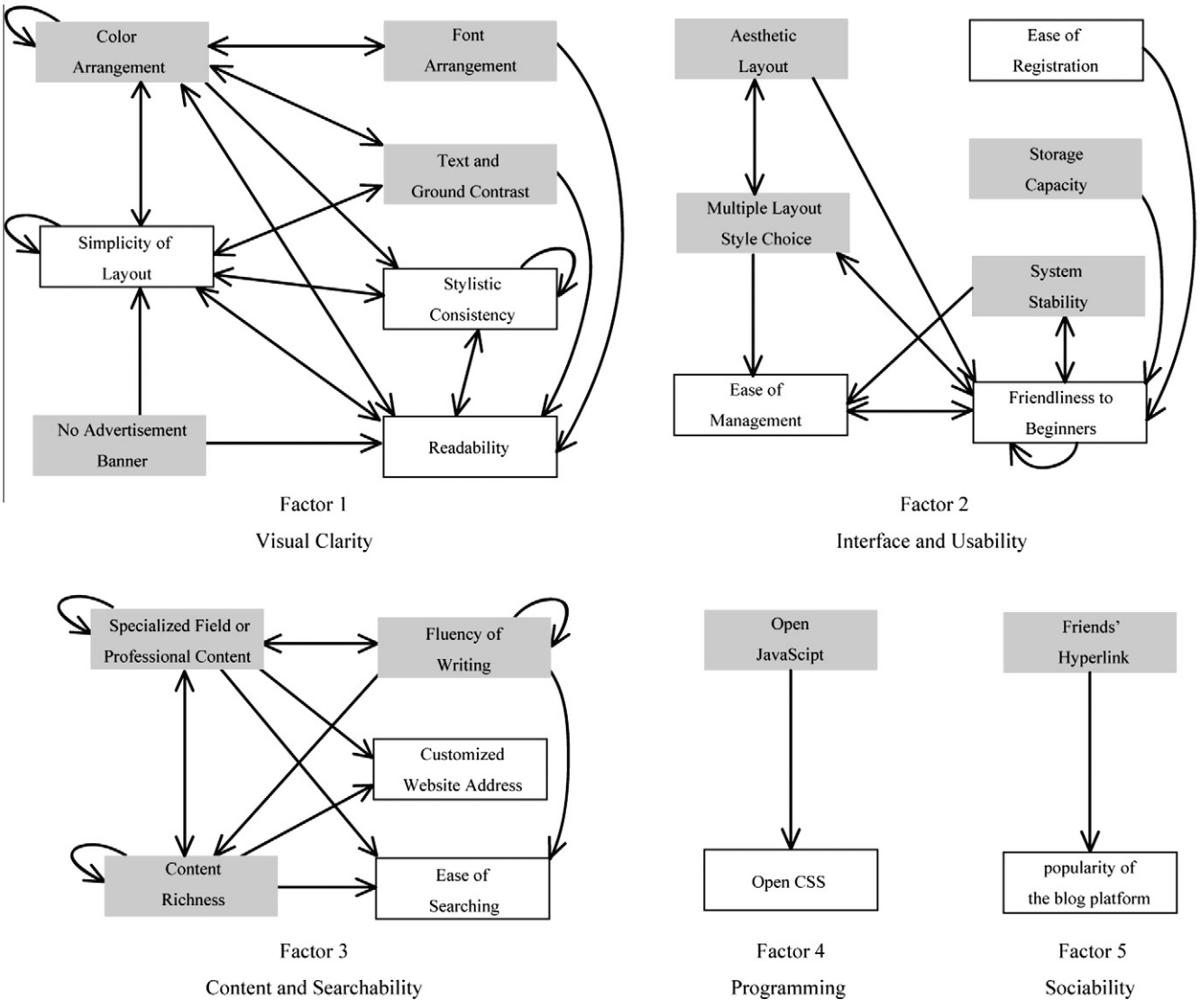

Fig. 1. The impact-relation maps for the five factors.

out and reading the content of a blog. Moving onto the second factor, if a blog developer wants to enhance the interface and usability of a blog, then system stability (C13) and multiple layout style choice (C9) are the most influential criteria and should be considered first. In other words, improving these two criteria will result in improving the overall quality of the interface and its usability. For the third factor, if we want to see improvements in the quality of the content and searchability aspects of a blog, then specialized field or professional content (C15) is the most important criterion to work on; the quality of a blog's content is the main reason readers keep returning to read it. When considering the fourth factor, some advanced bloggers wish to customize the appearance of their blog using code, then the criterion open JavaScipt (C21) is important. Finally, for the fifth factor, friends' hyperlink (C23) is the key criterion that influencing the popularity of the blog platform (C22).

5.2. Conclusion

Nowadays blogs are a common medium of daily communication. The factors influencing blog interface design are various and complicated. However, there is still insufficient evaluation of blog interface designs. The evaluation of blog interface design criteria is a MCDM problem, which requires considering many complex and interactive factors.

Based on several aspects of blog design evaluation, this study presents a hybrid MCDM evaluation model for blog design criteria. In accordance with the numerous criteria for blog design evaluation, this study combined factor analysis and the DEMATEL method to analyze and illustrate the interactive relationships and impact levels between criteria. By incorporating the opinions of experts, the DEMATEL method was used to systematically evaluate the criteria for blog design. When designing a blog, the designer is no longer restricted to his or her won subjective judgment, but can use a statistical method to obtain a more rational reference point. This can greatly contribute to the improvement of blog designs. In addition, the key factors in blog design evaluation were derived using factor analysis. The application of the hybrid MCDM model not only provides designers with a better design strategy but also helps to avoid some unnecessary failures.

Although there are numerous excellent studies devoted to blog design, few of these can explain the interaction between evaluation criteria in a systematic way. According to the results of empirical studies, a hybrid model should prove useful in evaluating blog design and visualizing the interrelationships between the criteria. Consequently, the author hopes that this study will make a useful contribution to better understanding blog design.

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