

*

,

-

-

-

(/ / , / / , / /)

:

[]

[]

[]

()

[]

)

(

[]

[]

[]

Saaty

[]

[]

[]

(A_5 A_1)

[] ()

c	A_1	A_2	A_3	A_4	A_5
A_1					
A_2					
A_3					
A_4					
A_5					

[] :

()

[]

$$a < b < c$$

$$(l_{ij}, m_{ij}, u_{ij})$$

$$l_{ij} < m_{ij} < u_{ij}$$

$$\begin{matrix} w_j & w_i \\ \vdots & \vdots \end{matrix}$$

$$\mu_{ij}\left(\frac{w_i}{w_j}\right) = \begin{cases} \frac{\left(\frac{w_i}{w_j} - l_{ij}\right)}{m_{ij} - l_{ij}}, & \frac{w_i}{w_j} \leq m_{ij} \\ \frac{\left(u_{ij} - \frac{w_i}{w_j}\right)}{u_{ij} - m_{ij}}, & \frac{w_i}{w_j} \geq m_{ij} \end{cases}$$

()

$$l_{ij} < w_i / w_j < u_{ij}$$

()

$$w_i / w_j = m_{ij}$$

(a,b,c)

P

[]

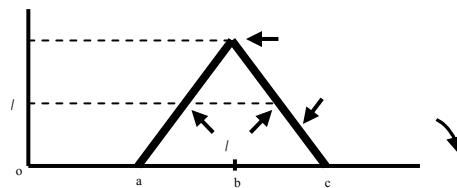
()

[]

$$\mu_P(w) = \min_{ij} \{ \mu_{ij}(w) | i = 1, \dots, n-1; j = 2, \dots, n; j > i \}$$

()

P



[] \Lambda

()

[]

[]

$$\lambda^* = \mu_P(w^*) = \max_{w \in Q^{n-1}} \min_{ij} \{ \mu_{ij}(w) \}$$

()

$$\mu_{\tilde{N}}(x) = \begin{cases} (x-a)/(b-a) & a \leq x \leq b \\ (c-x)/(c-b) & b \leq x \leq c \\ 0 & \text{otherwise} \end{cases}$$

()

[] ()

■ $\lambda \leq \mu_{ij}(w), i = 1, 2, \dots, n-1, j = 2, 3, \dots, n, j > i$ ()

) () $\sum_{l=1}^n w_l = 1, w_l > 0, l = 1, 2, \dots, n$ ()

) ()

()

: []

() $(m_{ij} - l_{ij})\lambda w_j - w_i + l_{ij}w_j \leq 0,$
 $i = 1, 2, \dots, n-1, j = 2, 3, \dots, n, j > i$ ()

- [] $(u_{ij} - m_{ij})\lambda w_j + w_i - u_{ij}w_j \leq 0,$
 $i = 1, 2, \dots, n-1, j = 2, 3, \dots, n, j > i$ ()

()

: []

-

-

-

-

(A, B, C) :

() ■

() ()

:

	A	B	C
A		(/ / /)	(/ / /)
B	()		(/)
C	()	(/)	

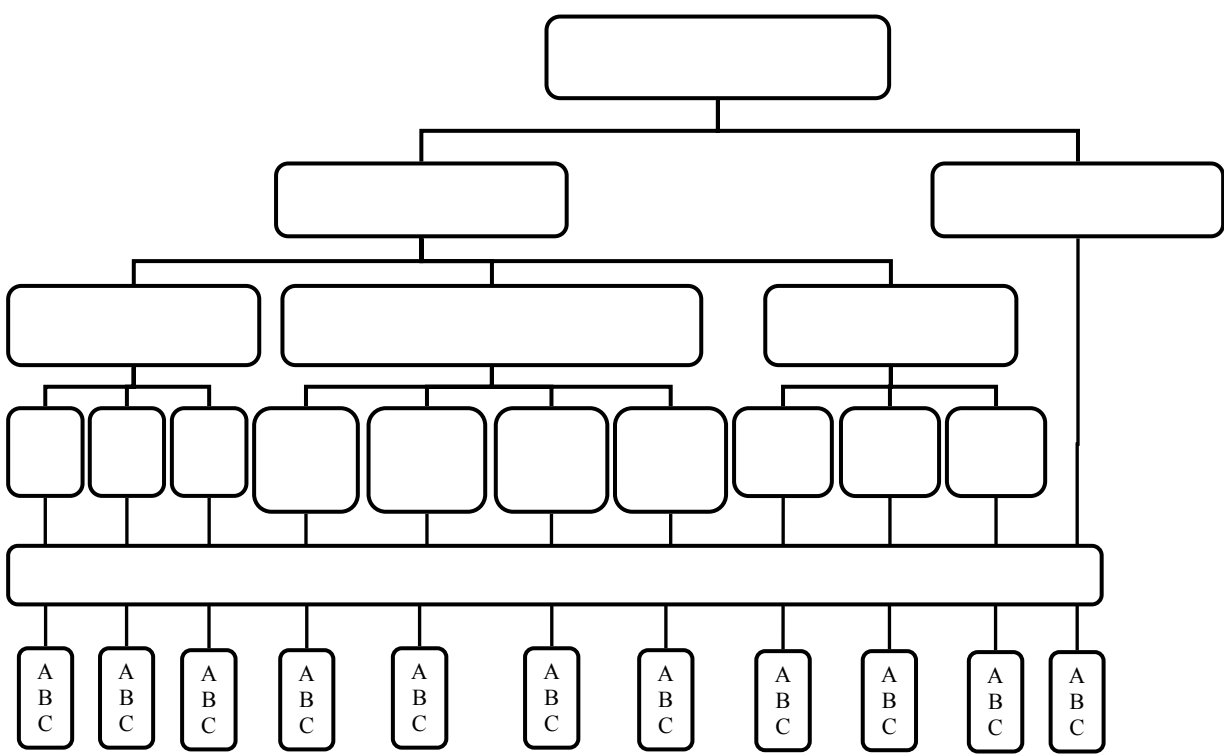
()

:

	A	B	C
A		(/ / /)	(/ / /)
B	()		(/)
C	()	(/)	

:

	A	B	C
A		(/ / /)	(/ / /)
B	()		(/)
C	()	(/)	



(I-IV) :A
 (V-VIII) :B
 (IX-XIII) :C

:

-	A	B	C
A		(/ / /)	(/ / / /)
B	()		(/ / /)
C	()	()	

	A	B	C
A		(/ / /)	(/ / / /)
B	()		(/ / / /)
C	()	()	

≤	A	B	C
A		(/ / /)	(/ / / /)
B	()		(/ / / /)
C	()	()	

	A	B	C
A		(/)	(/ / / /)
B	(/)		(/ / / /)
C	()	()	

(A, B, C)
 () ()
 () () ()
 ()

$\lambda ()$

	A	B	C
A		(/ / / /)	(/ / / /)
B	()		(/)
C	()	(/)	

	A	B	C
A		(/ / /)	(/ / / /)
B	()		(/ / / /)
C	()	()	

	A	B	C
A		(/)	(/ / / /)
B	(/)		(/ / / /)
C	()	()	

>	A	B	C
A		(/ / / /)	(/ / / /)
B	()		(/)
C	()	(/)	

A	B	C
/	/	/

() CR

B A

*

*

/

/

)

(

/

/ /

A	B	C	/
/	B	C	
/	A	C	

() ()

:

() ()

1 - Aghataher, R., Delavar, M. R. and Kamalian, N. (2005). "Weighing of contributing factors in vulnerability of cities against earthquakes." *Proc. Map Asia Conference*, August 22-25, Jakarta, Indonesia.

-
- 2 - Bood, R. P. and Postma, T. J. B. M. (1998). "Scenario analysis as a strategic management tool." *In Research Report Series of University of Groningen*, Research Institute SOM (Systems, Organizations and Management), <http://www.ub.rug.nl/eldoc/som/b/98B05/>.
 - 3 - *European Seismological Commission, 1993, European Macro-seismic Scale*, <http://www.quakes.bgs.ac.uk/hazard/ems1.htm>.
 - 4 - Gheorghhe, A. V. and Mock, R. (1999). *Risk Engineering-Bridging Risk Analysis with Stakeholders Values*, Kluwer Academic Publishers. Dordrecht, Hardbound.
 - 5 - Ghodsi Pour, H. (2002). *Analytical Hierarchy Process-AHP*. Amir Kabir University Publication Center. (In Persian).
 - 6 - Mikhailov, L. and Tsvetinov, P. (2004). "Evaluation of Services using a fuzzy analytic hierarchy process." *Applied Soft Computing*, Vol. 5, PP. 23–33.
 - 7 - Rashed, T. and Weeks, J. (2003). "Assessing vulnerability to earthquake hazards through spatial multicriteria analysis of urban areas." *International Journal of Geographical Information Science*, Vol. 17, No. 6, PP. 547-576.
 - 8 - Saaty, T. L. (1980). *The Analytical Hierarchy Process*. NY McGraw Hill.
 - 9 - Saaty, T. L. (1986). "Axiomatic foundation of analytical hierarchy process." *Management Science*, Vol. 32, No. 7.
 - 10 - Uitto, J. I. (1998). "The geography of disaster vulnerability in mega-cities." *Applied Geography*, Vol. 18, No. 1, PP. 7-16.
 - 11 - Warren, L. (2004). "Uncertainties in the Analytic Hierarchy Process." *DSTO Information Sciences Laboratory*, Australian Government, Dept. of Defense, Defense Science and Technology Organization.
 - 12 - Waugh, W. L. (2000). "Living with hazard: dealing with disasters." *An Introduction to Emergency Management*, New York, USA. M. E. Sharpe, Inc.
 - 13 - Zhang, F., Xie, L. and Fan, L. (2004). "Study on evaluation of cities' ability reducing earthquake disasters." *ACTA Seismologica SINICA Journal*, Vol. 17, No. 3, PP. 349-361.

- 1 - Mitigation
 - 2 - Preparedness
 - 3 - Response
 - 4 - Recovery
 - 5 - Earthquakes Vulnerability Index System
 - 6 - Diagonal Principal
 - 7 - Reciprocity
 - 8 - Transitivity
 - 9 - Independence
 - 10 - Homogeneity
 - 11 - Equal Importance
 - 12 - Weak Importance
 - 13 - Moderate Importance
 - 14 - Moderate Plus
 - 15 - Strong Importance
 - 16 - Strong Plus
 - 17 - Very Strong
 - 18 - Very, Very Strong
 - 19 - Extreme Importance
 - 20 - Consistency Index
 - 21 - Consistency Ratio
 - 22 - Ratio Index
-