UNEC Elmi Xəbərləri, İl 7, Cild 7, oktyabr- dekabr, 2019, səh. 136 - 150
Scientific Reviews in UNEC, Year 7, Volume 7, October– December, 2019, pp. 136 - 150

HOMOGEN FAKTORLARINA ƏSASLANAN BİR SEQMENTİN SEÇİMİ

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Daxil olmuşdur: 08 oktyabr 2019; qəbul edilmişdir: 25 dekabr 2019.

Xülasə
Seqmentləşdirmə biznes resursların hədəf yönümlü istifadəsinə imkan verir. Seqment(lər) üzrə dəyər təklifinə fokuslanma bütün imkanları biznes hədəf üçün səfərbər etməyə kömək edir. Seqmentin homogen faktorlar (demoqrafik, coğrafi, psixoqrafik və davranış) əsasında müəyyən edilməsi detallı yanaşma tələb edir. Baxmayaraq ki, bəzi faktorlar qrupun yaradılması üçün xüsusi önəmə malikdir, digərləri əsasən gələcək 4P addımları üçün vacibdir. Digər tərəfdən marketinq mütəxəssisləri segmentin seçilməsinə də xüsusi diqqət ayırmalıdırlar. Potensial müştəriləri cəlb etmək üçün onlar cəlbedici faktorlar əsasında təyin edilmiş seqmentə xitabən dəyər təklifini hazırlamalı və rəqiblərlə müqayisədə mövqeləndirməlidirlər. Bu halda, cəlbedici seqment üzrə qərar qəbuletmə problemi yaranır. Araşdırmamızda biz homogen cəlbedicilik faktorlarını təsvir edirik və onlar üzrə qərar qəbuletmə problemini həll etmək üçün FAHP (Fuzzy Analytic Hierarchy Process) Qeyri-səlis İyerarxik Təhlil Prosesi metodunu tətbiq edirik.

Açar sözlər: seqmentləşdirmə, marketinq, qərar qəbul etmə, qeyri-səlis məntiq, QAİP.

SINGLE SEGMENT SELECTION BASED ON THE HOMOGENEOUS FACTORS

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Received: 08 October 2019; Accepted: 25 December 2019.

Abstract
Segmentation enables the business to allocate its limited resources within the target market. The focus of value proposition on the segment(s) helps to concentrate all efforts on business goal. The evaluation of the segment based on the segment’s homogeneous factors (demographic, geographic, psychographic, and behavioral) needs detailed approach. Although some factors play crucial role on grouping,

some of them are essential for future 4P steps. On the other hand, marketers have to pay attention to the segment selection. Depending on attractiveness of factors of segment(s), they select their target market in order to prepare value proposition and position it in comparison with competitors to attract potential customers. At this rate, attractive segment selection appears as a problem for marketing decision maker. In our research, we describe homogeneous attractiveness factors and try to find out the solution for the decision-making problem via application of Fuzzy AHP method.

Keywords: segmentation, marketing, decision-making, fuzzy, FAHP.

ВЫБОР ОДНОГО СЕГМЕНТА НА ОСНОВЕ ГОМОГЕННЫХ ФАКТОРОВ

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Резюме

Сегментация позволяет использовать бизнес-ресурсы целенаправленно. Фокусирование внимания на ценностных предложениях по сегментам помогает мобилизовать все возможности для достижения бизнес-целей. Сегментация, основанная на гомогенных факторах (демографических, географических, психографических и поведенческих), требует детального подхода. Несмотря что некоторые факторы имеют особое значение для создания группы, другие важны для будущих шагов 4P. С другой стороны, специалисты по маркетингу должны обратить особое внимание на выбор сегмента. Чтобы привлечь потенциальных клиентов, им необходим разработать ценностных предложений для сегмент на основе привлекательных факторов и позиционировать их по сравнению с конкурентами. В этом случае возникает проблема принятия решения по привлекательному сегменту. В нашем исследовании мы описываем гомогенные факторы привлекательности и применяем метод FAHP (Fuzzy Analytic Hierarchy Process) - Процесс нечеткой аналитической иерархии для решения проблемы принятия решений.

Ключевые слова: сегментация, маркетинг, принятие решений, нечеткая логика, НАИП.

The market segmentation is the process of splitting customers, or potential customers, within a market into different groups, or segments, within which customers share a similar level of interest in the same, or comparable, set of needs satisfied by a distinct marketing proposition [1]. The main object is targeting the right market that business concentrates on in order to use its limited resources to reach the goal. According to Roger J. Best, "the first step in segmentation process is identifying the benefits that help to solve customer problems. The different customer needs affect customer product choices. Because of this reason, it is important to understand the different benefits that customers seek to solve different problems. It is appropriate to identify demographic, psychographic and behavioral indicators after grouping customers based on their needs. The differentiation factors of segments help us identify them in order to make a choice on the attractive ones" [2].
Most of companies prefer to identify its target market rather than dealing with mass markets. There are different segment identification and description methods to apply. In most cases, we can face in the papers and articles that authors apply clustering methods as K-mean, C-mean etc. to describe segments. Although the identification and description methods of segments are researched in most literatures and papers, attention to the segment selection and attractiveness factors evaluation have not been paid enough. The experts mostly focused their efforts on different segmentation evaluation methods and techniques (Bonoma, Shapiro 1983; Christen 1987; Elrod, Winner 1982; Morrison 1973; Novak et al. 1992; Wildt 1976). Even general studies of market segmentation have paid little or no attention to the evaluation and selection stages (Beane, Ennis 1987; Weinstein 1987; Wind 1978) [4]. In some papers, the segment selection problem is solved based on application of FAHP, COPRAS-G, and TOPSİS methods [4], [7]. The researchers take into account especially market related macro factors that have impact on decision-making. The segment's homogeneous factors mostly used in order to describe the segment itself for preparing 4P strategies. When market related macro factors are more or less the same for all the players of the market, it becomes difficult to distinguish the segment(s) in selection process.

Preliminaries

1.1. Fuzzy Set and Fuzzy Number

The introduction of the Fuzzy Set Theory by Zadeh (1965) provides an opportunity to deal with the uncertainty. The major advantage of the theory is capability of representing uncertain data. A class of objects with a continuum of grades of membership is a fuzzy set. The membership function characterizes the set and assigns to each object a grade of membership ranging between 0 and 1 [6].

A Fuzzy Set Theory is described via a tilde "~" that placed above a symbol. The Fig. 1 demonstrates a Triangular Fuzzy Number (TFN) M and $\mathrm{M} = (\mathrm{l}, \mathrm{m}, \mathrm{u})$. The l, m and u ($\mathrm{l} \leq \mathrm{m} \leq \mathrm{u}$) parameters are the smallest possible value, the most promising value, and the largest possible value, respectively. They describe a fuzzy event. The membership function is shown below [6]:

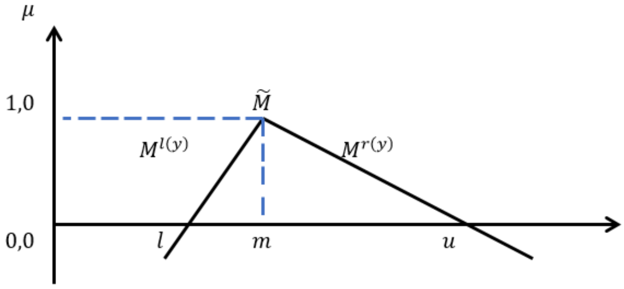

Figure 1**.** The membership function of the TFN $\widetilde{M}$ [6]

The membership function can be defined as follows [6]:

$$\mu\left(\frac{x}{\widetilde{M}}\right) = \begin{cases} 0, & x < l \\ (x-l)/(m-l), & l \leq x \leq m \\ (u-x)/(u-m), & m \leq x \leq u \\ 0, & x > u \end{cases} \quad (1)$$

The corresponding left and right representation of a fuzzy number and each degree of membership are given in the formula as follows [6]:

$$\widetilde{M} = M^{l(y)}, M^{r(y)} = [l + (m-l)y, u + (m-u)y], \; y \in [0,1] \quad (2)$$

where l(y) is the left side representation and r(y) denote the right side representation of a fuzzy number [6].

There are various operations on TFNs and the important ones are illustrated in this research. Two positive TFNs (a1, b1, c1) and (a1, b2, c2) have been given as follows [6]:

$$(a_1, b_1, c_1) + (a_2, b_2, c_2) = (a_1 + a_2, b_1 + b_2, c_1 + c_2)$$
$$(a_1, b_1, c_1) - (a_2, b_2, c_2) = (a_1 - a_2, b_1 - b_2, c_1 - c_2) \quad (3)$$
$$(a_1, b_1, c_1) \times (a_2, b_2, c_2) = (a_1 \times a_2, b_1 \times b_2, c_1 \times c_2)$$
$$(a_1, b_1, c_1)/(a_2, b_2, c_2) = (a_1/c_2, b_1/b_2, c_1/a_2)$$

1.2. The Fuzzy Analytic Hierarchy Process method

Saaty introduced The Fuzzy Analytic Hierarchy Process (FAHP) method in 1980. FAHP is the quantitive method, which makes it possible to make decision on one or several criteria and their alternatives. The hierarchy is built on pairwise comparison and subjective judgment. The process covers six steps:

- Description of problem via structuring it
- Criteria and alternative determination
- Calculation of weights of decision elements
- Calculation of matrix indicators
- Collection of defuzzified decision elements

AHP creates structured frame for determination of priorities for all stages with a help of pairwise comparison. It is described as 1 ÷ 9 scale in Table 1:

Table 1. 1 ÷ 9 Fundamental scale.

Strength of importance	Description
1	Equal importance
3	Medium importance
5	Strong importance
7	Very strong importance
9	Extreme importance
2,4,6,8	Average indicators

Application of the Fuzzy Logic Theory enabled to expand the capability of this method. FAHP found its use essentially on solution of planning, resource allocation and conflict management problems.

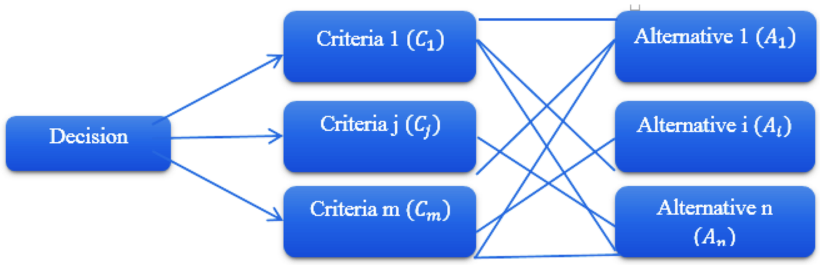

Figure 2. Description of hierarchy for multicriterial decision-making problem [4]

The steps below should be applied for structuring the decision model via FAHP method:

Step 1. We define pairwise comparison as described in Table 2:

Table 2. The description of Likert scale via application of fuzzy approach

Linguistic variable	Fuzzy scale
Equal important	(1,1,1)
Medium important	(2,3,4)
Strong important	(4,5,6)
Very strong important	(6,7,8)
Extreme important	(9,9,9)

For instance, according to the table above if we say the importance of criteria C_1 is very strong for us and stronger than criteria C_2 then this criteria is denoted with Triangular Fuzzy Number as $(4,5,6)$. On other hand criteria C_2 is described with Triangular Fuzzy Number as $(1/6\,,1/5\,,1/4)$ to C_1 relatively [5].
The pairwise comparison matrix is given in (4) and (5) equations where they indicate importance of criteria i over criteria j via $\tilde{a}_{ij}$ triangular fuzzy number $\tilde{a}_{ij}$. For instance, $\tilde{a}_{32}$ indicate importance of 3 rd criteria over 2 nd criteria.

$$\tilde{A} = \begin{bmatrix} \tilde{a}_{11} & \tilde{a}_{12} & \cdots & \cdots & \tilde{a}_{1n} \\ \tilde{a}_{21} & \tilde{a}_{22} & \cdots & \cdots & \tilde{a}_{2n} \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ \tilde{a}_{n1} & \tilde{a}_{n2} & \cdots & \cdots & \tilde{a}_{nn} \end{bmatrix} \qquad (4)$$

$$\tilde{A} = \begin{bmatrix} (1,1,1) & (a_{12}^{l}, a_{12}^{m}, a_{12}^{u}) & \cdots & (a_{1n}^{l}, a_{1n}^{m}, a_{1n}^{u}) \\ (\frac{1}{a_{12}^{u}}, \frac{1}{a_{12}^{m}}, \frac{1}{a_{12}^{l}}) & (1,1,1) & \cdots & (a_{2n}^{l}, a_{2n}^{m}, a_{2n}^{u}) \\ \vdots & \vdots & \ddots & \vdots \\ (\frac{1}{a_{1n}^{u}}, \frac{1}{a_{1n}^{m}}, \frac{1}{a_{1n}^{l}}) & (\frac{1}{a_{2n}^{u}}, \frac{1}{a_{2n}^{m}}, \frac{1}{a_{2n}^{l}}) & \cdots & (1,1,1) \end{bmatrix} \qquad (5)$$

Step 2. It is normalized via formula (5) for assurance of calculation results of importance determination in pairwise comparison matrix. Then we calculate Eigen vector as in Table 4. After the calculation of λ_{max} , we determine M_i with the help of defuzzification. We use formula (6) to find out consistency index.

Table 3. The description of factors as pairwise comparison matrix

C	C1			C2			C3		
C1	a_{11}^{l}	a_{11}^{m}	a_{11}^{u}	a_{12}^{l}	a_{12}^{m}	a_{12}^{u}	a_{13}^{l}	a_{13}^{m}	a_{13}^{u}
C2	a_{21}^{l}	a_{21}^{m}	a_{21}^{u}	a_{22}^{l}	a_{22}^{m}	a_{22}^{u}	a_{23}^{l}	a_{23}^{m}	a_{23}^{u}
C3	a_{31}^{l}	a_{31}^{m}	a_{31}^{u}	a_{32}^{l}	a_{32}^{m}	a_{32}^{u}	a_{33}^{l}	a_{33}^{m}	a_{33}^{u}

Table 4. Eigen vector calculation

C	Eigen vector calculation		
C1	$(a_{11}^{l} + a_{12}^{l} + a_{13}^{l})/3$	$(a_{11}^{m} + a_{12}^{m} + a_{13}^{m})/3$	$(a_{11}^{u} + a_{12}^{u} + a_{13}^{u})/3$
C2	$(a_{21}^{l} + a_{22}^{l} + a_{23}^{l})/3$	$(a_{21}^{m} + a_{22}^{m} + a_{23}^{m})/3$	$(a_{21}^{u} + a_{22}^{u} + a_{23}^{u})/3$
C3	$(a_{31}^{l} + a_{32}^{l} + a_{33}^{l})/3$	$(a_{31}^{m} + a_{32}^{m} + a_{33}^{m})/3$	$(a_{31}^{u} + a_{32}^{u} + a_{33}^{u})/3$

$$N_i = \frac{c_i}{\sum_{i=1}^{n} c_i} \qquad (5)$$

$$CI = \frac{\lambda_{max} - n}{n-1} \qquad (6)$$

Step 3. To check consistency index adequacy Saaty (2005) introduces the calculation of consistency rate (CR) [5]. If factors and sub-factors' matrixes obey the equation CR <= 10%, then the values calculated are relevant for further calculation. CR calculated as follows,

$$CR = \frac{CI}{RI} < 0.1 \sim 10\% \quad (7)$$

RI depending on criteria number has constant value and called Random Consistency Index. Saaty introduces its values in the table as follows,

Table 5. Indicators of Random Consistency Index (Saaty, 1977)

N	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49

Step 4. If factor and sub-factor matrixes fit Consistency Rate requirement, we carry on our calculation regarding them to solve segment selection problem. Fuzzy comparison value for each factor is described as follows:

$$\tilde{G}_i = (l_i, m_i, u_i) \quad (8)$$

Step 5. The calculation of $\tilde{G}_i$

$$l_i = (l_{i1} \times l_{i2} \times, \ldots \times l_{ik})^{\frac{1}{k}},\ i = 1,2, \ldots, k \quad (9)$$

$$m_i = (m_{i1} \times m_{i2} \times, \ldots \times m_{ik})^{\frac{1}{k}},\ i = 1,2, \ldots, k \quad (10)$$

$$u_i = (u_{i1} \times u_{i2} \times, \ldots \times u_{ik})^{\frac{1}{k}},\ i = 1,2, \ldots, k \quad (11)$$

Step 6. Fuzzy geometric mean is calculated with a help of formula below,

$$\tilde{G}_T = \left(\sum_{i=1}^{k} l_i, \sum_{i=1}^{k} m_i, \sum_{i=1}^{k} u_i\right) \quad (12)$$

Step 7. Fuzzy priorities are defined for each segment.
Then global weights are defined for each segment. Linguistic variables are described with Fuzzy Triangular Numbers via Chan method as shown in the table below,

Table 6. Fuzzy grading of sub-factors via Chan method [6].

Importance power	Fuzzy scale
Very good	(3,5,5)
Good	(1,3,5)
Medium	(1,1,1)
Weak	(1/5,1/3,1)
Very weak	(1/5,1/5,1/3)

Step 8. The geometric mean of the value of fuzzy priority $\widetilde{W}$ via normalization of factor priorities is calculated as follows,

$$\widetilde{W} = \frac{\tilde{G}_i}{\tilde{G}_T} = \frac{(l_i, m_i, u_i)}{(\sum_{i=1}^{k} l_i, \sum_{i=1}^{k} m_i, \sum_{i=1}^{k} u_i)} = \left(\frac{l_i}{\sum_{i=1}^{k} u_i}, \frac{m_i}{\sum_{i=1}^{k} m_i}, \frac{u_i}{\sum_{i=1}^{k} l_i}\right) \qquad (13)$$

Step 9. The defuzzification of triangular fuzzy number. The triangular fuzzy numbers are defuzzified via Centre of Area method with the help of the formula below,

$$M_i = \frac{lw_i + mw_i + uw_i}{3} \qquad (14)$$

Step 10. M_i is crisp number but it is normalized via formula as follows:

$$N_i = \frac{M_i}{\sum_{i=1}^{n} M_i} \qquad (15)$$

Statement of problem

In our research, we focus on evaluation of the attractive homogeneous factors of segments that have impact on decision-making. There are different approaches in different papers regarding the factors so that the authors try to consider all possible factors as segments' factors, competition, financial and economical, technological and political factors etc. [4]. In most cases, as a segment factor they choose demographic indicators. Therefore, our research focused mainly on the homogeny attractive factors as demographic, geographic, psychographic, behavioral indicators so that other general external factors may have the same affection for all segments in equal market conditions, which make them less distinguished. We assume that in aforementioned condition, it is more reliable to make decision on segment's homogeneous factors rather than on external ones. Applying fuzzy AHP method we will do decision making on the segment's homogeneous factors in this paper. The calculation is based on the research DATA collected in previous paper of the author [3].

Calculation

The answers of the respondents regarding psychographic questions were not enough to consider for this paper so that indicators of attitudes, values and interests offered by the author. Regarding the methodology of FAHP, the problem structured as follows:

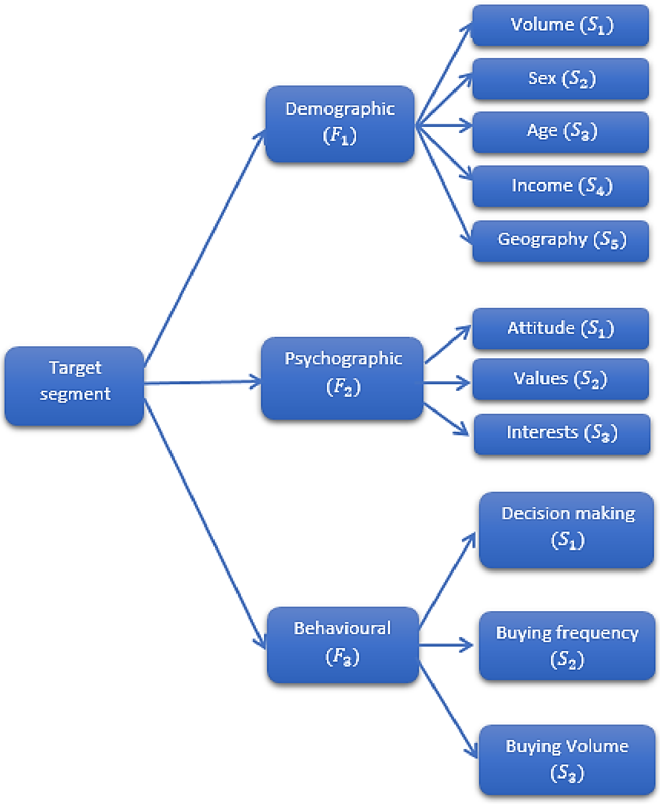

Figure 5. Structure of the linguistic variables that indicates factor and sub-factors

In this paper, we substitute criteria and alternatives for factor (F) and sub-factors (S) respectively. The importance of factor and sub-factor is defined before describing pairwise comparison matrix as follows,

Table 7. Definition of the importance of the factors

Factor	Linguistic variable	Fuzzy scale
	Equal important	(1,1,1)
F_3	Medium important	(2,3,4)
F_2	Strong important	(4,5,6)
F_1	Very strong important	(6,7,8)
	Extreme important	(9,9,9)

Table 8. Definition of the importance of the sub-factors of C1 factor

Sub-factors of C1	Linguistic variable	Fuzzy scale
	Equal important	(1,1,1)
S_2, S_3	Medium important	(2,3,4)
S_1, S_5	Strong important	(4,5,6)
S_4	Very strong important	(6,7,8)
	Extreme important	(9,9,9)

Table 9. Definition of the importance of the sub-factors of C2 factor

Sub-factors of C2	Linguistic variable	Fuzzy scale
	Equal important	(1,1,1)
S_3	Medium important	(2,3,4)
S_2	Strong important	(4,5,6)
S_1	Very strong important	(6,7,8)
	Extreme important	(9,9,9)

Table 10. Definition of the importance of the sub-factors of C3 factor

Sub-factors of C3	Linguistic variable	Fuzzy scale
	Equal important	(1,1,1)
S_3	Medium important	(2,3,4)
S_2	Strong important	(4,5,6)
S_1	Very strong important	(6,7,8)
	Extreme important	(9,9,9)

Table 11. Pairwise comparison matrix of Factors

F	F1			F2			F3		
F_1	1,00	1,00	1,00	6,00	7,00	8,00	4,00	5,00	6,00
F_2	0,13	0,14	0,17	1,00	1,00	1,00	0,50	0,71	1,00
F_3	0,17	0,20	0,2	1,00	1,40	2,00	1,00	1,00	1,00
Total	1,29	1,34	1,42	8,00	9,40	11,00	5,50	6,71	8,00

Table 12. The normalized factor values by the formula (5)

F	F_1			F_2			F_3		
F_1	0,77	0,74	0,71	0,75	0,74	0,73	0,73	0,74	0,75
F_2	0,10	0,11	0,12	0,13	0,11	0,09	0,09	0,11	0,13
F_3	0,13	0,15	0,18	0,13	0,15	0,18	0,18	0,15	0,13

Table 13. Eigen vector values based on the calculation in table 4

F	Eigen vector values		
F_1	0,750	0,745	0,728
F_2	0,104	0,106	0,111
F_3	0,145	0,149	0,161
Total	1,000	1,000	1,000

Table 14. The determination of Eigen vector maximum value λ_{max} and defuzzification.

F	Eigen vector values			L	M	U
F_1	0,750	0,745	0.728	$= 0,750 \times 1,29$	$= 0,745 \times 1,34$	$= 0,728 \times 1,42$
Sum of F_1	1,29	1,34	1,42			
F_2	0,104	0,106	0,111	0,834	1,000	1,223
Sum of F_2	8,00	9,40	11,00			
F_3	0,145	0,149	0,161	0,799	1,000	1,289
Sum of F_3	5,50	6,71	8,00			
	λ_{max}			$\sum_{i=1}^{3} l_i$=2,602	$\sum_{i=1}^{3} m_i$=3,000	$\sum_{i=1}^{3} u_i$=3,543
	M_i			$M_i = \frac{L+M+U}{3} = \frac{2.602 + 3,000 + 3,543}{3} = 3,048$		

$$CI = \frac{\lambda_{max} - n}{n-1} = \frac{3{,}048 - 3}{3} = 0{,}024$$
$$CR = \frac{CI}{RI} = \frac{0{,}024}{0{,}58} = 0{,}042 = 4{,}2\%$$

It is appropriate to carry on the calculation for pairwise comparison matrixes because the consistency rate of factors pursuant to CR<=10%.
Based on formulas (9), (10), (11), and (12):

$$l_{c1} = (1 \times 6 \times 4)^{\frac{1}{3}} = 2{,}88$$
$$l_{c2} = (0{,}13 \times 1 \times 0{,}50)^{\frac{1}{3}} = 0{,}40$$
$$l_{c3} = (0{,}17 \times 1 \times 1)^{\frac{1}{3}} = 0{,}55$$
$$\sum_{i=1}^{3} l_i = 2{,}88 + 0{,}40 + 0{,}55 = 3{,}83$$
$$m_{c1} = (1 \times 7 \times 5)^{\frac{1}{3}} = 3{,}27$$
$$m_{c2} = (0{,}14 \times 1 \times 0{,}71)^{\frac{1}{3}} = 0{,}47$$
$$m_{c3} = (0{,}20 \times 1{,}40 \times 1)^{\frac{1}{3}} = 0{,}65$$
$$\sum_{i=1}^{3} m_i = 3{,}27 + 0{,}47 + 0{,}65 = 4{,}39$$
$$u_{c1} = (1 \times 8 \times 6)^{\frac{1}{3}} = 3{,}63$$
$$u_{c2} = (0{,}17 \times 1 \times 1)^{\frac{1}{3}} = 0{,}55$$
$$u_{c3} = (0{,}25 \times 2 \times 1)^{\frac{1}{3}} = 0{,}79$$
$$\sum_{i=1}^{3} u_i = 3{,}63 + 0{,}55 + 0{,}79 = 4{,}98$$

$$\widetilde{W}_{c1} = \left[\frac{l_{c1}}{\sum_{i=1}^{3} u_c}, \frac{m_{c1}}{\sum_{i=1}^{3} m_c}, \frac{u_{c1}}{\sum_{i=1}^{3} l_c}\right] = \left[\frac{2{,}88}{4{,}98}, \frac{3{,}27}{4{,}39}, \frac{3{,}63}{3{,}83}\right] = [0{,}58; 0{,}74; 0{,}95]$$

$$\widetilde{W}_{c2} = \left[\frac{l_{c2}}{\sum_{i=1}^{3} u_c}, \frac{m_{c2}}{\sum_{i=1}^{3} m_c}, \frac{u_{c2}}{\sum_{i=1}^{3} l_c}\right] = \left[\frac{0{,}40}{4{,}98}, \frac{0{,}47}{4{,}39}, \frac{0{,}55}{3{,}83}\right] = [0{,}08; 0{,}11; 0{,}14]$$

$$\widetilde{W}_{c3} = \left[\frac{l_{c3}}{\sum_{i=1}^{3} u_c}, \frac{m_{c3}}{\sum_{i=1}^{3} m_c}, \frac{u_{c3}}{\sum_{i=1}^{3} l_c}\right] = \left[\frac{0{,}55}{4{,}98}, \frac{0{,}65}{4{,}39}, \frac{0{,}79}{3{,}83}\right] = [0{,}11; 0{,}15; 0{,}21]$$

Each sub-factor is calculated pursuant to their importance as a next step. We can follow the same rules that we applied for factor calculation in Tables 11, 12, 13, and 14.

Table 15. The pairwise comparison matrix of sub-factors of (F_1)

F1	S1			S2			S3			S4			S5		
S1	1,00	1,00	1,00	2,00	3,00	4,00	2,00	3,00	4,00	6,00	7,00	8,00	4,00	5,00	6,00
S2	0,25	0,33	0,50	1,00	1,00	1,00	1,00	1,00	1,00	1,50	2,33	4,00	0,50	0,60	0,67
S3	0,25	0,33	0,50	1,00	1,00	1,00	1,00	1,00	1,00	1,50	2,33	4,00	0,50	0,60	0,67
S4	0,13	0,14	0,13	0,25	0,43	0,67	0,25	0,43	0,67	1,00	1,00	1,00	0,50	0,71	1,00
S5	1,00	1,00	1,00	0,33	0,60	1,00	0,33	0,60	1,00	1,00	1,40	2,00	1,00	1,00	1,00

$$CI = \frac{\lambda_{max} - n}{n-1} = \frac{5{,}406 - 5}{4} = 0{,}102$$
$$CR = \frac{CI}{RI} = \frac{0{,}102}{1{,}12} = 0{,}090 = 9{,}0\%$$

Table 16. The pairwise comparison matrix of sub-factors of (F_2).

F2	S1			S2			S3		
S1	1,00	1,00	1,00	4,00	5,00	6,00	2,00	3,00	4,00
S2	0,17	0,20	0,25	1,00	1,00	1,00	0,33	0,60	1,00
S3	0,25	0,33	0,50	1,00	1,67	3,00	1,00	1,00	1,00

$$CI = \frac{\lambda_{max} - n}{n-1} = \frac{3{,}118 - 3}{3} = 0{,}059$$
$$CR = \frac{CI}{RI} = \frac{0{,}059}{0{,}58} = 0{,}102 = 10{,}2\%$$

The calculations provided for the factors should be applied for subfactors as well. Then we determine the global fuzzy factor for each subfactor as described in Table 17.

Table 17. The values of the global fuzzy factors that determined for subfactors

Factors	The fuzzy factor for subfactors	The global fuzzy factor for subfactors
Demographic factor (F_1) [0,58;0,74;0,95]	[0,33;0,51;0,77]	[0,19;0,38;0,73]
	[0,09;0,14;0,22]	[0,05;0,10;0,21]
	[0,09;0,14;0,22]	[0,05;0,10;0,21]
	[0,04;0,07;0,12]	[0,03;0,05;0,11]
	[0,08;0,14;0,23]	[0,05;0,10;0,22]
Psychographic factor (F_2) [0,08;0,11;0,14]	[0,43;0,65;0,96]	[0,03;0,07;0,13]
	[0,08;0,13;0,21]	[0,007;0,014;0,03]
	[0,14;0,22;0,38]	[0,01;0,02;0,05]
Behavioral factor (F_3) [0,11;0,15;0,21]	[0,43;0,65;0,96]	[0,05;0,14;0,20]
	[0,08;0,13;0,21]	[0,01;0,03;0,04]
	[0,14;0,22;0,38]	[0,01;0,05;0,08]

The segments given in Table 19 are the alternatives. We should select between two segments depending on the calculation of the total weights via applying Chan's prioritization method as follows,

Table 18. Segment profiles [3].

SEGMENT A		SEGMENT B	
Volume	x person	Volume	y person
Priority	Price, safety and economy	Priority	Beauty and comfort
Type of decision-making	Rational	Type of decision-making	Emotional
Rate of dependents from consultancy	63%	Rate of dependants from consultancy	70%
Income	1500-2000	Income	>1500
Medium age range	28-40	Medium age range	23-36
Geography	Baku	Geography	Baku
Marital status	Married (75%)	Marital status	Married (70%)
Gender	Male (75%)	Gender	Male (90%)
Potential buyer volume	37%	Potential buyer volume	34%
Buying frequency	3-5 years	Buying frequency	3-5 years

As we see, the method (table 19) is useful for solving the selection problem among two or more segments. Despite of the calculation via applying the prioritization method based on linguistic variables described with the triangular fuzzy number, the subjectivity in this method emerges yet. It is possible to minimize the subjectivity in the prioritization via using expert opinions regarding linguistic priority variables.

Table 19. The calculation of the total weights via applying Chan's prioritization method [6]

Alternatives	Sub-factors	The fuzzy factor indicators for sub-factors	Fuzzy scale	Linguistic description	Weight
SEGMENT	Volume	[0,19;0,38;0,73]			
A	Sex	[0,05;0,10;0,21]			
	Age	[0,05;0,10;0,21]	(1,3,5)	Good	[0,190;1,132;3,663]
	Income	[0,03;0,05;0,11]	(1,1,1)	Medium	[0,055;0,102;0,206]
	Geograp	[0,05;0,10;0,22]	(1,1,1)	Medium	[0,055;0,102;0,206]
	hy	[0,03;0,07;0,13]	(3,5,5)	Very good	[0,076;0,269;0,550]
	Attitude	[0,007;0,014;0,0	(1/5,1/5,1/3	Very weak	[0,010;0,021;0,074]
	Values	3]	)	Good	[0,034;0,215;0,670]
	Interests	[0,01;0,02;0,05]	(1,3,5)	Good	[0,007;0,043;0,146]
	Decision	[0,05;0,14;0,20]	(1,3,5)	Medium	[0,011;0,024;0,053]
	making	[0,01;0,03;0,04]	(1,1,1)	Good	[0,047;0,411;1,005]
	Buying	[0,01;0,05;0,08]	(1,3,5)	Very weak	[0,002;0,005;0,015]
	frequenc		(1/5,1/5,1/3	Buying vol.	[0,003;0,015;0,080]
	y		)		
	Buying		(1/5,1/3,1)		
	volume				
SEGMENT	Volume	[0,19;0,38;0,73]			
B	Sex	[0,05;0,10;0,21]			
	Age	[0,05;0,10;0,21]	(3,5,5)	Very good	[0,570;1,887;3,663]
	Income	[0,03;0,05;0,11]	(1,3,5)	Good	[0,055;0,307;1,029]
	Geograp	[0,05;0,10;0,22]	(1,3,5)	Good	[0,055;0,307;1,029]
	hy	[0,03;0,07;0,13]	(1,1,1)	Medium	[0,025;0,054;0,110]
	Attitude	[0,007;0,014;0,0	(1/5,1/5,1/3	Very weak	[0,010;0,021;0,074]
	Values	3]	)	Good	[0,034;0,215;0,670]
	Interests	[0,01;0,02;0,05]	(1,3,5)	Good	[0,007;0,043;0,146]
	Dec.	[0,05;0,14;0,20]	(1,3,5)	Medium	[0,011;0,024;0,053]
	making	[0,01;0,03;0,04]	(1,1,1)	Very good	[0,142;0,685;1,005]
	Buying	[0,01;0,05;0,08]	(3,5,5)	Very weak	[0,002;0,005;0,015]
	frequenc		(1/5,1/5,1/3	Good	[0,015;0,137;0,399]
	y		)		
	Buying		(1,3,5)		
	volume				

The results after the defuzzification and normalization by formulas (14), (15) as follows:

Table 20. Defuzzification and normalization of the results

Alternatives	Weight	Mi	Ni
SEGMENT			
A	[0,190;1,132;3,663]	1.66	0,52
	[0,055;0,102;0,206]	0,12	0,04
	[0,055;0,102;0,206]	0,12	0,04
	[0,076;0,269;0,550]	0,30	0,09
	[0,010;0,021;0,074]	0,03	0,01
	[0,034;0,215;0,670]	0,31	0,10
	[0,007;0,043;0,146]	0,07	0,02
	[0,011;0,024;0,053]	0,03	0,01
	[0,047;0,411;1,005]	0,49	0,15

	[0,002;0,005;0,015]	0,01	0,002
	[0,003;0,015;0,080]	0,03	0,001
		3,17	1,000
SEGMENT			
B	[0,570;1,887;3,663]	2,04	0,64
	[0,055;0,307;1,029]	0,46	0,15
	[0,055;0,307;1,029]	0,46	0,15
	[0,025;0,054;0,110]	0,06	0,02
	[0,010;0,021;0,074]	0,03	0,01
	[0,034;0,215;0,670]	0,31	0,10
	[0,007;0,043;0,146]	0,07	0,02
	[0,011;0,024;0,053]	0,03	0,01
	[0,142;0,685;1,005]	0,61	0,19
	[0,002;0,005;0,015]	0,01	0,002
	[0,015;0,137;0,399]	0,18	0,06
		4,27	1,35

Conclusion

As a result, we defined that Segment B with 1,35 score is more relevant to our target. In the next step, we can apply the same method via crisp numbers and for the selection of several segments so that to compare the results in order to understand how well the method fits to our goal in segment selection. The solution of decision-making problem regarding single segment or multi-segment selection will help businesses to define and attract the target market to allocate their resources effectively.

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