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Use the Principle of Decision Support System (DSS) to Help Us Carefully Choose the Best or Most Suitable Telecommunications Company for the Customer

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Abstract: People have to make decisions almost everywhere and almost always. In the course of military operations, in politics, in running the enterprise, in choosing a car or apartment exchange option and in thousands of other cases. Choosing the right telecommunications company for the customer means trusting the company and the satisfaction of its services. The task of choosing the right laptop is actual for most modern people. We will deals in this study a number of communication companies that have a certain set of characteristics and services. It is required to choose from them one that will be the best and most stable. The choice is made through one of the methods of decision support (Algorithm of Thomas Saaty).

Key words: Thomas Saaty, DSS, telecommunications company, decision support system, right laptop, characteristics

INTRODUCTION

Very often management problems have several solutions. Often, choosing one solution from the set of possible ones, the person making the decision is guided only by intuitive ideas. As a result, the decision making is of an uncertain nature which affects the quality of the decisions made. Often used in recent years, the method of decision-making for problems of uncertainty the method of analysing hierarchies, based on a multi-criteria description of the problem was proposed by Thomas Saaty.

The essence of this method is the quantitative expression of qualitative judgments. The problem is structured as a hierarchy, the top of which is the goal and the subsequent levels are appropriately defined criteria and alternatives. The investigation is reduced to a sequence of pairwise comparison of criteria and pairwise comparisons of alternatives (Power, 2002). The method of analyzing hierarchies is described in detail by Saaty in his researches "Decision Making: A method for analyzing hierarchies", "Analytical planning. Organization of system" (Marakas, 1999).

At the department of management and informatics of SF ORAGS, research was conducted on the application of this method to solve various management problems that showed that the application of the hierarchy analysis method is very effective in solving nondeterministic problems, problems in which parameters have only a qualitative assessment for example: the problem of real estate valuation, the task of choosing a manager, the task of selecting municipal transport, the task of choosing a provider, the task of choosing an operating system. Let's illustrate the work of the method on the example of the task of selecting the head of the main production.

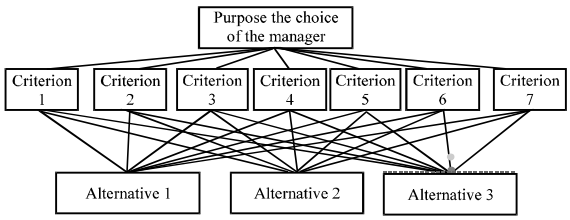

Fig. 1: Explains essential criteria for choosing the head of the main production

Let's assume that the following criteria are the essential criteria for choosing the head of the main production: criterion communication skills, criterion energy, criterion, optimism, criterion, emotional stability, criterion, social maturity, criterion, preference for a strategy of cooperation or competition in resolving conflict situations, criterion, the ability to quickly switch attention from negative information to the prospects of the future (Fig. 1).

MATERIALS AND METHODS

Components of Decision Support Systems (DSS): A decision support systems consists of three main components, namely database, software system and user interface (Power, 2002; Marakas, 1999).

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DSS database: It contains data from various sources, including internal data from the organization, the data generated by different applications and the external data mined form the internet, etc. The decision support systems database can be a small database or a standalone system or a huge data warehouse supporting the information needs of an organization. To avoid the interference ofdecision support system with the working of operational systems, the DSS database usually contains a copy of the production database.

DSS Software system: It consists of various mathematical and analytical models that are used to analyze the complex data, thereby producing the required information. A model predicts the output in the basis of different inputs or different conditions or finds out the combination of conditions and input that is required to produce the desired output.

A decision support system may compromise different models where each model performs a specific function. The selection of models that must be included in adecision support system family depends on user requirements and the purposes of DSS. Note that, the DSS Software contains the predefined models (or routines) using which new models can be built to support specific type of decisions.

DSS user interface: It is an interactive graphical interface which makes the interaction easier between the DSS and its users. It displays the results (output) of the analysis in various forms such as text, table, charts or graphics. The user can select the appropriate option to view the output according to his requirement.

RESULTS AND DISCUSSION

Evaluation of communication companies according to a set of standards: Telecommunication company (Athir) provides cellular services in Iraq. In the regional market of telecommunication services there are 3 more companies; Asia, Korek and Itsalna. People in time are searching for the best connection to speak comfortably. The task of choosing the right connection is relevant for most people.We will carry out the assessment according to the following criteria:

- Flexibility of the tariff policy (i.e., the possibility of choosing the most suitable tariff plan, their diversity, as well as the level of tariffs for the services offered)
- The quality of the spoken tract (audibility, recognizability, intelligibility, reliability of the connection, no disconnection after the connection is already established)
- Coverage area (the area of the serviced territory, the correspondence of the actual service area to the zone represented on the map)
- Service (attitude towards clients, staff competence, lack of queues, difficulties with dialing to the subscriber service)

Brand awareness

Choice of method for solving the problem: The problem of making a decision on a set of alternatives is considered. It refers to poorly structured problems. DSS based on the Hierarchy Analysis Method (HAM) is a simple and convenient tool that will help to structure the problem, build a set of alternatives, identify the factors that characterize them determine the significance of these factors, evaluate alternatives for each of the factors, find inaccuracies and contradictions in the judgments of the decision maker/expert, rank alternatives, analyze the solution and justify the results. DSS we can be used to solve the following typical tasks:

- Evaluation of the quality of organizational, design solutions
- Definition of investment policy in various areas
- Tasks of location (choice of location of harmful and dangerous industries, points of service)
- Allocation of resources
- Analysis of the problem using the "cost-effectiveness" method
- Strategic planning
- Design and selection of equipment, goods
- Choice of profession, job, recruitment

The main provisions of the hierarchy analysis method were developed by the well-known American Mathematician Saaty and published in 1977. Tasks in the hierarchy is shown in Fig. 2.

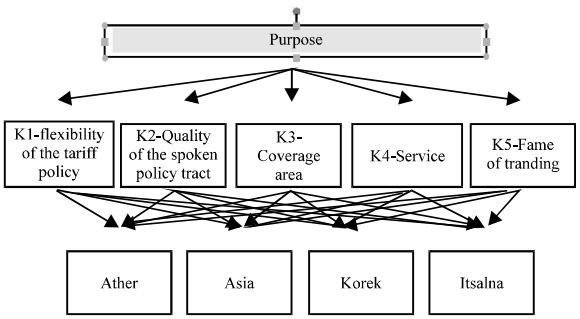

Fig. 2: Basic standards for communication networks, characteristics and services

Table 1: Matrix of paired comparisons

Matrix	K1	K2	K3	K4	K5	A	X
KI	1	**1**	**7**	**9**	**9**		
K2	1	1	**5**	**9**	**9**		
K3	1/7	1/5	1	**3**	**3**		
K4	1/9	1/9	1/3	1	**5**		
K5	1/9	1/9	1/3	1/5	1		
Σ							

Fontnote: Paired comparism of metrix

Table 2: Characteristics of telecommunication networks

Characteristic No. 1	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Characteristic No. 2
K1									+									K2
K1			+															K3
K1	+																	K4
K1	+																	K5
K2					+													K3
K2	+																	K4
K2	+																	K5
K3							+											K4
K3							+											K5
K4									+									K5

Table 3: Calculate the eigenvector of the matrix (A)

Matrix	K1	K2	K3	K4	K5	A	X
KI	1	1	7	9	9	= GEOMEAN (E4:14)	
K2	= 1/F4	1	5	9	9	= GEOMEAN (E5:15)	
K3	= 1/G4	1/G5	1	3	3	= GEOMEAN (E6:16)	
K4	= 1/H4	1/H5	1/H6	1	5	= GEOMEAN (E7:17)	
K5	= 1/14	1/15	1/16	1/17	1	= GEOMEAN (E8:18)	
Σ	= CYMM	= CYMM	= CYMM	= CYMM	= CYMM	= CYMM (J4:J8)	

Table 4: Calculate the priority vector (X)

Matrix	K1	K2	K3	K4	K5	A	X
KI	1	**1**	**7**	**9**	**9**	= GEOMEAN(E4:14)	= J4/$J$9
K2	= 1/F4	1	**5**	**9**	**9**	= GEOMEAN(E5:15)	= J5/$J$9
K3	= 1/G4	1/G5	1	**3**	**3**	= GEOMEAN(E6:16)	= J6/$J$9
K4	= 1/H4	1/H5	1/H6	1	**5**	= GEOMEAN(E7:17)	= J7/$J$9
K5	= 1/14	1/15	1/16	1/17	1	= GEOMEAN(E8:18)	= J8/$J$9
Σ	= SUM	= SUM	= SUM	= SUM	= SUM	= SUM (J4:J8)	= SUM (K4:K8)

Application of the Thomas Saaty algorithm (Saaty, 2005, 2008)

Step 1: Comparison of characteristics relative to the goal To do this, we construct a matrix of paired criteria comparisons (Table 1 and 2).

Number of questions = n * (n-1)/2 = 5 (4)/2 = 10 questions we will ask the decision maker (Saaty and Vargas, 2006). If the degree of significance of the criterion K1 significantly exceeds the significance of the criterion K3 then in the cell with the address G4 we put 7. If the significance of the criterion K3 significantly exceeded the significance of the criterion K1 then in the cell G4 the inverse estimate (1/7) would be put. Next, we need to calculate the eigenvector of the matrix (A) and the priority vector (X).

The components of the eigenvector of the matrix are calculated by the formula of the geometric mean, respectively into the cell with the address J4, the formula = GEOMEAN(E4: I4) and then stretch it to the entire range of cells J5: J8. The final line of this column uses the function = SUM (J4: J8) (Table 3).

Next, we need to define a vector of local priorities X, The component of the priority vector is defined as the ratio of the component of the eigenvector of the matrix to the sum of the values of its components.

Accordingly, in cell K1, we need to enter the formula: = J4/$J$9 and then stretch it to the entire block of cells (Saaty and Vargas, 2000) (Table 4). As a result of the calculations, we get Table 5. Next, the consistency of the evaluations is determined by determining the consistency relation (formula).

Step 2: Defining the priorities of companies in terms of criteria. At this step, we will to Comparison of alternatives with respect to K1-K5 (Table 6-16).

Table 5: Table of results

Matrix	K1	K2	K3	K4	K5	A	X
KI	**1**	**1**	**7**	**9**	**9**	3.554	0.4261
K2	1	**1**	**5**	**9**	**9**	3.323	0.3984
K3	1/7	1/5	**1**	**3**	**3**	0.762	0.0914
K4	1/9	1/9	1/3	**1**	**5**	0.460	0.0551
K5	1/9	1/9	1/3	1/5	1	0.242	0.0290
Σ	2.365	2.422	13.667	22.200	27.000	8.340	1.0000

Paired comparison of matrix

Table 6: Flexibility rate policy

K1-flexibility rate policy

K1	Ather	Asia	Korek	Itsalna	A	X	L_{max} = 4.174
Ather	1	3	5	7	3.201086	0.570375	uc = 2.840667
Asia	0.333333	1	1	5	1.136219	0.202454	cc = 0.9
Korek	0.2	1	1	5	1	0.178182	oc = 3.156296
Itsalna	0.142857	0.2	0.2	1	0.274942	0.04899	
Sum	1.67619	5.2	7.2	18	5.612247	1	

Table 7: Comparison of alternatives with respect to K1

Alternatives No. 1	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Alternatives No. 2
Ather							+											Asia
Ather					+													Korek
Ather			+															Itsalna
Asia									+									Korek
Asia					+													Itsalna
korek					+													Itsalna

Table 8: Quality of the spoken tract

K2-quality of the spoken tract

K2	Ather	Asia	Korek	Itsalna	A	X	L_{max} = 4,825775
Ather	1	3	0.111111	0.111111	0.438691	0.078576	Hc = 3.492441
Asia	0.333333	1	1	0.333333	0.57735	0.103412	cc = 0.9
Korek	9	1	1	0.2	1.158292	0.207468	oc = 3.88049
Itsalna	9	3	5	1	3.408658	0.610543	
Cymma	19.33333	8	7.111111	1.644444	5.582992	1	

Table 9: Comparison of the alternatives with respect to the K2

Alternatives No. 1	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Alternatives No. 1
Ather							+											Asia
Ather																	+	Korek
Ather			+														+	Itsalna
Asia									+									Korek
Asia											+							Itsalna
Korek													+					Itsalna

Table 10: Zone coverage

September 26, 2018k3-zone coverage

K3	Ather	Asia	Korek	Itsalna	A	X	L_{max} = 4.137788
ather	1	3	1	9	2.279507	0.449764	Hc = 2,804455
asia	0.333333	1	1	3	1	0.197308	cc = 0.9
korek	1	1	1	5	1.495349	0.295044	oc = 3.116061
itsalna	0.111111	0.333333	0.2	1	0.293371	0.057884	
sum	2.444444	5.333333	3.2	18	5.068226	1	

Table 11: Comparison of alternatives with respect to K3

Alternatives No. 1	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Alternatives No. 2
Ather							+											Asia
Ather									+									Korek
Ather		+																Itsalna
Asia									+									Korek
Asia							+											Itsalna
Korek					+													Itsalna

Table 12: Service maintenance

K4-service maintenance

K4	Ather	Asia	Korek	Itsalna	A	X	Lmax = 4.538007
Ather	1	0.111111	0.2	9	0.66874	0.112214	Hc = 3.204674
Asia	9	1	1	7	2.817313	0.472744	cc = 0.9
Korek	5	1	1	5	2.236068	0.375211	oc = 3.560748
Itsalna	0.111111	0.142857	0.2	1	0.237368	0.03983	
Cymma	15.11111	2.253968	2.4	22	5.95949	1	

Table 13: Comparison of the alternatives with respect to the K4

Alternatives No. 1	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Alternatives No. 2
Ather																	+	Asia
Ather					+								+					Korek
Ather		+																Itsalna
Asia									+									Korek
Asia			+															Itsalna
Korek					+													Itsalna

Table 14: Brand fame

K5-brand fame

K5	Ather	Asia	Korek	Itsalna	A	X	Ji_{max} = 4.947861
Ather	1	1	9	1	1.732051	0.325591	Hc = 3.614527
Asia	1	1	7	7	2.645751	0.497349	cc = 0.9
Korek	0.111111	0.142857	1	5	0.530771	0.099775	oc = 4.016142
Itsalna	1	0.142857	0.2	1	0.411134	0.077285	S u m
	3.111111	2.285714	17.2	14	5.319707	1	

Table 15: Comparison of alternatives with respect to the K5

Alternatives No. 1	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Alternatives No. 2
Ather									+									Asia
Ather		+																Korek
Ather									+									Itsalna
Asia			+															Korek
Asia			+															Itsalna
Korek					+													Itsalna

Table 16: The priorities of the alternatives obtained in one table

Alternative	K1	K2	K3	K4	K5	-
Ather	0.57038	0.07858	0.44976	0.11221	0.32559	0.331075
Asia	0.20245	0.10341	0.19731	0.47274	0.49735	0.18597
Korek	0.17818	0.20747	0.29504	0.37521	0.09978	0.209113
Itsalna	0.04899	0.61054	0.05788	0.03983	0.07729	0.273841

CONCLUSION

We discussed in this study to a group of telecommunications companies as well as that each company of mobile phone companies have a range of services and features and that these companies are competing with each other for the client to decide which one is the best. By using Kaaty's algorithm, we analyzed the data as well as all the services provided by the companies in terms of the quality of the connection and the coverage of the network for the largest area, etc.

The companies are the focus of the research are four mobile phone companies serving in Iraq: Ather, Asia, Cork, Itsalna. After implementing the algorithm mentioned above, the decision was made that the best telecommunications company that provides the best services is Atheer Telecom.

REFERENCES

Marakas, G.M., 1999. Decision Support Systems in the Twenty-First Century. Vol. 21, Prentice Hall, Upper Saddle River, New Jersey, USA., Pages: 506.

Power, D.J., 2002. Decision Support Systems: Concepts and Resources for Managers. Greenwood Publishing Group, Westport, CT. USA., ISBN-13: 9781567204971, pp: 251.

Saaty, T.L. and L.G. Vargas, 2000. Models, Methods, Concepts and Applications of the Analytic Hierarchy Process. Kluwer Academic Publishers, Boston.

Saaty, T.L. and L.G. Vargas, 2006. Decision Making with the Analytic Network Process: Economic, Political, Social and Technological Applications with Benefits, Opportunities, Costs and Risks. Springer, New York, ISBN: 9780387339870, Pages: 278.

Saaty, T.L., 2005. Theory and Applications of the Analytic Network Process: Decision Making with Benefits Opportunities, Cost and Risks. 3rd Edn., RWS Publications, Pittsburgh, USA., ISBN-13: 9781888603064, Pages: 352.

Saaty, T.L., 2008. Decision making with the analytic hierarchy process. Int. J. Serv. Sci., 1: 83-98