An Exploratory Study of Critical Success Factors of Brand Extension Strategies using Fuzzy Analytical Hierarchy Process

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Abstract: Nowadays, the issue of brand extension strategy has emerged as one of the most crucial topics for marketing management. Previous studies report extraordinarily high failure in brand extension strategies. Hence, this study present a practical framework for evaluation critical factors of brand extension strategy of product based on appropriate criteria and Fuzzy Analytical Hierarchy Process technique. For obtaining critical factors, the key published papers are employed to derive those initially important factors firstly, 15 factors are identified. These factors have been discussed and publicized in academic and management fields and can be summarized as three aspects and fifteen initially factors. Consequently, the proposed Fuzzy AHP approach is used to measure relative weights for evaluating these factors. The proposed methodology implemented as an actual case in the biggest automobile manufacture in Iran. Finally, the results of this study shows that "Quality", "Services after sale", "Determining the suitable strategies in Brand field", "Top management commitment and support" and "Advertisement" is the top five critical factors.
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1. Introduction

In today's new competitive environment, marketers endeavor to reduce marketing expenses and increase sales. Strong brands enjoying high brand strategy can help managers and policy makers to relish higher margins, less vulnerability to competitive attacks, greater customer loyalty, better customer response to communications, and more cooperation from trade and other intermediaries. In order to keep track of the strength of their brands, managers need to able to quantify brand strategy. However, creating and holding brand extension strategy is a challenge for top managers in the organizations.

A direct branding strategy is defined as a new extension that is strongly linked to the parent brand's name, colors, and/or symbols, which appears in a prominent position in the brand name (Milberg et al., 1997). A beneficial brand extension strategy can reduce marketing expenditures (Randall, 1993) and, thus increase new product introductions' profitability (Collins-Dodd and Louviere, 1999). Furthermore, the parent brand's image can also benefit from brand extensions (Balachander and Ghose, 2003).

From a detailed examination of the literature, the concept of brand strategy cannot uniform, owing to the difference of the perspective of the research. The authority of the United States Marketing Philip Kolter says that (Philip Kotler, 1997; Philip Kotler, 1999). The brand is a name, a noun, a symbol or a design, or the sum of the above, whose purpose is to make their own product or service is different from other competitors. Therefore, the so-called brand strategy is just a corporate strategy, which take the corporate brand as core competitiveness in order to obtaining the difference profit and the value. Its essence is the inevitable outcome with the development of market economy to the current stage. Developing brand strategies are therefore essential in building brands. A branding strategy reflects the number and nature of common and distinctive brand identities applied to the different products sold by an organization. Devising a brand strategy involves deciding the nature of new and existing brand identities to be applied to new and existing products (Kotler & Keller, 2006; Keller, 2003). In other words, branding strategies are concerned with how brand identities are employed across the products of an organization (Keller, 2002). It is therefore not surprising that ' capitalizing on the equity in established brand names has become the guiding strategy of product planners ' (Tauber, 1988). This notion is supported by Simms (2005), who identifies 82 percent of new product introductions as brand extensions.

Given the importance and popularity of brand extension strategy on the one hand, and a brand extension failure rate of about 80 per cent on the other, it is pivotal to know which factors influence brand extension success (Völckner and Sattler, 2006). Researchers have sought to identify factors related to the success of a brand extension, and the negative effect that the brand extension strategy may have on the original brand (Loken and John, 1993; Gu¨rhan-Canli and Maheswaran, 1998; John et al., 1998; Martı´nez and Pina, 2003; etc). The choice of branding strategy is likely to be a key factor in the development of any line extension, but specific effects of the branding strategy have received limited attention in the brand/line extension literature (Milberg et al., 1997). The decision as to how to brand new products is thus critical. When an organization introduces a new product, it has three main choices, namely (1) it can develop new brand identities for the new product; (2) it can apply some of its existing brand identities; and (3) it can use a combination of new and existing brand identities (Kotler & Keller, 2006).

Brand extensions are among the most important and often used branding strategies (Keller 2003). They refer to the use of well-known brand names when launching new products—for example, the transfer of the Virgin brand (i.e., the parent) to a new product (i.e., the extension) such as limousine services.

Unfortunately, there are only a few studies that address for critical factors of brand extension strategies. Therefore, the motivation of this study is that although several critical success factor analyses in the field of brand strategies appear in the literature, most of them do not have any technical background. In addition, lack of theoretically empirical research in the classification factors, that are affected the successful brand strategies is existed. Many researchers have proposed using fuzzy analytical hierarchy process (FAHP) technique and this technique has become a popular and common tool in literature at least in this problem. Iranmanesh et al., (2008) applied a risk evaluation methodology to prioritize and organize risk factors in IT projects based on fuzzy analytical hierarchy process (FAHP). Azadeh et al. (2010) presented a robust decision-making methodology based on Fuzzy Analytical Hierarchy Process (FAHP) for evaluating and selecting the appropriate simulation software package. Azadeh et al. (2011) presented a decision making approach based on Fuzzy Analytical Hierarchy Process (Fuzzy AHP), Technique for Order Performance by Similarity to Ideal Solution (TOPSIS), and computer simulation to determine the most efficient number of operators and the efficient measurement of operator assignment in CMS. Miri-Nargesi et al. (2011) proposed a fuzzy group decision making process to evaluate and select the appropriate Information System Project (ISP) based on fuzzy Analytical Hierarchy Process (FAHP).

Therefore, in this study Fuzzy Analytical Hierarchy Process is used to classify CSFs for helping decision-makers focus on those factors that provide great influence. As an advantage, the AHP enables decision-maker to handle problems in which the subjective judgment of an individual decision-maker constitutes an important role of the decision-making process. Also using fuzzy theory in this problem can reduce ambiguities and uncertainties that are inherent in the judgments of experts in the field of selection. The proposed methodology implemented in an actual case in one of the biggest Car Company (SAIPA) in Iran.

The reminder of the paper is structured as follows: Section 2 describes the proposed methodology to Brand Strategy problem based on Fuzzy AHP and presenting of all criteria that we considered; in section 3, the proposed methodology applied as an empirical illustration is provided and the results of proposed methodology are discussed. Finally, the conclusions of this work are presented in section 4.

2. Fuzzy Analytic Hierarchy Process (FAHP)

Analytic hierarchy process (AHP) is a useful method for solving complex decision-making problems involving expert judgment (Saaty, 1980). In AHP method, the multi-attribute weight measurement is calculated by pair-wise comparison of the relative importance of two factors. Traditional methods of AHP still cannot process imprecise or vague knowledge, to address such vagueness; Zadeh (1965) introduced fuzzy sets theory, to rationalize uncertainty associated with impression or vagueness. Fuzzy set theory resembles human reasoning in its use of approximate information and uncertainty in decision making; many researchers have used fuzzy theory in conjunction with AHP. The steps of the proposed methodology are as follows:

Step1: *Find Criteria and Alternatives and Establish hierarchal structure*

Firstly, the organization should specify the strategies and selection criteria for evaluating these criteria by interviewing the SAIPA staff and managers (through different approaches i.e. Delphi, brainstorming and so on) and reviewing the literature.

Step 2: *Gather expert' judgments based on fuzzy number and establish fuzzy pair wise comparison matrix*

The sample questionnaire is used to determine the priorities of the criteria using experts' opinions based on fuzzy numbers. This questionnaire along with similar questionnaire about the evaluation of the alternatives should be filled by the experts for the evaluation of the relative importance of the criteria as well as the relative performance of the alternatives. In this paper, triangular fuzzy numbers is used which is illustrated in Figure (1). Equation (1) shows the membership function of a triangular fuzzy number. Triangular fuzzy number (TFN) is usually shown with (l, m, u).

$$U(x)=\begin{cases}\dfrac{x-l}{m-l} & l\le x\le m\\[2mm] \dfrac{u-x}{u-m} & m\le x\le u\\[2mm] 0 & \text{Otherwise}\end{cases}\qquad (1)$$

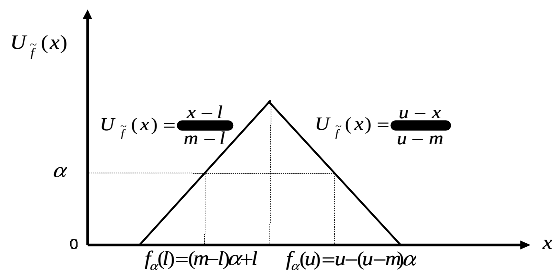

Figure 1. Triangular Fuzzy Number

The conventional AHP method, which is proposed by Saaty (1980), uses pair-wise comparisons shown in equation (2). The fuzzy judgment matrix can be defined as follows:

$$\tilde{A}^k=[\tilde{a}_{ij}]^k \qquad (2)$$

where

$$\tilde{a}_{ij}^k=(1,1,1):\forall i=j;\ \tilde{a}_{ij}^k=\frac{1}{\tilde{a}_{ij}^k}:\forall i\neq j\ .$$

$\tilde{A}^k$ is the fuzzy judgment matrix of evaluator k, $\tilde{a}_{ij}^k$ the fuzzy assessments between criterion *i* and *j* of evaluator *k*, $\tilde{a}_{ij}=(l_{ij}^k,m_{ij}^k,u_{ij}^k)$ n is the number of the related criteria at this level. FAHP replaces crisp *aij* in AHP by triangular fuzzy numbers. Because each number in the matrix shows the opinions of the experts, fuzzy number is the best solution to show expert judgments. Eigenvector method proposed by Buckley (1985) is used here to analyze the data and achieve the consensus of the experts. As is shown in equations (3-6), *l*, *m*, and *n* show the minimum possible, most likely and the maximum possible value of a fuzzy number, respectively. These numbers have following characteristic:

$$\tilde{a}_{ij}^k=(l_{ij},m_{ij},u_{ij}):l_{ij}\le m_{ij}\le u_{ij},\ l_{ij},m_{ij},u_{ij}\in[1/9,9] \qquad (3)$$

Based on Saaty's scale (1980), the linguistic scale and corresponding triangular fuzzy numbers are illustrated in Table (1).

Table 1. The linguistic scale and corresponding triangular fuzzy numbers

Fuzzy	Linguistic scales	Scale of fuzzy
$\tilde{1}$	Equally important	(1, 1, 1)
$\tilde{3}$	Weakly important	(2, 3, 4)
$\tilde{5}$	Essentially important	(4, 5, 6)
$\tilde{7}$	Very strongly	(6, 7, 8)
$\tilde{9}$	Absolutely important	(7, 8, 9)
$\tilde{2},\tilde{4},\tilde{6},\tilde{8}$	Intermediate values	(x- 1, x, x+1)
$1/\tilde{x}$	between two adjacent judgments	(1/(x+ 1), 1/x, 1/ (x- 1))

***Step 3:** Calculate Consistency Rate (C.R.)*

According to the analysis of Csutora and Buckley (2001), let $\tilde{A}=[\tilde{a}_{ij}]$ be a fuzzy judgment matrix with triangular fuzzy number $\tilde{a}_{ij}=(l_{ij},m_{ij},u_{ij})$ and form $A=[m_{ij}]$. If *A* is consistent, then $\tilde{A}$ is consistent. Saaty (1980) suggested consistency index (C.I.) and consistency rate (C.R) to verify the consistency of the judgment matrix. Random index R.I. represents the average consistency index over numerous random entries of the same order reciprocal matrices. The value of R.I. depends on the value of n (the number of related criteria or alternative in decision matrices) which is shown in Table 2.

Table 2. Random Index used to compute consistency rate (C.R.)

n	1	2	3	4	5
R.I.	0	0	0.52	0.89	1.11
n	6	7	8	9	10
R.I.	1.25	1.35	1.4	1.45	1.49

Saaty (1990) provided a consistency index to measure any inconsistency within the judgments in each pair-wise comparison matrix as well as for the entire hierarchy. The consistency index (C.I.) is formulated as follows:

$$C.I.=\frac{\lambda_{\max}-n}{n-1} \qquad (4)$$

where $\lambda_{\max}$ is the maximum eigenvalue, and *n* is the dimension of matrix. Accordingly, the consistency rate (C.R.) can be computed with the use of following equation:

$$C.R. = \frac{C.I.}{R.I.} \qquad (5)$$

Step 4: *Test Consistency Rate (C.R.)*

If $C.R. < 0.1$, the estimate is acceptable; if the consistency is not passed, a new comparison matrix must be established.

Step 5: *Defuzzify each expert's Judgment using CFCS Method*

The method for defuzzification used in this paper is the converting fuzzy data into crisp scores (CFCS) method introduced by Opricovic and Tzeng (2003). The CFCS method can clearly express fuzzy perception, which is based on the procedure of determining the lower and upper scores by fuzzy min and fuzzy max, and the total score is determined as a weighted average according to the membership functions (Lin, 2010). The steps of CFCS method are as follow:

1: Normalized matrix

$$xl_{ij}^{k} = (l_{ij}^{k} - \min l_{ij}^{k}) / \Delta_{\min}^{\max} \qquad (6)$$

$$xm_{ij}^{k} = (m_{ij}^{k} - \min l_{ij}^{k}) / \Delta_{\min}^{\max} \qquad (7)$$

$$xu_{ij}^{k} = (u_{ij}^{k} - \min l_{ij}^{k}) / \Delta_{\min}^{\max} \qquad (8)$$

where

$$\Delta_{min}^{max} = \max u_{ij}^{k} - \min l_{ij}^{k} \qquad (9)$$

2: Computing lower (ls) and upper (us) normalized value:

$$xls_{ij}^{k} = xm_{ij}^{k} / (1 + xm_{ij}^{k} - xl_{ij}^{k}) \qquad (10)$$

$$xus_{ij}^{k} = xu_{ij}^{k} / (1 + xu_{ij}^{k} - xm_{ij}^{k}) \qquad (11)$$

3: Computing total normalized crisp value:

$$x_{ij}^{k} = [xls_{ij}^{k}(1 - xls_{ij}^{k}) + xus_{ij}^{k}] / [1 - xls_{ij}^{k} + xus_{ij}^{k}] \qquad (12)$$

4: Computing crisp value:

$$a_{ij}^{*k} = \min l_{ij}^{k} + x_{ij}^{k}\Delta_{\min}^{\max} \qquad (13)$$

For all experts' judgments, Equations (6-13) should be implemented separately. After calculating the crisp value for each expert, the consistency Rate of each expert can be also calculated.

Step 6: *Calculate integrated crisp values, weights and final ranking*

After defuzzifying by using CFCS Method and collecting all consistent crisp judgments for all levels of the hierarchical structure, geometric average is applied to integrate crisp values of k evaluators using Equation (14).

$$a_{ij}^{*} = \sqrt[k]{\left(a_{ij}^{*1} \times a_{ij}^{*2} \times \ldots \times a_{ij}^{*k}\right)} \qquad (14)$$

$$A_{ij}^{*} = [a_{ij}^{*}] \qquad (15)$$

A_{ij}^{*} is a aggregated crisp judgment matrix of *k* evaluators, a_{ij}^{*} is the aggregated crisp assessments of criterion *i* and criterion *j* of k experts, i, j = 1, 2. . . n, and k is the number of experts. In the next Step, we can achieve the final weight of the alternatives using Equation (16) and then the decision can be made based on the weight of alternatives. The weights are sorted decreasingly and the first ranked alternative is selected finally.

$$w_i = \frac{\left(\prod_{j=1}^{n} a_{ij}^{*}\right)^{1/n}}{\sum_{i=1}^{n}\left(\prod_{j=1}^{n} a_{ij}^{*}\right)^{1/n}} \qquad i, j = 1, 2, \ldots, n \qquad (16)$$

3. Applying the Proposed Methodology

As mentioned before, according to the decision problem presented in Section 1, in this section, the proposed methodology on an actual case in one of the biggest Car Company (SAIPA) in Iran is implemented. SAIPA is one of the few largest automobile manufacturers in the Middle East. Since 1966, SAIPA has produced different passenger cars such as SABA, SAIPA111, SAIPA 132, SAIPA 141, Rio and Xantia as well as the New Local Brand, TIBA, which is on the way for mass production. The production volume reached 520,000 vehicles in 2008 capturing more than 53% of the local market share in the passenger car segment and resulting in a turn-over of more than 4.2 billion US$.

According to the strategic plan of SAIPA, the production volume of the year 2011 will amount to 720,000 vehicles. The main factory is located on the suburb of Tehran, Iran. The company's strategy is to improve infrastructure of information system technology to continue progress pace in its competitive advantage and achieve higher market share. The brand strategy is one the important plan for this company. The company's managers have decided to implement the successful planning for their brand strategy. Therefore, when we construct the AHP model, the first element is to look for the criteria. After reviewing, the literature shows that different organizations may want to consider different criteria and strategies, but in our actual case, the management convenes a meeting to study the criteria, experts finally considered seventeen criteria.

For this problem, after some debate, the task force depicts a hierarchy structure as illustrated in Figure (2). The fuzzy decision matrices for intangible criteria and brand strategies to select the most important criteria are attained from a verbal questionnaire filled by thirty different experts who had work in IT field at the SAIPA Company and then converted to fuzzy numbers based on scales mentioned in Table (1) for Fuzzy AHP. Information about tangible criteria and brand strategies is collected documents, which were existent in the organization.

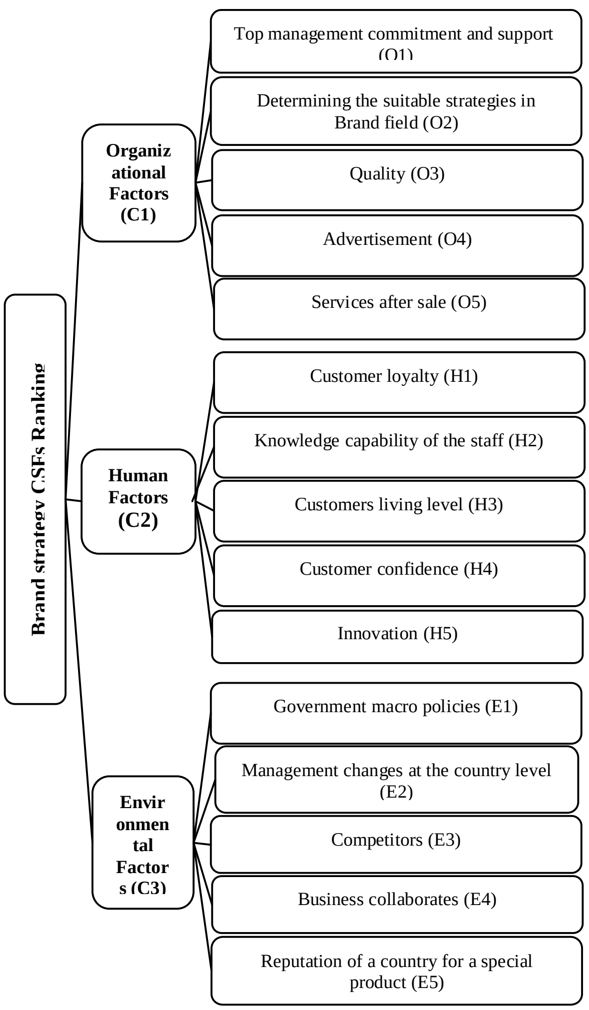

Figure 2. Hierarchy structure for Critical success factors of the brand strategies

Step1: *Find Criteria and Alternatives and Establish hierarchal structure*

The first step of analytical hierarchy process is to find criteria and alternatives using expert judgment and literature reviews. In this section, fifteen criteria have been identified for the problem. These criteria are categorized into the three aspects such as Organizational, Human and Environmental. After that, decision makers will establish hierarchical structure. The hierarchical model should be able to break the existing complex decision problem into manageable components of different layers/levels. Different layers of the hierarchy structure are sketched in Figure .2.

Step 2: *Gather experts' judgments based on fuzzy number and establish fuzzy pair wise comparison matrix*

In this step the pair-wise comparison matrices for main and sub criteria are gathered from a verbal questionnaire filled by thirty experts in the SAIPA Company. Then these verbal pair-wise comparison matrices are replaced with correspondent triangular fuzzy numbers. For example, the integrated fuzzy comparison matrix for all evaluators of three main criteria with respect to the goal node is shown in Table 3.

Table 3. The integrated fuzzy comparison matrix for all evaluators of three main criteria with respect to the goal node

	C1			**C2**			**C3**		
	l	*m*	*u*	*l*	*m*	*u*	*L*	*m*	*u*
C1	1	1	1	2.97	3.71	4.37	2.21	2.72	3.21
C2	0.22	0.26	0.336	1	1	1	1.09	1.37	1.73
C3	0.31	0.36	0.45	0.57	0.72	0.91	1	1	1

Step 3: *Calculate Consistency rate (C.R.)*

As mentioned above in step 3 of the proposed methodology, if $\tilde{A} = [\tilde{a}_{ij}]$ be a fuzzy judgment matrix with triangular fuzzy number (e.g. data in Table (3)), to calculate consistency rate, firstly we form $A = [m_{ij}]$. Then the consistencies of fuzzy judgment matrix (Table (3)) are evaluated using Equations (4-5) and (17) is used to determine maximum eigenvalue (λ_{max}).For the data in Table (3) we have:

$$\lambda_{max} = 3.0444 \quad C.I. = \frac{\lambda_{max} - n}{n-1} = \frac{3.0444 - 3}{3-1} = 0.0222$$

and CR ; 0.0383<0.1

Step 4: *Test Consistency Rate*

If judgments of the evaluators were inconsistent, we asked them to repeat the pair-wise comparison processes until the consistency index was less than 0.1. The result shows that the decision matrix for the second level of the proposed hierarchical structure for all evaluators is consistent.

Step 5: *Defuzzify each expert's Judgment using CFCS Method*

After the fuzzy matrix is made and consistency test is satisfied, CFCS method is applied to carry out defuzzification (Opricovic and Tzeng, 2003). After ensuring the consistency of the data in Table (3), data in this table should be defuzzified to calculate the final weights of criteria.

Step 6: *Calculate integrated matrix values, weights and final ranking*

When all thirty evaluators' judgments are defuzzified and passed the consistency test, firstly Equations (14-15) are applied to calculate integrated crisp matrix. Then, in the final step, Equation (16) is applied for computing the final weights of criteria in level 1, 2 of Hierarchy. Table (4), (5) shows the aggregate crisp judgment matrix and weights of main and sub criteria in Level 1, 2, respectively.

Table 4. Aggregate crisp judgment matrix with respect to Level 1 for thirty experts

	C1	C2	C3	Weights (Ranking)
C1	1	3.654199	2.711263	**0.768 (1)**
C2	0.270271	1	1.39932	**0.135 (2)**
C3	0.369396	0.735721	1	**0.097 (3)**

Table 5. Aggregate crisp judgment matrix with respect to Level 2 for thirty experts (Organizational Factors)

	O1	O2	O3	O4	O5	**Geometric Mean**	Weights (Ranking)
O1	1	0.981412	0.612884	1.118005	0.866358	**0.165**	**0.127 (4)**
O2	1.035285	1	0.585769	2.114881	0.62912	**0.176**	**0.135 (3)**
O3	1.659517	1.742758	1	3.823217	2.007752	**0.341**	**0.262 (1)**
O4	0.913721	0.480371	0.258689	1	0.406764	**0.099**	**0.076 (5)**
O5	1.177449	1.621319	0.500993	2.501764	1	**0.219**	**0.168 (2)**

For another criterion in the level 2 the same calculations have been carried out. As a result of the calculations based on table (4), the weights of five criteria of level 2 i.e. Top management commitment and support, determining the suitable strategies in Brand field, quality, advertisement, services after sale are 0.127, 0.135, 0.262, 0.076 and 0.168, respectively. For sub-criteria in level 2 step 2 to 6 are performed. By multiplying weights of level 1 in level 2 (Sub-criteria), global weights are determined. The final rank in per environment is shown in Table (6).

Table 6. Final ranking of criteria

ID	**Weights**	**Final ranking in each environment**	**Final ranking**
O1	0.127	4	4
O2	0.135	3	3
O3	0.262	1	1
O4	0.076	5	5
O5	0.168	2	2
H1	0.023	4	10
H2	0.028	3	8
H3	0.014	5	14
H4	0.031	2	7
H5	0.045	1	6
E1	0.025	1	9
E2	0.02	3	12
E3	0.022	2	11
E4	0.017	4	13
E5	0.014	5	15

According to the obtained results, the third criterion (O3) has the highest weight and is the most proper brand strategies factor according to the experts' judgment. Therefore, the priorities for all criteria are in the following order: O3, O5, O2, O1, O4, H5, H4, H2, E1, H1, E3, E2, E4, H3 and E5. In order to better understanding the results of this ranking, results are sketched in Figure (3).

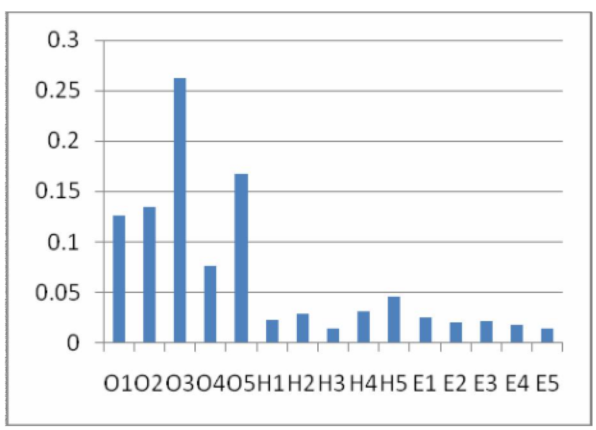

Figure 3. Graphical priorities of criteria

The results have clearly demonstrated that Quality is critical to succeed. Besides, the results show that another important criterion for successful brand strategy is Services after sale. In addition, determining the suitable strategies in Brand field is a vital criterion in this regard. On the other hand, Top management commitment and support is a crucial criterion. Furthermore, advertisement should be considered for succession of the brand strategies. Finally, it should be mentioned that all organization should be noted that these criteria which has important role to success the brand strategies.

4. Conclusions

A brand extension strategy in an organization has some benefits. Yet in many cases, failure rates of brand extension strategies have reported. In order to reduce the failure rate of brand extension strategies and also better understanding of the mentioned strategies, several studies have conducted. However, most of those studies as mentioned simply list factors and are lacking in the systematic efforts and technical background to classify and evaluating factors. To evaluate the priority of CSFs, MCDM method could be useful. Hence, AHP method as a MCDM technique in this problem could be applied. In this paper, a practical framework for evaluation and selecting CSFs of brand extension strategies based on fuzzy analytical hierarchy process has been applied. Applying AHP method under fuzzy environment by giving the experts opinions could lead us to realistic decision-making process. The results of this study shows that “Quality”, “Services after sale”, “Determining the suitable strategies in Brand field”, “Top management commitment and support” and “Advertisement” is the top five CSFs. These results could be very useful in other similar cases. For the extension of this study, other fuzzy AHP methods can be used. In addition, various methods of multi-criteria evaluation such as TOPSIS and Data Envelopment Analysis (DEA), in the fuzzy environment can be applied.

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