SUPPLIER SELECTION

IN SUPPLY CHAIN MANAGEMENT

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ABSTRACT

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SUPPLIER SELECTION IN SUPPLY CHAIN MANAGEMENT

The main goal for purchasing departments of companies is to provide whole raw material and other materials needed for production. Purchasing departments of companies have to be in view of the fact that the lowest cost, highest quality and similar criteria for being successful and getting more profit in nowadays competition environment. Therefore supplier selection is very important for the companies.

In this study, 'supplier selection in supply chain management using analytic hierarchy process method' subject which is very important for the companies is taken form. A literature survey chapter which is formed of criticisms, interpretations and proposals has been placed in this study. As such analytic hierarchy process method is explained and explanatory knowledge about method is given in the other chapter. The application of this method is shown for one of raw material of a company in the following chapter.

Key Words

Supply Chain Management

Supplier Selection

Analytic Hierarchy Process Method

KISA ÖZET

KEREM KÖSE Aralık 2004

TEDARİK ZİNCİRİ YÖNETİMİNDE TEDARİKÇİ SEÇİMİ

İşletmelerin satın alma bölümlerinin ana amacı, üretim için gerek olan tüm hammadde ve diğer malzemeleri işletmeye tedarik etmektir. İşletmelerin günümüz rekabet ortamında başarılı olup, yüksek kar elde etmeleri için, satın alma bölümleri en düşük maliyeti, en yüksek kaliteyi ve benzeri kriterleri göz önünde bulundurmak zorundadırlar. Bundan dolayı tedarikçi seçimi işletmelerde önem arz etmektedir.

Bu çalışmada, işletmeler için çok önemli olan 'tedarik zinciri yönetiminde analitik hiyerarşi proses yöntemi' ile tedarikçi seçimi konusu ele alınmıştır. Çalışmada, analitik hiyerarşi proses yöntemi hakkında yapılan eleştiri, öneri ve yorumlardan oluşan bir literatür taraması bölümü bulunmaktadır. Bunun yanı sıra diğer bir bölümde analitik hiyerarşi proses yöntemi anlatılmıştır ve açıklayıcı bilgiler verilmiştir. Devam eden bölümde ise bir işletmenin hammaddelerinden biri için bu yöntemin uygulanması gösterilmiştir.

Anahtar Kelimeler:

Tedarik Zinciri Yönetimi

Tedarikçi Seçimi

Analitik Hiyerarşi Proses Yöntemi

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AHP	ANALYTIC HIERARCHY PROCESS

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INTRODUCTION

Decision making is a hard and complex process because of right decision making obligation. To reach the right and the best decision is gradually getting importance in the companies and organizations. Many various methods has been developed for decision making. One of these methods is Analytic Hierarchy Process which has been introduced by Thomas L. Saaty.

An application of Analytic Hierarchy Process is presented in this thesis in order to solve supplier selection problem of a manufacturing company.

The content of thesis is as follows;

In the first chapter; criticisms, interpretations and proposals about supplier selection problem and Analytic Hierarchy Process are described.

In the second chapter; some information is given about the introduction and development of Analytic Hierarchy Process . Also all theoretic information is described to put Analytic Hierarchy Process into practice.

In the last and third chapter; application of Analytic Hierarchy Process in Mega Electronics are shown step by step. It starts with some information about Mega Electronics, application of Pareto Classification to choose the mostly used raw materials in Mega Electronics follows and the chapter ends with choosing the best supplier for Mega Electronics.

CHAPTER 1

LITERATURE REVIEW

1.1 Literature Review on the Supplier Selection Problem

Stamm and Golhar [1], Ellram [2], and Roa and Kiser [3], identified, respectively, thirteen, eighteen, and sixty criteria for supplier selection.

Vokurka, Choobineh and Vadi [4]develop an expert system that covers multiple phases in the supplier selection process, among which the formulation of supplier selection criteria.

After a supplier has been rated on all criteria, the buyer gives an overall rating, again through ticking one of the three options. In this way, suppliers are sorted into three categories. The categorical method is discussed widely in Purchasing textbooks, e.g. Zenz and Timmerman [5, 6].

Dickson [7] identified twenty three different criteria commonly evaluated during the selection process.

According to Limmerick and Cunnington [8], a successful partners selection needs compatibility between members based on willingness of share, level of technologies, goals, and values of companies.

1.2 Literature Review on the Analytic Hierarchy Process

AHP has been used in problems with success and has received a lot of criticisms, interpretations and proposals. Some examples will be given to these criticisms, interpretations and proposals in this part.

Current and Weber [9] explained that vendor selection problems may be formulated within the mathematical constructs of facility layout models.

AHP is an other method which uses pairwise comparison and it was applied by Narasimhan [10].

Ghodsypour and Brien [11] interpreted supplier selection as it is a multicriteria problem which includes both qualitative and quantitative factors. In order to select the best suppliers it is necessary to make a trade off between these tangible and intangible factors some of which may conflict.

Smith and Swann [12, 13] defends that, this approach, *Analytic Hierarchy Process (AHP)* is more accurate than the other scoring methods.

Nydick and Hill [14], Barbarosoglu and Yazgac [15], Narasimhan [10] propose the use of the analytic hierarchy process (AHP) to deal with imprecision in supplier choice.

Ossadnik and Lange [16], compared different computer software which is applying Analytic Hierarchy Process (AHP) easily and quickly by using Analytic Hierarchy Process (AHP). Expert Choice Software has been found out as the best Analytic Hierarchy Process (AHP) software among three different software (ECPro, Automan, Hipre3+).

Zaim, Sevkli and Tarim [17], proposed fuzzy analytic hierarchy process (FAHP) approach for solving the problem of complex multi-criteria decision-making for supplier selection.

Thomas L. Saaty [18] described the analytic hierarchy process is a decision approach designed to aid in the solution of the complex multiple criteria problems in a number of application domains.

F. Zahedi [19] comments that the structure of the hierarchy depends upon the nature or type of managerial decision and also the number of the levels in a hierarchy depends on the complexity of the problem being analyzed and the degree of detail of the problem that an analyst requires to solve.

CHAPTER 2

THE ANALYTIC HIERARCHY PROCESS (AHP)

2.1 Overview of the Analytic Hierarchy Process

Thomas L. Saaty introduced Analytic Hierarchy Process (AHP) first in 1971, then developed and published in his 1980 book, *The Analytic Hierarchy Process*. AHP is designed for to find solutions of decision making problems which are including multi criteria. AHP provides to analyze the goal, criteria, sub criteria and alternatives of problem in hierarchy structure and provides to reach optimum solution. It organizes the problem into smaller parts and then guides the decision makers through a series of pair wise comparison judgments to develop a hierarchy. Outcome of these judgments becomes numerical values.

The decision maker starts by laying out the overall hierarchy of the decision. He or she first must identify own goal in this hierarchy lay out and then identify the criteria and sub criteria which are important to reach the goal. After naming all these elements of hierarchy, criteria are weighted according to the priority of their importance. Pairwise comparisons are involved by this process. After determining the weights, alternative suppliers are rated then the decision maker computes the overall score of each supplier.

2.2 Hierarchical Structure

The goal takes place at the top of the hierarchy. Required criteria, sub criteria and alternatives which are needed to reach the goal are shown in order from above to down in hierarchical structure. (Figure-1)

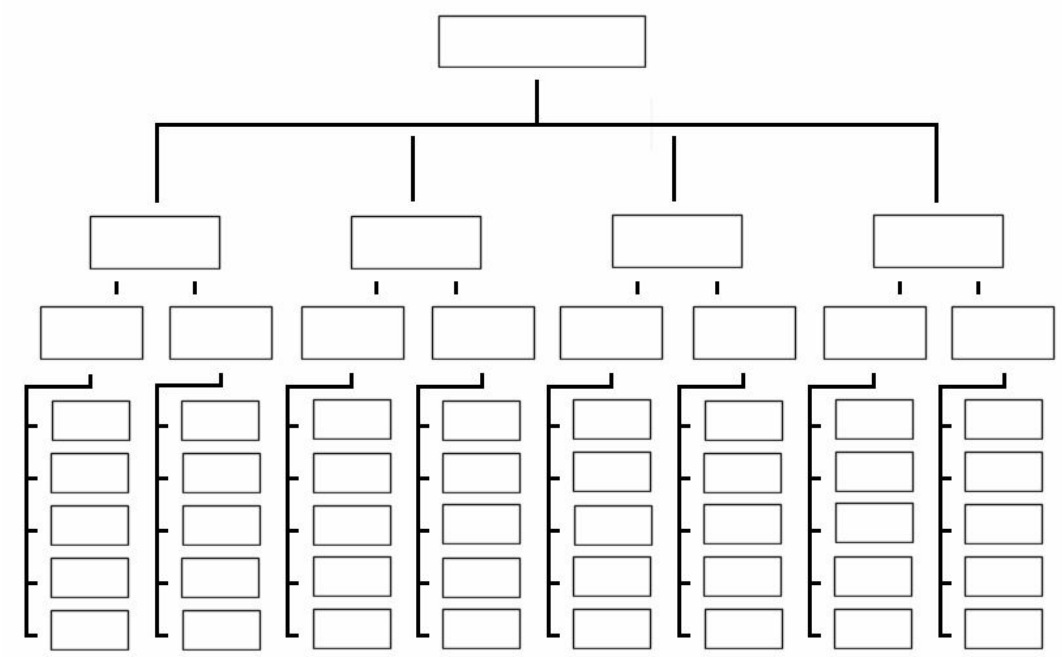

FIGURE-1 TYPICAL HIERARCHY TREE

2.3 Pairwise Comparisons

In AHP the decision maker determines how well each alternative on a criterion using pairwise comparisons. In a pairwise comparison the decision maker compares two alternatives according to one criterion and indicates preference. The comparisons are made using preference scale, which assigns numerical values to different levels of preference. (Table-1)

TABLE-1 PREFERENCE SCALE FOR PAIRWISE COMPARISONS

PREFERENCE LEVEL	NUMERICAL VALUE
Equally preferred	1
Equally to moderately preferred	2
Moderately preferred	3
Moderately to strongly preferred	4
Strongly preferred	5
Strongly to very strongly preferred	6
Very strongly preferred	7
Very strongly to extremely preferred	8
Extremely preferred	9

2.4 General Methodology of AHP

The steps of AHP can be summarized as follows:

1. Defining the goal
2. Defining the criteria
3. Form the hierarchy tree
4. Calculate the weights of the criteria and sub criteria by the way pairwise comparison
5. Rate the alternative suppliers
6. Compute the overall score of each supplier

2.5 Computing the Consistency Ratio

The consistency ratio (CR) is equal to the consistency index (CI) divided by the random index (RI), which is determined from a table. The random index is a direct function of the number of alternatives. Random indices for consistency check are shown below in the table. (Table-2)

TABLE-2 RANDOM INDICES FOR CONSISTENCY

n	2	3	4	5	6	7	8	9	10
RI	0	.58	.90	1.12	1.24	1.32	1.41	1.45	1.51

Consistency index measures the degree of inconsistency in pairwise comparisons. The formula for consistency index is;

$$CI = \frac{\lambda - n}{n - 1}$$

n is the number of items being compared. The value for lambda is simply the average value of the consistency vector.

As mentioned before the formula for consistency ratio is;

$$CR = \frac{CI}{RI}$$

The consistency ratio tells us how consistent we are with our answers. Higher numbers mean we are less consistent, lower numbers mean we are more consistent. If the consistency ratio 0.10 or less, the decision maker's answers are consistent.

CHAPTER 3

APPLICATION OF THE AHP MODEL IN MEGA ELECTRONICS

3.1 Information about the company Mega Electronics

Mega Electronics has established in 1971 and started to wind motor bobbins in 30 msq closed area at Karaköy. In 1973 production capacity was 5000 pcs per month then Mega increased its production capacity 720.000 pcs per month in 2004. In 1987 Mega Electronics approved its quality with T.S.E. certificate first in own sector in Turkey and then approved some of its products with CE certificate .Mega made its first export in 1987 to U.S.A. and approved the quality of the products that produced by Mega in the international markets . At the same time Mega made preparations for a new plant which has 4500 msq closed area and keeping on production since 1992 at this new plant. Also Mega added ballast to its production range on this date. Mega is making 100 % of its production in own plant and has 100 personnel supported by managers, engineers , technicians and operators . Mega provides product that increases production, productivity and quality level for industry more than 33 years and Mega is groving up with expanding its product range by using accumulation of knowledge, experience, quality and technology.

Mega Electronics use enamelled copper wire as one of the raw materials in it's production lines and there are five suppliers; Asar Emaye ,Bemka Emaye, Santel Emaye, Elsan Emaye and Erikoglu Emaye.

3.2 Applying Pareto (ABC) Classification in Mega Electronics

Pareto classification applied in Mega Electronics for determining the raw materials to use in AHP model. We chose the first five mostly used raw materials written below from the classification. The classification is shown in appendix part and graphic is shown below. (Figure-1)

- 0,80 mm HO type enamelled copper wire
- 1,10 mm HO type enamelled copper wire
- 0,28 mm HO type enamelled copper wire
- 1,05 mm HO type enamelled copper wire
- 1,15 mm HO type enamelled copper wire

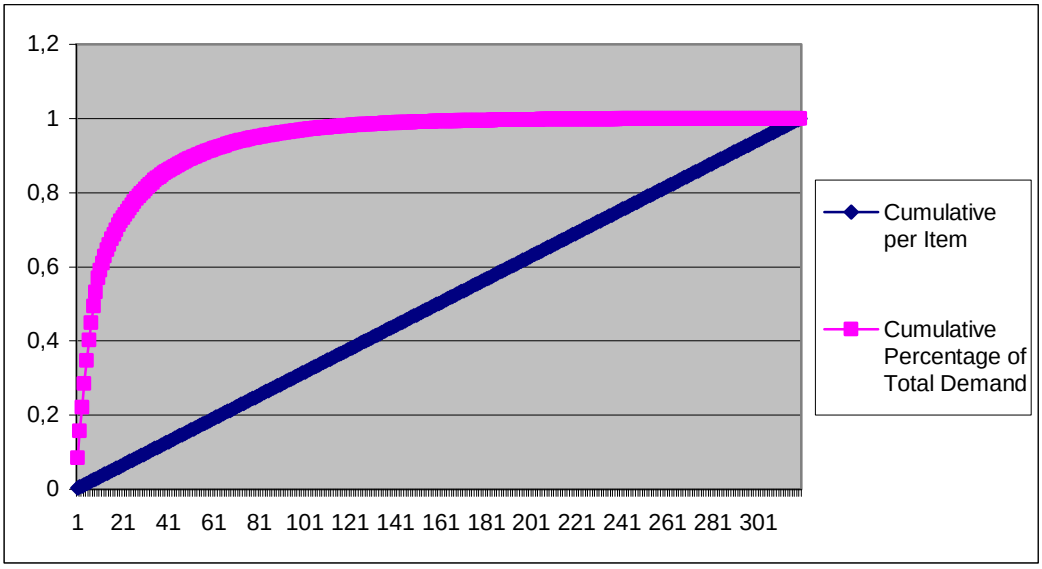

FIGURE-2 PARETO CLASSIFICATION GRAPH OF MEGA ELECTRONICS

3.3 Applying AHP Model in Mega Electronics

Pareto (ABC) Classification is applied to Mega Electronics raw materials in item 3.2 and five different enamelled copper wire types are determined to apply AHP model.

First of all goal has to be defined by decision maker for the model; goal is defined as ‘selecting the best supplier’ for all chosen enamelled copper wire types in this model. As written before; five suppliers are present in Mega Electronics for our raw material enamelled copper wire so the best one will be chosen by decision maker.

After this step criteria and sub criteria have to be defined . After negotiations in Mega Electronics between managers our criteria and sub criteria are defined about enamelled copper wire as written below;

Criteria;

- quality
- cost
- delivery
- service

Sub criteria;

For quality;

- rejection rate in the incoming quality control
- Remedy for quality problems.

For cost;

- cost reduction
- Pricing structure.

For delivery;

- compliance with due date and quantity
- Delivery to company address.

For service;

- level of cooperation and information exchange
- Production facility and capacity.

Now hierarchy tree can be formed for the model because all items are available to form hierarchy tree. (Figure-3)

The goal, criteria and sub criteria will be used common in cases, but after now all steps have to be carried out for each item separately.

3.3.1 Calculating the weights of criteria and sub criteria by using pairwise comparison for the type of enamelled copper wire *0.80 mm HO*.

In this step pairwise comparison matrixes will be formed for all criteria and sub criteria of 0.80 mm HO type enamelled copper wire to calculate the weights according to hierarchy tree.

First matrix is for sub criteria ‘rejection rate in the incoming quality control’ of criteria ‘quality’. (Table-3)

TABLE-3 PAIRWISE COMPARISON MATRIX OF REJECTION RATE IN THE INCOMING QUALITY CONTROL

REJECTION RATE IN THE INCOMING QUALITY CONTROL					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**5,0000**	**3,0000**	**1,0000**	**1,0000**
BEMKA	0,2000	1,0000	**0,3333**	**0,2000**	**0,2000**
SANTEL	0,3333	3,0000	1,0000	**0,3333**	**0,3333**
ELSAN	1,0000	5,0000	3,0000	1,0000	**1,0000**
ERIKOGLU	1,0000	5,0000	3,0000	1,0000	1,0000
TOTAL	3,5333	19,0000	10,3333	3,5333	3,5333

The forming of pairwise comparison shown above will be explained because of being first.

The table above is formed in Excel to calculate values easily. As you see in table, alternatives (suppliers) are written in head line and head column to make pairwise comparison. Only the values written bold are entered by decision maker. First pairwise comparison can be run detailed for example.

Question: In Rejection Rate in the Incoming Quality Control; how much more approval is Bemka than Santel?

Answer: According to preference level, Santel is three times more approval than Bemka.

Also this question is answered basing on data which is received from company Mega Electronics.

Data;

0.80 mm HO material bought from Bemka is 8524.14 KGS.

0.80 mm HO material refused in Mega Electronics from Bemka material is 38.800 KGS.

0.80 mm HO material bought from Santel is 7019.715 KGS.

0.80 mm HO material refused in Mega Electronics from Santel material is 0 KGS.

All pairwise comparisons are made by the same way in this matrix and will have been made by the same way in others.

The table shown below is calculation of the weights according to Rejection Rate in the Incoming Quality Control Pairwise Comparison Matrix. (Table-4)

TABLE-4 CALCULATION OF THE WEIGHTS ACCORDING TO REJECTION RATE IN THE INCOMING QUALITY CONTROL PAIRWISE COMPARISON MATRIX

REJECTION RATE IN THE INCOMING QUALITY CONTROL						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,2830	0,2632	0,2903	0,2830	0,2830	0,2805
BEMKA	0,0566	0,0526	0,0323	0,0566	0,0566	0,0509
SANTEL	0,0943	0,1579	0,0968	0,0943	0,0943	0,1075
ELSAN	0,2830	0,2632	0,2903	0,2830	0,2830	0,2805
ERIKOGLU	0,2830	0,2632	0,2903	0,2830	0,2830	0,2805
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Consistency Ratio of this matrix (Table-4) is 0,01.

Second matrix is for sub criteria ‘remedy for quality problems’ of criteria ‘quality’. (Table-5)

TABLE-5 PAIRWISE COMPARISON MATRIX OF REMEDY FOR QUALITY PROBLEMS

REMEDY FOR QUALITY PROBLEMS					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**2,0000**	**2,0000**	**2,0000**	**1,0000**
BEMKA	0,5000	1,0000	**0,5000**	**0,3333**	**1,0000**
SANTEL	0,5000	2,0000	1,0000	**2,0000**	**3,0000**
ELSAN	0,5000	3,0000	0,5000	1,0000	**2,0000**
ERIKOGLU	1,0000	1,0000	0,3333	0,5000	1,0000
TOTAL	3,5000	9,0000	4,3333	5,8333	8,0000

The table shown below is calculation of the weights according to Remedy for Quality Problems Pairwise Comparison Matrix. (Table-6)

TABLE-6 CALCULATION OF THE WEIGHTS ACCORDING TO REMEDY FOR QUALITY PROBLEMS PAIRWISE COMPARISON MATRIX

REMEDY FOR QUALITY PROBLEMS						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,2857	0,2222	0,4615	0,3429	0,1250	0,2875
BEMKA	0,1429	0,1111	0,1154	0,0571	0,1250	0,1103
SANTEL	0,1429	0,2222	0,2308	0,3429	0,3750	0,2627
ELSAN	0,1429	0,3333	0,1154	0,1714	0,2500	0,2026
ERIKOGLU	0,2857	0,1111	0,0769	0,0857	0,1250	0,1369
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Consistency Ratio of this matrix (Table-6) is 0,09.

Up to this line, the weights for sub criteria of criterion ‘quality’ are calculated. Now a matrix will be formed for criteria of criterion ‘quality’ to make pairwise comparison between each criterion of criterion ‘quality’. (Table-7)

TABLE-7 PAIRWISE COMPARISON MATRIX OF QUALITY

QUALITY		
	RRITIQC	RFQP
RRITIQC	1,0000	**5,0000**
RFQP	0,2000	1,0000
TOTAL	1,2000	6,0000

This time, a question can be prepared as below;

Question: In Quality; how much more important is Rejection Rate in the Incoming Quality Control than Remedy for Quality Problems?

Answer: According to preference level, Rejection Rate in the Incoming Quality Control is five times more approval than Remedy for Quality Problems.

The table shown below is calculation of the weights according to Quality Pairwise Comparison Matrix. (Table-8)

TABLE-8 CALCULATION OF THE WEIGHTS ACCORDING TO QUALITY PAIRWISE COMPARISON MATRIX

QUALITY			
	RRITIQC	RFQP	TOTAL
RRITIQC	0,8333	0,8333	0,8333
RFQP	0,1667	0,1667	0,1667
TOTAL	1,0000	1,0000	1,0000

Consistency Ratio of this matrix (Table-8) is 0,00.

Our model will continue with other criteria and their sub criteria by the same way.

Matrix shown below is for sub criteria ‘cost reduction’ of criteria ‘cost’. (Table-9)

TABLE-9 PAIRWISE COMPARISON MATRIX OF COST REDUCTION

COST REDUCTION					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,2500**	**0,2500**	**1,0000**	**0,5000**
BEMKA	4,0000	1,0000	**1,0000**	**3,0000**	**2,0000**
SANTEL	4,0000	1,0000	1,0000	**3,0000**	**2,0000**
ELSAN	1,0000	0,3333	0,3333	1,0000	**2,0000**
ERIKOGLU	2,0000	0,5000	0,5000	0,5000	1,0000
TOTAL	12,0000	3,0833	3,0833	8,5000	7,5000

The table shown below is calculation of the weights according to Remedy for Quality Problems Pairwise Comparison Matrix. (Table-10)

TABLE-10 CALCULATION OF THE WEIGHTS ACCORDING TO COST REDUCTION PAIRWISE COMPARISON MATRIX

COST REDUCTION						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0833	0,0811	0,0811	0,1176	0,0667	0,0860
BEMKA	0,3333	0,3243	0,3243	0,3529	0,2667	0,3203
SANTEL	0,3333	0,3243	0,3243	0,3529	0,2667	0,3203
ELSAN	0,0833	0,1081	0,1081	0,1176	0,2667	0,1368
ERIKOGLU	0,1667	0,1622	0,1622	0,0588	0,1333	0,1366
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Consistency Ratio of this matrix (Table-10) is 0,04.

Matrix shown below is for sub criteria ‘pricing structure’ of criterion ‘cost’. (Table-11)

TABLE-11 PAIRWISE COMPARISON MATRIX OF PRICING STRUCTURE

PRICING STRUCTURE					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**4,0000**	**0,5000**	**2,0000**	**4,0000**
BEMKA	0,2500	1,0000	**0,2500**	**0,5000**	**1,0000**
SANTEL	2,0000	4,0000	1,0000	**3,0000**	**4,0000**
ELSAN	0,5000	2,0000	0,3333	1,0000	**2,0000**
ERIKOGLU	0,2500	1,0000	0,2500	0,5000	1,0000
TOTAL	4,0000	12,0000	2,3333	7,0000	12,0000

The table shown below is calculation of the weights according to Pricing Structure Pairwise Comparison Matrix. (Table-12)

TABLE-12 CALCULATION OF THE WEIGHTS ACCORDING TO PRICING STRUCTURE PAIRWISE COMPARISON MATRIX

PRICING STRUCTURE						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,2500	0,3333	0,2143	0,2857	0,3333	0,2833
BEMKA	0,0625	0,0833	0,1071	0,0714	0,0833	0,0815
SANTEL	0,5000	0,3333	0,4286	0,4286	0,3333	0,4048
ELSAN	0,1250	0,1667	0,1429	0,1429	0,1667	0,1488
ERIKOGLU	0,0625	0,0833	0,1071	0,0714	0,0833	0,0815
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Consistency Ratio of this matrix (Table-12) is 0,01.

Again a matrix will be formed for criteria of criterion ‘cost’ to make pairwise comparison between each criterion of criterion ‘cost’. (Table-13)

TABLE-13 PAIRWISE COMPARISON MATRIX OF COST

COST		
	CR	PS
CR	1,0000	**5,0000**
PS	0,2000	1,0000
TOTAL	1,2000	6,0000

The table shown below is calculation of the weights according to Cost Pairwise Comparison Matrix. (Table-14)

TABLE-14 CALCULATION OF THE WEIGHTS ACCORDING TO COST PAIRWISE COMPARISON MATRIX

COST			
	CR	PS	TOTAL
CR	0,8333	0,8333	0,8333
PS	0,1667	0,1667	0,1667
TOTAL	1,0000	1,0000	1,0000

Consistency Ratio of this matrix (Table-14) is 0,00.

Now it’s turn of third criterion ‘delivery’.

Matrix shown below is for sub criteria ‘compliance with due date and quantity’ of criteria ‘delivery’. (Table-15)

TABLE-15 PAIRWISE COMPARISON MATRIX OF COMPLIANCE WITH DUE DATE AND QUANTITY

COMPLIANCE WITH DUE DATE AND QUANTITY					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1429**	**0,2000**	**0,2000**	**0,1429**
BEMKA	7,0000	1,0000	**3,0000**	**3,0000**	**1,0000**
SANTEL	5,0000	0,3333	1,0000	**1,0000**	**0,3333**
ELSAN	5,0000	0,3333	1,0000	1,0000	**0,5000**
ERIKOGLU	7,0000	1,0000	3,0000	2,0000	1,0000
TOTAL	25,0000	2,8095	8,2000	7,2000	2,9762

The table shown below is calculation of the weights according to Compliance with due date and quantity Pairwise Comparison Matrix. (Table-16)

TABLE-16 CALCULATION OF THE WEIGHTS ACCORDING TO COMPLIANCE WITH DUE DATE AND QUANTITY PAIRWISE COMPARISON MATRIX

COMPLIANCE WITH DUE DATE AND QUANTITY						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0400	0,0508	0,0244	0,0278	0,0480	0,0382
BEMKA	0,2800	0,3559	0,3659	0,4167	0,3360	0,3509
SANTEL	0,2000	0,1186	0,1220	0,1389	0,1120	0,1383
ELSAN	0,2000	0,1186	0,1220	0,1389	0,1680	0,1495
ERIKOGLU	0,2800	0,3559	0,3659	0,2778	0,3360	0,3231
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Consistency Ratio of this matrix (Table-16) is 0,02.

The other matrix is for sub criteria ‘delivery to company address’ of criteria ‘delivery’. (Table-17)

TABLE-17 PAIRWISE COMPARISON MATRIX OF COMPLIANCE DELIVERY TO COMPANY ADDRESS

DELIVERY TO COMPANY ADDRESS					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1111**	**0,1429**	**0,1111**	**0,1111**
BEMKA	9,0000	1,0000	**2,0000**	**1,0000**	**1,0000**
SANTEL	7,0000	0,5000	1,0000	**0,5000**	**0,3333**
ELSAN	9,0000	1,0000	2,0000	1,0000	**1,0000**
ERIKOGLU	9,0000	1,0000	3,0000	1,0000	1,0000
TOTAL	35,0000	3,6111	8,1429	3,6111	3,4444

The table shown below is calculation of the weights according to Delivery to Company Address Pairwise Comparison Matrix. (Table-18)

TABLE-18 CALCULATION OF THE WEIGHTS ACCORDING TO DELIVERY TO COMPANY ADDRESS PAIRWISE COMPARISON MATRIX

DELIVERY TO COMPANY ADDRESS						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0286	0,0308	0,0175	0,0308	0,0323	0,0280
BEMKA	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
SANTEL	0,2000	0,1385	0,1228	0,1385	0,0968	0,1393
ELSAN	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
ERIKOGLU	0,2571	0,2769	0,3684	0,2769	0,2903	0,2939
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Consistency Ratio of this matrix (Table-18) is 0,01.

A matrix will be formed for criteria of criterion ‘delivery’ to make pairwise comparison between each criterion of criterion ‘delivery’. (Table-19)

TABLE-19 PAIRWISE COMPARISON MATRIX OF DELIVERY

DELIVERY		
	CWDDAQ	DTCA
CWDDAQ	1,0000	**2,0000**
DTCA	0,5000	1,0000
TOTAL	1,5000	3,0000

The table shown below is calculation of the weights according to Delivery Pairwise Comparison Matrix. (Table-20)

TABLE-20 CALCULATION OF THE WEIGHTS ACCORDING TO DELIVERY PAIRWISE COMPARISON MATRIX

DELIVERY			
	CWDDAQ	DTCA	TOTAL
CWDDAQ	0,6667	0,6667	0,6667
DTCA	0,3333	0,3333	0,3333
TOTAL	1,0000	1,0000	1,0000

Consistency Ratio of this matrix (Table-20) is 0,00.

Last and fourth criterion ‘service’ will be compared as follows;

Matrix shown below is for sub criteria ‘Level of Cooperation and Information Exchange’ of criteria ‘service’. (Table-21)

TABLE-21 PAIRWISE COMPARISON MATRIX OF LEVEL OF COOPERATION AND INFORMATION EXCHANGE

LEVEL OF COOPERATION AND INFORMATION EXCHANGE					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1111**	**0,1429**	**0,1111**	**0,1111**
BEMKA	9,0000	1,0000	**2,0000**	**1,0000**	**1,0000**
SANTEL	7,0000	0,5000	1,0000	**0,5000**	**0,3333**
ELSAN	9,0000	1,0000	2,0000	1,0000	**1,0000**
ERIKOGLU	9,0000	1,0000	3,0000	1,0000	1,0000
TOTAL	35,0000	3,6111	8,1429	3,6111	3,4444

The table shown below is calculation of the weights according to Level of Cooperation and Information Exchange Pairwise Comparison Matrix. (Table-22)

TABLE-22 CALCULATION OF THE WEIGHTS ACCORDING TO LEVEL OF COOPERATION AND INFORMATION EXCHANGE PAIRWISE COMPARISON MATRIX

LEVEL OF COOPERATION AND INFORMATION EXCHANGE						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0286	0,0308	0,0175	0,0308	0,0323	0,0280
BEMKA	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
SANTEL	0,2000	0,1385	0,1228	0,1385	0,0968	0,1393
ELSAN	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
ERIKOGLU	0,2571	0,2769	0,3684	0,2769	0,2903	0,2939
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Consistency Ratio of this matrix (Table-22) is 0,01.

The other matrix is for sub criteria ‘Production Facility and Capacity’ of criteria ‘service’. (Table-23)

TABLE-23 PAIRWISE COMPARISON MATRIX OF PRODUCTION FACILITY AND CAPACITY

PRODUCTION FACILITY AND CAPACITY					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1111**	**0,1111**	**0,1111**	**0,1111**
BEMKA	9,0000	1,0000	**1,0000**	**1,0000**	**1,0000**
SANTEL	9,0000	1,0000	1,0000	**1,0000**	**1,0000**
ELSAN	9,0000	1,0000	1,0000	1,0000	**1,0000**
ERIKOGLU	9,0000	1,0000	1,0000	1,0000	1,0000
TOTAL	37,0000	4,1111	4,1111	4,1111	4,1111

The table shown below is calculation of the weights according to Production Facility and Capacity Pairwise Comparison Matrix. (Table-24)

TABLE-24 CALCULATION OF THE WEIGHTS ACCORDING TO PRODUCTION FACILITY AND CAPACITY PAIRWISE COMPARISON MATRIX

PRODUCTION FACILITY AND CAPACITY						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0270	0,0270	0,0270	0,0270	0,0270	0,0270
BEMKA	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
SANTEL	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
ELSAN	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
ERIKOGLU	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Consistency Ratio of this matrix (Table-24) is 0,00.

A matrix will be formed for criteria of criterion ‘service’ to make pairwise comparison between each criterion of criterion ‘service’. (Table-25)

TABLE-25 PAIRWISE COMPARISON MATRIX OF SERVICE

SERVICE		
	LOCAIE	PFAC
LOCAIE	1,0000	**0,5000**
PFAC	2,0000	1,0000
TOTAL	3,0000	1,5000

The table shown below is calculation of the weights according to Service Pairwise Comparison Matrix. (Table-26)

TABLE-26 CALCULATION OF THE WEIGHTS ACCORDING TO SERVICE PAIRWISE COMPARISON MATRIX

SERVICE			
	RRITIQC	RFQP	TOTAL
RRITIQC	0,3333	0,3333	0,3333
RFQP	0,6667	0,6667	0,6667
TOTAL	1,0000	1,0000	1,0000

Consistency Ratio of this matrix (Table-4) is 0,00.

All weights are calculated of the criteria and sub criteria, next step is rating the alternative suppliers.

Tables which is including all weights of sub criteria will be formed. (Table-27/28)

TABLE-27 WEIGHTS OF SUB CRITERIA ACCORDING COMPANIES

CRITERIA								
	RRITIC	RFQP	CR	PS	CWDDAQ	DTCA	LOCAIE	PFAC
ASAR	0,2805	0,2875	0,0860	0,2833	0,0382	0,0280	0,0280	0,0270
BEMKA	0,0509	0,1103	0,3203	0,0815	0,3509	0,2694	0,2694	0,2432
SANTEL	0,1075	0,2627	0,3203	0,4048	0,1383	0,1393	0,1393	0,2432
ELSAN	0,2805	0,2026	0,1368	0,1488	0,1495	0,2694	0,2694	0,2432
ERIKOGLU	0,2805	0,1369	0,1366	0,0815	0,3231	0,2939	0,2939	0,2432

Table-28 WEIGHTS OF SUB CRITERIA ACCORDING CRITERIA

QUALITY		COST		DELIVERY		SERVICE	
RRITIC	RFQP	CR	PS	CWDDAQ	DTCA	LOCAIE	PFAC
0,8333	0,1667	0,8333	0,1667	0,6667	0,3333	0,3333	0,6667

The model's last pairwise comparison matrix which contributes the calculation of the weights of criteria according to each other has to be formed by decision maker. (Table-29)

TABLE-29 PAIRWISE COMPARISON MATRIX OF CRITERIA ACCORDING TO EACH OTHER

CRITERIA				
	QUALITY	COST	DELIVERY	SERVICE
QUALITY	1,0000	**2,0000**	**4,0000**	**5,0000**
COST	0,5000	1,0000	**3,0000**	**4,0000**
DELIVERY	0,2500	0,3333	1,0000	**2,0000**
SERVICE	0,2500	0,2500	0,5000	1,0000
TOTAL	2,0000	3,5833	8,5000	12,0000

The table shown below is calculation of the weights according to Criteria Pairwise Comparison Matrix. (Table-30)

TABLE-30 CALCULATION OF THE WEIGHTS ACCORDING TO CRITERIA PAIRWISE COMPARISON MATRIX

CRITERIA					
	QUALITY	COST	DELIVERY	SERVICE	TOTAL
QUALITY	0,5000	0,5581	0,4706	0,4167	0,4863
COST	0,2500	0,2791	0,3529	0,3333	0,3038
DELIVERY	0,1250	0,0930	0,1176	0,1667	0,1256
SERVICE	0,1250	0,0698	0,0588	0,0833	0,0842
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000

Consistency Ratio of this matrix (Table-4) is 0,05.

Finally last step will be computing the overall score of each supplier. In this step decision maker can start with calculating the overall score of Asar. Decision maker will multiply weight of Rejection Rate in the Incoming Quality Control for Asar (Table-27) with the weight of Rejection Rate in the Incoming Quality Control for criteria quality (Table-28) and again will multiply this multiplication with total weight of quality. (Table-30) Numerical values of these calculation are 0,2805 . 0,8333 . 0,4863 . Then this calculation will be made for all sub criteria. After these calculations all these multiplications will be added and decision maker will reach the overall score of Asar. Alternative

suppliers' overall scores will be calculated like this calculation and all overall scores will come out. (Table-31)

TABLE-31 OVERALL SCORES OF ALTERNATIVE SUPPLIERS FOR 0.80 MM HO MATERIAL

ASAR	0,1798
BEMKA	0,1767
SANTEL	0,2015
ELSAN	0,2173
ERIKOGLU	0,2248
TOTAL	1,0000

Based on these scores developed by AHP, Erikoglu should be selected as the 0.80 mm HO supplier company for Mega Electronics.

3.3.2 Computing the Consistency Ratio

To find the consistency ratio of a pairwise comparison matrix, following calculations will be made. Pairwise comparison matrix of criteria according to each other and the weights of criteria are given for example. (Table 29-32)

TABLE-32 THE WEIGHTS OF CRITERIA

CRITERIA	
QUALITY	0,4863
COST	0,3038
DELIVERY	0,1256
SERVICE	0,0842

The evaluation value which is in the first column of the first line in the pairwise comparison matrix of criteria will be multiplied by weight of criterion quality. Then decision maker multiply the evaluation value which is in the second column of the first line in the pairwise comparison matrix of criteria times weight of criterion cost. After these two calculations again the

evaluation value which is in the third column of the first line in the pairwise comparison matrix of criteria will be multiplied by weight of criterion delivery. At last the evaluation value which is in the fourth column of the first line in the pairwise comparison matrix of criteria will be multiplied by weight of criterion service. After all these multiplications, results of multiplications will be added. Calculations are as follows;

(((1)(0,4863))+((2)(0,3038))+((4)(0,1256))+((5)(0,0842))) = 2,0173

The same computations will be done for second, third and fourth lines of matrix as follows;

(((0,5)(0,4863))+((1)(0,3038))+((3)(0,1256))+((4)(0,0842))) = 1,2606

(((0,25)(0,4863))+((0,3333)(0,3038))+((1)(0,1256))+((2)(0,0842))) = 0,5169

(((0,25)(0,4863))+((0,25)(0,3038))+((0,5)(0,1256))+((1)(0,0842))) = 0,3446

Now the results will be divided by the weights of criteria as follows;

2,0173/0,4863 = 4,1483

1,2606/0,3038 = 4,1494

0,5169/0,1256 = 4,1154

0,3446/0,0842 = 4,0926

Then the results will be added and divided by number of items being compared. Decision maker reaches the lambda value as shown below;

$$4{,}1483 + 4{,}1494 + 4{,}1154 + 4{,}0926 = 16{,}5057$$

$$\frac{16{,}5057}{4} = 4{,}1264 = \lambda$$

Now it is easy to replace values in formula to compute the consistency index.

$$CI = \frac{4{,}1264 - 4}{4 - 1} = 0{,}0421$$

Last step is calculation of consistency ratio formula.

$$CR = \frac{0{,}0421}{0{,}90} = 0{,}05$$

Finally 0,05 consistency ratio means decision maker's answers are consistent because end value is less than the line 0,10.

3.3.3 Calculating the weights of criteria and sub criteria by using pairwise comparison for the type of enamelled copper wire *1.10 mm HO*.

In this step pairwise comparison matrixes will be formed for all criteria and sub criteria of 1.10 mm HO type enamelled copper wire to calculate the weights according to hierarchy tree.

First matrix is for sub criteria ‘rejection rate in the incoming quality control’ of criteria ‘quality’. (Table-33)

TABLE-33 PAIRWISE COMPARISON MATRIX OF REJECTION RATE IN THE INCOMING QUALITY CONTROL

REJECTION RATE IN THE INCOMING QUALITY CONTROL					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**3,0000**	**1,0000**	**5,0000**	**1,0000**
BEMKA	0,3333	1,0000	**0,3333**	**3,0000**	**0,3333**
SANTEL	1,0000	3,0000	1,0000	**5,0000**	**1,0000**
ELSAN	0,2000	0,3333	0,2000	1,0000	**0,2000**
ERIKOGLU	1,0000	3,0000	1,0000	5,0000	1,0000
TOTAL	3,5333	10,3333	3,5333	19,0000	3,5333

The table shown below is calculation of the weights according to Rejection Rate in the Incoming Quality Control Pairwise Comparison Matrix. (Table-34)

TABLE-34 CALCULATION OF THE WEIGHTS ACCORDING TO REJECTION RATE IN THE INCOMING QUALITY CONTROL PAIRWISE COMPARISON MATRIX

REJECTION RATE IN THE INCOMING QUALITY CONTROL						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,2830	0,2903	0,2830	0,2632	0,2830	0,2805
BEMKA	0,0943	0,0968	0,0943	0,1579	0,0943	0,1075
SANTEL	0,2830	0,2903	0,2830	0,2632	0,2830	0,2805
ELSAN	0,0566	0,0323	0,0566	0,0526	0,0566	0,0509
ERIKOGLU	0,2830	0,2903	0,2830	0,2632	0,2830	0,2805
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Second matrix is for sub criteria ‘remedy for quality problems’ of criteria ‘quality’. (Table-35)

TABLE-35 PAIRWISE COMPARISON MATRIX OF REMEDY FOR QUALITY PROBLEMS

REMEDY FOR QUALITY PROBLEMS					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**2,0000**	**2,0000**	**2,0000**	**1,0000**
BEMKA	0,5000	1,0000	**0,5000**	**0,3333**	**1,0000**
SANTEL	0,5000	2,0000	1,0000	**2,0000**	**3,0000**
ELSAN	0,5000	3,0000	0,5000	1,0000	**2,0000**
ERIKOGLU	1,0000	1,0000	0,3333	0,5000	1,0000
TOTAL	3,5000	9,0000	4,3333	5,8333	8,0000

The table shown below is calculation of the weights according to Remedy for Quality Problems Pairwise Comparison Matrix. (Table-36)

TABLE-36 CALCULATION OF THE WEIGHTS ACCORDING TO REMEDY FOR QUALITY PROBLEMS PAIRWISE COMPARISON MATRIX

REMEDY FOR QUALITY PROBLEMS						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,2857	0,2222	0,4615	0,3429	0,1250	0,2875
BEMKA	0,1429	0,1111	0,1154	0,0571	0,1250	0,1103
SANTEL	0,1429	0,2222	0,2308	0,3429	0,3750	0,2627
ELSAN	0,1429	0,3333	0,1154	0,1714	0,2500	0,2026
ERIKOGLU	0,2857	0,1111	0,0769	0,0857	0,1250	0,1369
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Up to this line, the weights of sub criteria of criterion ‘quality’ are calculated. Now a matrix will be formed for criteria of criterion ‘quality’ to make pairwise comparison between each criterion of criterion ‘quality’. (Table-37)

TABLE-37 PAIRWISE COMPARISON MATRIX OF QUALITY

QUALITY		
	RRITIQC	RFQP
RRITIQC	1,0000	**5,0000**
RFQP	0,2000	1,0000
TOTAL	1,2000	6,0000

The table shown below is calculation of the weights according to Quality Pairwise Comparison Matrix. (Table-38)

TABLE-38 CALCULATION OF THE WEIGHTS ACCORDING TO QUALITY PAIRWISE COMPARISON MATRIX

QUALITY			
	RRITIQC	RFQP	TOTAL
RRITIQC	0,8333	0,8333	0,8333
RFQP	0,1667	0,1667	0,1667
TOTAL	1,0000	1,0000	1,0000

Our model will continue with other criteria and their sub criteria by the same way.

Matrix shown below is for sub criteria ‘cost reduction’ of criteria ‘cost’. (Table-39)

TABLE-39 PAIRWISE COMPARISON MATRIX OF COST REDUCTION

COST REDUCTION					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,2500**	**0,2500**	**1,0000**	**0,5000**
BEMKA	4,0000	1,0000	**1,0000**	**3,0000**	**2,0000**
SANTEL	4,0000	1,0000	1,0000	**3,0000**	**2,0000**
ELSAN	1,0000	0,3333	0,3333	1,0000	**2,0000**
ERIKOGLU	2,0000	0,5000	0,5000	0,5000	1,0000
TOTAL	12,0000	3,0833	3,0833	8,5000	7,5000

The table shown below is calculation of the weights according to Remedy for Quality Problems Pairwise Comparison Matrix. (Table-40)

TABLE-40 CALCULATION OF THE WEIGHTS ACCORDING TO COST REDUCTION PAIRWISE COMPARISON MATRIX

COST REDUCTION						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0833	0,0811	0,0811	0,1176	0,0667	0,0860
BEMKA	0,3333	0,3243	0,3243	0,3529	0,2667	0,3203
SANTEL	0,3333	0,3243	0,3243	0,3529	0,2667	0,3203
ELSAN	0,0833	0,1081	0,1081	0,1176	0,2667	0,1368
ERIKOGLU	0,1667	0,1622	0,1622	0,0588	0,1333	0,1366
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Matrix shown below is for sub criteria ‘pricing structure’ of criterion ‘cost’. (Table-41)

TABLE-41 PAIRWISE COMPARISON MATRIX OF PRICING STRUCTURE

PRICING STRUCTURE					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**4,0000**	**0,5000**	**2,0000**	**4,0000**
BEMKA	0,2500	1,0000	**0,2500**	**0,5000**	**1,0000**
SANTEL	2,0000	4,0000	1,0000	**3,0000**	**4,0000**
ELSAN	0,5000	2,0000	0,3333	1,0000	**2,0000**
ERIKOGLU	0,2500	1,0000	0,2500	0,5000	1,0000
TOTAL	4,0000	12,0000	2,3333	7,0000	12,0000

The table shown below is calculation of the weights according to Pricing Structure Pairwise Comparison Matrix. (Table-42)

TABLE-42 CALCULATION OF THE WEIGHTS ACCORDING TO PRICING STRUCTURE PAIRWISE COMPARISON MATRIX

PRICING STRUCTURE						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,2500	0,3333	0,2143	0,2857	0,3333	0,2833
BEMKA	0,0625	0,0833	0,1071	0,0714	0,0833	0,0815
SANTEL	0,5000	0,3333	0,4286	0,4286	0,3333	0,4048
ELSAN	0,1250	0,1667	0,1429	0,1429	0,1667	0,1488
ERIKOGLU	0,0625	0,0833	0,1071	0,0714	0,0833	0,0815
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Again a matrix will be formed for criteria of criterion ‘cost’ to make pairwise comparison between each criterion of criterion ‘cost’. (Table-43)

TABLE-43 PAIRWISE COMPARISON MATRIX OF COST

COST		
	CR	PS
CR	1,0000	**5,0000**
PS	0,2000	1,0000
TOTAL	1,2000	6,0000

The table shown below is calculation of the weights according to Cost Pairwise Comparison Matrix. (Table-44)

TABLE-44 CALCULATION OF THE WEIGHTS ACCORDING TO COST PAIRWISE COMPARISON MATRIX

COST			
	CR	PS	TOTAL
CR	0,8333	0,8333	0,8333
PS	0,1667	0,1667	0,1667
TOTAL	1,0000	1,0000	1,0000

Now it's turn of third criterion 'delivery'.

Matrix shown below is for sub criteria 'compliance with due date and quantity' of criteria 'delivery'. (Table-45)

TABLE-45 PAIRWISE COMPARISON MATRIX OF COMPLIANCE WITH DUE DATE AND QUANTITY

COMPLIANCE WITH DUE DATE AND QUANTITY					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1429**	**0,2000**	**0,2000**	**0,1429**
BEMKA	7,0000	1,0000	**3,0000**	**3,0000**	**1,0000**
SANTEL	5,0000	0,3333	1,0000	**1,0000**	**0,3333**
ELSAN	5,0000	0,3333	1,0000	1,0000	**0,5000**
ERIKOGLU	7,0000	1,0000	3,0000	2,0000	1,0000
TOTAL	25,0000	2,8095	8,2000	7,2000	2,9762

The table shown below is calculation of the weights according to Compliance with due date and quantity Pairwise Comparison Matrix. (Table-46)

TABLE-46 CALCULATION OF THE WEIGHTS ACCORDING TO COMPLIANCE WITH DUE DATE AND QUANTITY PAIRWISE COMPARISON MATRIX

COMPLIANCE WITH DUE DATE AND QUANTITY						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0400	0,0508	0,0244	0,0278	0,0480	0,0382
BEMKA	0,2800	0,3559	0,3659	0,4167	0,3360	0,3509
SANTEL	0,2000	0,1186	0,1220	0,1389	0,1120	0,1383
ELSAN	0,2000	0,1186	0,1220	0,1389	0,1680	0,1495
ERIKOGLU	0,2800	0,3559	0,3659	0,2778	0,3360	0,3231
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

The other matrix is for sub criteria ‘delivery to company addresses of criteria ‘delivery’. (Table-47)

TABLE-47 PAIRWISE COMPARISON MATRIX OF COMPLIANCE DELIVERY TO COMPANY ADDRESS

DELIVERY TO COMPANY ADDRESS					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1111**	**0,1429**	**0,1111**	**0,1111**
BEMKA	9,0000	1,0000	**2,0000**	**1,0000**	**1,0000**
SANTEL	7,0000	0,5000	1,0000	**0,5000**	**0,3333**
ELSAN	9,0000	1,0000	2,0000	1,0000	**1,0000**
ERIKOGLU	9,0000	1,0000	3,0000	1,0000	1,0000
TOTAL	35,0000	3,6111	8,1429	3,6111	3,4444

The table shown below is calculation of the weights according to Delivery to Company Address Pairwise Comparison Matrix. (Table-48)

TABLE-48 CALCULATION OF THE WEIGHTS ACCORDING TO DELIVERY TO COMPANY ADDRESS PAIRWISE COMPARISON MATRIX

DELIVERY TO COMPANY ADDRESS						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0286	0,0308	0,0175	0,0308	0,0323	0,0280
BEMKA	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
SANTEL	0,2000	0,1385	0,1228	0,1385	0,0968	0,1393
ELSAN	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
ERIKOGLU	0,2571	0,2769	0,3684	0,2769	0,2903	0,2939
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

A matrix will be formed for criteria of criterion ‘delivery’ to make pairwise comparison between each criterion of criterion ‘delivery’. (Table-49)

TABLE-49 PAIRWISE COMPARISON MATRIX OF DELIVERY

DELIVERY		
	CWDDAQ	DTCA
CWDDAQ	1,0000	**2,0000**
DTCA	0,5000	1,0000
TOTAL	1,5000	3,0000

The table shown below is calculation of the weights according to Delivery Pairwise Comparison Matrix. (Table-50)

TABLE-50 CALCULATION OF THE WEIGHTS ACCORDING TO DELIVERY PAIRWISE COMPARISON MATRIX

DELIVERY			
	CWDDAQ	DTCA	TOTAL
CWDDAQ	0,6667	0,6667	0,6667
DTCA	0,3333	0,3333	0,3333
TOTAL	1,0000	1,0000	1,0000

Last and fourth criterion ‘service’ will be compared as follows;

Matrix shown below is for sub criteria ‘Level of Cooperation and Information Exchange’ of criteria ‘service’. (Table-51)

TABLE-51 PAIRWISE COMPARISON MATRIX OF LEVEL OF COOPERATION AND INFORMATION EXCHANGE

LEVEL OF COOPERATION AND INFORMATION EXCHANGE					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1111**	**0,1429**	**0,1111**	**0,1111**
BEMKA	9,0000	1,0000	**2,0000**	**1,0000**	**1,0000**
SANTEL	7,0000	0,5000	1,0000	**0,5000**	**0,3333**
ELSAN	9,0000	1,0000	2,0000	1,0000	**1,0000**
ERIKOGLU	9,0000	1,0000	3,0000	1,0000	1,0000
TOTAL	35,0000	3,6111	8,1429	3,6111	3,4444

The table shown below is calculation of the weights according to Level of Cooperation and Information Exchange Pairwise Comparison Matrix. (Table-52)

TABLE-52 CALCULATION OF THE WEIGHTS ACCORDING TO LEVEL OF COOPERATION AND INFORMATION EXCHANGE PAIRWISE COMPARISON MATRIX

LEVEL OF COOPERATION AND INFORMATION EXCHANGE						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0286	0,0308	0,0175	0,0308	0,0323	0,0280
BEMKA	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
SANTEL	0,2000	0,1385	0,1228	0,1385	0,0968	0,1393
ELSAN	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
ERIKOGLU	0,2571	0,2769	0,3684	0,2769	0,2903	0,2939
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

The other matrix is for sub criteria ‘Production Facility and Capacity’ of criteria ‘service’. (Table-53)

TABLE-53 PAIRWISE COMPARISON MATRIX OF PRODUCTION FACILITY AND CAPACITY

PRODUCTION FACILITY AND CAPACITY					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1111**	**0,1111**	**0,1111**	**0,1111**
BEMKA	9,0000	1,0000	**1,0000**	**1,0000**	**1,0000**
SANTEL	9,0000	1,0000	1,0000	**1,0000**	**1,0000**
ELSAN	9,0000	1,0000	1,0000	1,0000	**1,0000**
ERIKOGLU	9,0000	1,0000	1,0000	1,0000	1,0000
TOTAL	37,0000	4,1111	4,1111	4,1111	4,1111

The table shown below is calculation of the weights according to Production Facility and Capacity Pairwise Comparison Matrix. (Table-54)

TABLE-54 CALCULATION OF THE WEIGHTS ACCORDING TO PRODUCTION FACILITY AND CAPACITY PAIRWISE COMPARISON MATRIX

PRODUCTION FACILITY AND CAPACITY						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0270	0,0270	0,0270	0,0270	0,0270	0,0270
BEMKA	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
SANTEL	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
ELSAN	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
ERIKOGLU	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

A matrix will be formed for criteria of criterion ‘service’ to make pairwise comparison between each criterion of criterion ‘service’. (Table-55)

TABLE-55 PAIRWISE COMPARISON MATRIX OF SERVICE

SERVICE		
	RRITIQC	RFQP
RRITIQC	1,0000	**0,5000**
RFQP	2,0000	1,0000
TOTAL	3,0000	1,5000

The table shown below is calculation of the weights according to Service Pairwise Comparison Matrix. (Table-56)

TABLE-56 CALCULATION OF THE WEIGHTS ACCORDING TO SERVICE PAIRWISE COMPARISON MATRIX

SERVICE			
	RRITIQC	RFQP	TOTAL
RRITIQC	0,3333	0,3333	0,3333
RFQP	0,6667	0,6667	0,6667
TOTAL	1,0000	1,0000	1,0000

All weights are calculated of the criteria and sub criteria, next step is rating the alternative suppliers.

Tables which is including all weights of sub criteria will be formed. (Table-57/58)

TABLE-57 WEIGHTS OF SUB CRITERIA ACCORDING COMPANIES

	CRITERIA							
	RRITIC	RFQP	CR	PS	CWDDAQ	DTCA	LOCAIE	PFAC
ASAR	0,2805	0,2875	0,0860	0,2833	0,0382	0,0280	0,0280	0,0270
BEMKA	0,0509	0,1103	0,3203	0,0815	0,3509	0,2694	0,2694	0,2432
SANTEL	0,1075	0,2627	0,3203	0,4048	0,1383	0,1393	0,1393	0,2432
ELSAN	0,2805	0,2026	0,1368	0,1488	0,1495	0,2694	0,2694	0,2432
ERIKOGLU	0,2805	0,1369	0,1366	0,0815	0,3231	0,2939	0,2939	0,2432

TABLE-58 WEIGHTS OF SUB CRITERIA ACCORDING CRITERIA

QUALITY		COST		DELIVERY		SERVICE	
RRITIC	RFQP	CR	PS	CWDDAQ	DTCA	LOCAIE	PFAC
0,8333	0,1667	0,8333	0,1667	0,6667	0,3333	0,3333	0,6667

The model's last pairwise comparison matrix which contributes the calculation of the weights of criteria according to each other has to be formed by decision maker. (Table-59)

TABLE-59 PAIRWISE COMPARISON MATRIX OF CRITERIA ACCORDING TO EACH OTHER

	CRITERIA			
	QUALITY	COST	DELIVERY	SERVICE
QUALITY	1,0000	**2,0000**	**4,0000**	**5,0000**
COST	0,5000	1,0000	**3,0000**	**4,0000**
DELIVERY	0,2500	0,3333	1,0000	**2,0000**
SERVICE	0,2500	0,2500	0,5000	1,0000
TOTAL	2,0000	3,5833	8,5000	12,0000

The table shown below is calculation of the weights according to Criteria Pairwise Comparison Matrix. (Table-60)

TABLE-60 CALCULATION OF THE WEIGHTS ACCORDING TO CRITERIA PAIRWISE COMPARISON MATRIX

CRITERIA					
	QUALITY	COST	DELIVERY	SERVICE	TOTAL
QUALITY	0,5000	0,5581	0,4706	0,4167	0,4863
COST	0,2500	0,2791	0,3529	0,3333	0,3038
DELIVERY	0,1250	0,0930	0,1176	0,1667	0,1256
SERVICE	0,1250	0,0698	0,0588	0,0833	0,0842
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000

Finally last step will be computing the overall score of each supplier. In this step decision maker can start with calculating the overall score of Asar. Decision maker will multiply weight of Rejection Rate in the Incoming Quality Control for Asar (Table-57) with the weight of Rejection Rate in the Incoming Quality Control for criteria quality (Table-58) and again will multiply this multiplication with total weight of quality. (Table-60) Numerical values of these calculation are 0,2805 . 0,8333 . 0,4863 . Then this calculation will be made for all sub criteria. After these calculations all these multiplications will be added and decision maker will reach the overall score of Asar. Alternative suppliers' overall scores will be calculated like this calculation and all overall scores will come out. (Table-61)

TABLE-61 OVERALL SCORES OF ALTERNATIVE SUPPLIERS FOR 1.10 MM HO MATERIAL

ASAR	0,1798
BEMKA	0,1996
SANTEL	0,2716
ELSAN	0,1242
ERIKOGLU	0,2248
TOTAL	1,0000

Based on these scores developed by AHP, Santel should be selected as the 1.10 mm HO supplier company for Mega Electronics.

3.3.4 Calculating the weights of criteria and sub criteria by using pairwise comparison for the type of enamelled copper wire *0.28 mm HO*.

In this step pairwise comparison matrixes will be formed for all criteria and sub criteria of 0.28 mm HO type enamelled copper wire to calculate the weights according to hierarchy tree.

First matrix is for sub criteria ‘rejection rate in the incoming quality control’ of criteria ‘quality’. (Table-62)

TABLE-62 PAIRWISE COMPARISON MATRIX OF REJECTION RATE IN THE INCOMING QUALITY CONTROL

REJECTION RATE IN THE INCOMING QUALITY CONTROL					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,3333**	**0,1429**	**0,1111**	**0,2000**
BEMKA	3,0000	1,0000	**0,2000**	**0,1429**	**0,3333**
SANTEL	7,0000	5,0000	1,0000	**0,3333**	**3,0000**
ELSAN	9,0000	7,0000	3,0000	1,0000	**5,0000**
ERIKOGLU	5,0000	3,0000	0,3333	0,2000	1,0000
TOTAL	25,0000	16,3333	4,6762	1,7873	9,5333

The table shown below is calculation of the weights according to Rejection Rate in the Incoming Quality Control Pairwise Comparison Matrix. (Table-63)

TABLE-63 CALCULATION OF THE WEIGHTS ACCORDING TO REJECTION RATE IN THE INCOMING QUALITY CONTROL PAIRWISE COMPARISON MATRIX

REJECTION RATE IN THE INCOMING QUALITY CONTROL						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0400	0,0204	0,0305	0,0622	0,0210	0,0348
BEMKA	0,1200	0,0612	0,0428	0,0799	0,0350	0,0678
SANTEL	0,2800	0,3061	0,2138	0,1865	0,3147	0,2602
ELSAN	0,3600	0,4286	0,6415	0,5595	0,5245	0,5028
ERIKOGLU	0,2000	0,1837	0,0713	0,1119	0,1049	0,1344
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Second matrix is for sub criteria ‘remedy for quality problems’ of criteria ‘quality’. (Table-64)

TABLE-64 PAIRWISE COMPARISON MATRIX OF REMEDY FOR QUALITY PROBLEMS

REMEDY FOR QUALITY PROBLEMS					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**2,0000**	**2,0000**	**2,0000**	**1,0000**
BEMKA	0,5000	1,0000	**0,5000**	**0,3333**	**1,0000**
SANTEL	0,5000	2,0000	1,0000	**2,0000**	**3,0000**
ELSAN	0,5000	3,0000	0,5000	1,0000	**2,0000**
ERIKOGLU	1,0000	1,0000	0,3333	0,5000	1,0000
TOTAL	3,5000	9,0000	4,3333	5,8333	8,0000

The table shown below is calculation of the weights according to Remedy for Quality Problems Pairwise Comparison Matrix. (Table-65)

TABLE-65 CALCULATION OF THE WEIGHTS ACCORDING TO REMEDY FOR QUALITY PROBLEMS PAIRWISE COMPARISON MATRIX

REMEDY FOR QUALITY PROBLEMS						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,2857	0,2222	0,4615	0,3429	0,1250	0,2875
BEMKA	0,1429	0,1111	0,1154	0,0571	0,1250	0,1103
SANTEL	0,1429	0,2222	0,2308	0,3429	0,3750	0,2627
ELSAN	0,1429	0,3333	0,1154	0,1714	0,2500	0,2026
ERIKOGLU	0,2857	0,1111	0,0769	0,0857	0,1250	0,1369
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Up to this line, the weights of sub criteria of criterion ‘quality’ are calculated. Now a matrix will be formed for criteria of criterion ‘quality’ to make pairwise comparison between each criterion of criterion ‘quality’. (Table-66)

TABLE-66 PAIRWISE COMPARISON MATRIX OF QUALITY

QUALITY		
	RRITIQC	RFQP
RRITIQC	1,0000	**5,0000**
RFQP	0,2000	1,0000
TOTAL	1,2000	6,0000

The table shown below is calculation of the weights according to Quality Pairwise Comparison Matrix. (Table-67)

TABLE-67 CALCULATION OF THE WEIGHTS ACCORDING TO QUALITY PAIRWISE COMPARISON MATRIX

QUALITY			
	RRITIQC	RFQP	TOTAL
RRITIQC	0,8333	0,8333	0,8333
RFQP	0,1667	0,1667	0,1667
TOTAL	1,0000	1,0000	1,0000

Our model will continue with other criteria and their sub criteria by the same way.

Matrix shown below is for sub criteria ‘cost reduction’ of criteria ‘cost’. (Table-68)

TABLE-68 PAIRWISE COMPARISON MATRIX OF COST REDUCTION

COST REDUCTION					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,2500**	**0,2500**	**1,0000**	**0,5000**
BEMKA	4,0000	1,0000	**1,0000**	**3,0000**	**2,0000**
SANTEL	4,0000	1,0000	1,0000	**3,0000**	**2,0000**
ELSAN	1,0000	0,3333	0,3333	1,0000	**2,0000**
ERIKOGLU	2,0000	0,5000	0,5000	0,5000	1,0000
TOTAL	12,0000	3,0833	3,0833	8,5000	7,5000

The table shown below is calculation of the weights according to Remedy for Quality Problems Pairwise Comparison Matrix. (Table-69)

TABLE-69 CALCULATION OF THE WEIGHTS ACCORDING TO COST REDUCTION PAIRWISE COMPARISON MATRIX

COST REDUCTION						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0833	0,0811	0,0811	0,1176	0,0667	0,0860
BEMKA	0,3333	0,3243	0,3243	0,3529	0,2667	0,3203
SANTEL	0,3333	0,3243	0,3243	0,3529	0,2667	0,3203
ELSAN	0,0833	0,1081	0,1081	0,1176	0,2667	0,1368
ERIKOGLU	0,1667	0,1622	0,1622	0,0588	0,1333	0,1366
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Matrix shown below is for sub criteria ‘pricing structure’ of criterion ‘cost’. (Table-70)

TABLE-70 PAIRWISE COMPARISON MATRIX OF PRICING STRUCTURE

PRICING STRUCTURE					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**4,0000**	**0,5000**	**2,0000**	**4,0000**
BEMKA	0,2500	1,0000	**0,2500**	**0,5000**	**1,0000**
SANTEL	2,0000	4,0000	1,0000	**3,0000**	**4,0000**
ELSAN	0,5000	2,0000	0,3333	1,0000	**2,0000**
ERIKOGLU	0,2500	1,0000	0,2500	0,5000	1,0000
TOTAL	4,0000	12,0000	2,3333	7,0000	12,0000

The table shown below is calculation of the weights according to Pricing Structure Pairwise Comparison Matrix. (Table-71)

TABLE-71 CALCULATION OF THE WEIGHTS ACCORDING TO PRICING STRUCTURE PAIRWISE COMPARISON MATRIX

PRICING STRUCTURE						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,2500	0,3333	0,2143	0,2857	0,3333	0,2833
BEMKA	0,0625	0,0833	0,1071	0,0714	0,0833	0,0815
SANTEL	0,5000	0,3333	0,4286	0,4286	0,3333	0,4048
ELSAN	0,1250	0,1667	0,1429	0,1429	0,1667	0,1488
ERIKOGLU	0,0625	0,0833	0,1071	0,0714	0,0833	0,0815
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Again a matrix will be formed for criteria of criterion ‘cost’ to make pairwise comparison between each criterion of criterion ‘cost’. (Table-72)

TABLE-72 PAIRWISE COMPARISON MATRIX OF COST

COST		
	CR	PS
CR	1,0000	**5,0000**
PS	0,2000	1,0000
TOTAL	1,2000	6,0000

The table shown below is calculation of the weights according to Cost Pairwise Comparison Matrix. (Table-73)

TABLE-73 CALCULATION OF THE WEIGHTS ACCORDING TO COST PAIRWISE COMPARISON MATRIX

COST			
	CR	PS	TOTAL
CR	0,8333	0,8333	0,8333
PS	0,1667	0,1667	0,1667
TOTAL	1,0000	1,0000	1,0000

Now it’s turn of third criterion ‘delivery’.

Matrix shown below is for sub criteria ‘compliance with due date and quantity’ of criteria ‘delivery’. (Table-74)

TABLE-74 PAIRWISE COMPARISON MATRIX OF COMPLIANCE WITH DUE DATE AND QUANTITY

COMPLIANCE WITH DUE DATE AND QUANTITY					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1429**	**0,2000**	**0,2000**	**0,1429**
BEMKA	7,0000	1,0000	**3,0000**	**3,0000**	**1,0000**
SANTEL	5,0000	0,3333	1,0000	**1,0000**	**0,3333**
ELSAN	5,0000	0,3333	1,0000	1,0000	**0,5000**
ERIKOGLU	7,0000	1,0000	3,0000	2,0000	1,0000
TOTAL	25,0000	2,8095	8,2000	7,2000	2,9762

The table shown below is calculation of the weights according to Compliance with due date and quantity Pairwise Comparison Matrix. (Table-75)

TABLE-75 CALCULATION OF THE WEIGHTS ACCORDING TO COMPLIANCE WITH DUE DATE AND QUANTITY PAIRWISE COMPARISON MATRIX

COMPLIANCE WITH DUE DATE AND QUANTITY						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0400	0,0508	0,0244	0,0278	0,0480	0,0382
BEMKA	0,2800	0,3559	0,3659	0,4167	0,3360	0,3509
SANTEL	0,2000	0,1186	0,1220	0,1389	0,1120	0,1383
ELSAN	0,2000	0,1186	0,1220	0,1389	0,1680	0,1495
ERIKOGLU	0,2800	0,3559	0,3659	0,2778	0,3360	0,3231
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

The other matrix is for sub criteria ‘delivery to company addresses of criteria ‘delivery’. (Table-76)

TABLE-76 PAIRWISE COMPARISON MATRIX OF COMPLIANCE DELIVERY TO COMPANY ADDRESS

DELIVERY TO COMPANY ADDRESS					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1111**	**0,1429**	**0,1111**	**0,1111**
BEMKA	9,0000	1,0000	**2,0000**	**1,0000**	**1,0000**
SANTEL	7,0000	0,5000	1,0000	**0,5000**	**0,3333**
ELSAN	9,0000	1,0000	2,0000	1,0000	**1,0000**
ERIKOGLU	9,0000	1,0000	3,0000	1,0000	1,0000
TOTAL	35,0000	3,6111	8,1429	3,6111	3,4444

The table shown below is calculation of the weights according to Delivery to Company Address Pairwise Comparison Matrix. (Table-77)

TABLE-77 CALCULATION OF THE WEIGHTS ACCORDING TO DELIVERY TO COMPANY ADDRESS PAIRWISE COMPARISON MATRIX

DELIVERY TO COMPANY ADDRESS						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0286	0,0308	0,0175	0,0308	0,0323	0,0280
BEMKA	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
SANTEL	0,2000	0,1385	0,1228	0,1385	0,0968	0,1393
ELSAN	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
ERIKOGLU	0,2571	0,2769	0,3684	0,2769	0,2903	0,2939
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

A matrix will be formed for criteria of criterion ‘delivery’ to make pairwise comparison between each criterion of criterion ‘delivery’. (Table-78)

TABLE-78 PAIRWISE COMPARISON MATRIX OF DELIVERY

DELIVERY		
	CWDDAQ	DTCA
CWDDAQ	1,0000	**2,0000**
DTCA	0,5000	1,0000
TOTAL	1,5000	3,0000

The table shown below is calculation of the weights according to Delivery Pairwise Comparison Matrix. (Table-79)

TABLE-79 CALCULATION OF THE WEIGHTS ACCORDING TO DELIVERY PAIRWISE COMPARISON MATRIX

DELIVERY			
	CWDDAQ	DTCA	TOTAL
CWDDAQ	0,6667	0,6667	0,6667
DTCA	0,3333	0,3333	0,3333
TOTAL	1,0000	1,0000	1,0000

Last and fourth criterion ‘service’ will be compared as follows;

Matrix shown below is for sub criteria ‘Level of Cooperation and Information Exchange’ of criteria ‘service’. (Table-80)

TABLE-80 PAIRWISE COMPARISON MATRIX OF LEVEL OF COOPERATION AND INFORMATION EXCHANGE

LEVEL OF COOPERATION AND INFORMATION EXCHANGE					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1111**	**0,1429**	**0,1111**	**0,1111**
BEMKA	9,0000	1,0000	**2,0000**	**1,0000**	**1,0000**
SANTEL	7,0000	0,5000	1,0000	**0,5000**	**0,3333**
ELSAN	9,0000	1,0000	2,0000	1,0000	**1,0000**
ERIKOGLU	9,0000	1,0000	3,0000	1,0000	1,0000
TOTAL	35,0000	3,6111	8,1429	3,6111	3,4444

The table shown below is calculation of the weights according to Level of Cooperation and Information Exchange Pairwise Comparison Matrix. (Table-81)

TABLE-81 CALCULATION OF THE WEIGHTS ACCORDING TO LEVEL OF COOPERATION AND INFORMATION EXCHANGE PAIRWISE COMPARISON MATRIX

LEVEL OF COOPERATION AND INFORMATION EXCHANGE						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0286	0,0308	0,0175	0,0308	0,0323	0,0280
BEMKA	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
SANTEL	0,2000	0,1385	0,1228	0,1385	0,0968	0,1393
ELSAN	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
ERIKOGLU	0,2571	0,2769	0,3684	0,2769	0,2903	0,2939
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

The other matrix is for sub criteria ‘Production Facility and Capacity’ of criteria ‘service’. (Table-82)

TABLE-82 PAIRWISE COMPARISON MATRIX OF PRODUCTION FACILITY AND CAPACITY

PRODUCTION FACILITY AND CAPACITY					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1111**	**0,1111**	**0,1111**	**0,1111**
BEMKA	9,0000	1,0000	**1,0000**	**1,0000**	**1,0000**
SANTEL	9,0000	1,0000	1,0000	**1,0000**	**1,0000**
ELSAN	9,0000	1,0000	1,0000	1,0000	**1,0000**
ERIKOGLU	9,0000	1,0000	1,0000	1,0000	1,0000
TOTAL	37,0000	4,1111	4,1111	4,1111	4,1111

The table shown below is calculation of the weights according to Production Facility and Capacity Pairwise Comparison Matrix. (Table-83)

TABLE-83 CALCULATION OF THE WEIGHTS ACCORDING TO PRODUCTION FACILITY AND CAPACITY PAIRWISE COMPARISON MATRIX

PRODUCTION FACILITY AND CAPACITY						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0270	0,0270	0,0270	0,0270	0,0270	0,0270
BEMKA	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
SANTEL	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
ELSAN	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
ERIKOGLU	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

A matrix will be formed for criteria of criterion ‘service’ to make pairwise comparison between each criterion of criterion ‘service’. (Table-84)

TABLE-84 PAIRWISE COMPARISON MATRIX OF SERVICE

SERVICE		
	RRITIQC	RFQP
RRITIQC	1,0000	**0,5000**
RFQP	2,0000	1,0000
TOTAL	3,0000	1,5000

The table shown below is calculation of the weights according to Service Pairwise Comparison Matrix. (Table-85)

TABLE-85 CALCULATION OF THE WEIGHTS ACCORDING TO SERVICE PAIRWISE COMPARISON MATRIX

SERVICE			
	RRITIQC	RFQP	TOTAL
RRITIQC	0,3333	0,3333	0,3333
RFQP	0,6667	0,6667	0,6667
TOTAL	1,0000	1,0000	1,0000

All weights are calculated of the criteria and sub criteria, next step is rating the alternative suppliers.

Tables which is including all weights of sub criteria will be formed. (Table-86/87)

TABLE-86 WEIGHTS OF SUB CRITERIA ACCORDING COMPANIES

CRITERIA								
	RRITIC	RFQP	CR	PS	CWDDAQ	DTCA	LOCAIE	PFAC
ASAR	0,0348	0,2875	0,0860	0,2833	0,0382	0,0280	0,0280	0,0270
BEMKA	0,0678	0,1103	0,3203	0,0815	0,3509	0,2694	0,2694	0,2432
SANTEL	0,2602	0,2627	0,3203	0,4048	0,1383	0,1393	0,1393	0,2432
ELSAN	0,5028	0,2026	0,1368	0,1488	0,1495	0,2694	0,2694	0,2432
ERIKOGLU	0,1344	0,1369	0,1366	0,0815	0,3231	0,2939	0,2939	0,2432

TABLE-87 WEIGHTS OF SUB CRITERIA ACCORDING CRITERIA

QUALITY		COST		DELIVERY		SERVICE	
RRITIC	RFQP	CR	PS	CWDDAQ	DTCA	LOCAIE	PFAC
0,8333	0,1667	0,8333	0,1667	0,6667	0,3333	0,3333	0,6667

The model's last pairwise comparison matrix which contributes the calculation of the weights of criteria according to each other has to be formed by decision maker. (Table-88)

TABLE-88 PAIRWISE COMPARISON MATRIX OF CRITERIA ACCORDING TO EACH OTHER

CRITERIA				
	QUALITY	COST	DELIVERY	SERVICE
QUALITY	1,0000	**2,0000**	**4,0000**	**5,0000**
COST	0,5000	1,0000	**3,0000**	**4,0000**
DELIVERY	0,2500	0,3333	1,0000	**2,0000**
SERVICE	0,2500	0,2500	0,5000	1
TOTAL	2,0000	3,5833	8,5000	12,0000

The table shown below is calculation of the weights according to Criteria Pairwise Comparison Matrix. (Table-89)

TABLE-89 CALCULATION OF THE WEIGHTS ACCORDING TO CRITERIA PAIRWISE COMPARISON MATRIX

CRITERIA					
	QUALITY	COST	DELIVERY	SERVICE	TOTAL
QUALITY	0,5000	0,5581	0,4706	0,4167	0,4863
COST	0,2500	0,2791	0,3529	0,3333	0,3038
DELIVERY	0,1250	0,0930	0,1176	0,1667	0,1256
SERVICE	0,1250	0,0698	0,0588	0,0833	0,0842
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000

Finally last step will be computing the overall score of each supplier. In this step decision maker can start with calculating the overall score of Asar. Decision maker will multiply weight of Rejection Rate in the Incoming Quality Control for Asar (Table-86) with the weight of Rejection Rate in the Incoming Quality Control for criteria quality (Table-87) and again will multiply this multiplication with total weight of quality. (Table-89) Numerical values of these calculation are 0,0348 . 0,8333 . 0,4863 . Then this calculation will be made for all sub criteria. After these calculations all these multiplications will be added and decision maker will reach the overall score of Asar. Alternative

suppliers' overall scores will be calculated like this calculation and all overall scores will come out. (Table-90)

TABLE-90 OVERALL SCORES OF ALTERNATIVE SUPPLIERS FOR 0.28 MM HO MATERIAL

ASAR	0,0802
BEMKA	0,1835
SANTEL	0,2633
ELSAN	0,3074
ERIKOGLU	0,1655
TOTAL	1,0000

Based on these scores developed by AHP, Elsan should be selected as the 0.28 mm HO supplier company for Mega Electronics.

3.3.5 Calculating the weights of criteria and sub criteria by using pairwise comparison for the type of enamelled copper wire *1.05 mm HO*.

In this step pairwise comparison matrixes will be formed for all criteria and sub criteria of 1.05 mm HO type enamelled copper wire to calculate the weights according to hierarchy tree.

First matrix is for sub criteria 'rejection rate in the incoming quality control' of criteria 'quality'. (Table-91)

TABLE-91 PAIRWISE COMPARISON MATRIX OF REJECTION RATE IN THE INCOMING QUALITY CONTROL

REJECTION RATE IN THE INCOMING QUALITY CONTROL					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**1,0000**	**1,0000**	**1,0000**	**1,0000**
BEMKA	1,0000	1,0000	**1,0000**	**1,0000**	**1,0000**
SANTEL	1,0000	1,0000	1,0000	**1,0000**	**1,0000**
ELSAN	1,0000	1,0000	1,0000	1,0000	**1,0000**
ERIKOGLU	1,0000	1,0000	1,0000	1,0000	1,0000
TOTAL	5,0000	5,0000	5,0000	5,0000	5,0000

The table shown below is calculation of the weights according to Rejection Rate in the Incoming Quality Control Pairwise Comparison Matrix. (Table-92)

TABLE-92 CALCULATION OF THE WEIGHTS ACCORDING TO REJECTION RATE IN THE INCOMING QUALITY CONTROL PAIRWISE COMPARISON MATRIX

REJECTION RATE IN THE INCOMING QUALITY CONTROL						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,2000	0,2000	0,2000	0,2000	0,2000	0,2000
BEMKA	0,2000	0,2000	0,2000	0,2000	0,2000	0,2000
SANTEL	0,2000	0,2000	0,2000	0,2000	0,2000	0,2000
ELSAN	0,2000	0,2000	0,2000	0,2000	0,2000	0,2000
ERIKOGLU	0,2000	0,2000	0,2000	0,2000	0,2000	0,2000
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Second matrix is for sub criteria ‘remedy for quality problems’ of criteria ‘quality’. (Table-93)

TABLE-93 PAIRWISE COMPARISON MATRIX OF REMEDY FOR QUALITY PROBLEMS

REMEDY FOR QUALITY PROBLEMS					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**2,0000**	**2,0000**	**2,0000**	**1,0000**
BEMKA	0,5000	1,0000	**0,5000**	**0,3333**	**1,0000**
SANTEL	0,5000	2,0000	1,0000	**2,0000**	**3,0000**
ELSAN	0,5000	3,0000	0,5000	1,0000	**2,0000**
ERIKOGLU	1,0000	1,0000	0,3333	0,5000	1,0000
TOTAL	3,5000	9,0000	4,3333	5,8333	8,0000

The table shown below is calculation of the weights according to Remedy for Quality Problems Pairwise Comparison Matrix. (Table-94)

TABLE-94 CALCULATION OF THE WEIGHTS ACCORDING TO REMEDY FOR QUALITY PROBLEMS PAIRWISE COMPARISON MATRIX

REMEDY FOR QUALITY PROBLEMS						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,2857	0,2222	0,4615	0,3429	0,1250	0,2875
BEMKA	0,1429	0,1111	0,1154	0,0571	0,1250	0,1103
SANTEL	0,1429	0,2222	0,2308	0,3429	0,3750	0,2627
ELSAN	0,1429	0,3333	0,1154	0,1714	0,2500	0,2026
ERIKOGLU	0,2857	0,1111	0,0769	0,0857	0,1250	0,1369
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Up to this line, the weights of sub criteria of criterion ‘quality’ are calculated. Now a matrix will be formed for criteria of criterion ‘quality’ to make pairwise comparison between each criterion of criterion ‘quality’. (Table-95)

TABLE-95 PAIRWISE COMPARISON MATRIX OF QUALITY

QUALITY		
	RRITIQC	RFQP
RRITIQC	1,0000	**5,0000**
RFQP	0,2000	1,0000
TOTAL	1,2000	6,0000

The table shown below is calculation of the weights according to Quality Pairwise Comparison Matrix. (Table-96)

TABLE-96 CALCULATION OF THE WEIGHTS ACCORDING TO QUALITY PAIRWISE COMPARISON MATRIX

QUALITY			
	RRITIQC	RFQP	TOTAL
RRITIQC	0,8333	0,8333	0,8333
RFQP	0,1667	0,1667	0,1667
TOTAL	1,0000	1,0000	1,0000

Our model will continue with other criteria and their sub criteria by the same way.

Matrix shown below is for sub criteria ‘cost reduction’ of criteria ‘cost’. (Table-97)

TABLE-97 PAIRWISE COMPARISON MATRIX OF COST REDUCTION

COST REDUCTION					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,2500**	**0,2500**	**1,0000**	**0,5000**
BEMKA	4,0000	1,0000	**1,0000**	**3,0000**	**2,0000**
SANTEL	4,0000	1,0000	1,0000	**3,0000**	**2,0000**
ELSAN	1,0000	0,3333	0,3333	1,0000	**2,0000**
ERIKOGLU	2,0000	0,5000	0,5000	0,5000	1,0000
TOTAL	12,0000	3,0833	3,0833	8,5000	7,5000

The table shown below is calculation of the weights according to Remedy for Quality Problems Pairwise Comparison Matrix. (Table-98)

TABLE-98 CALCULATION OF THE WEIGHTS ACCORDING TO COST REDUCTION PAIRWISE COMPARISON MATRIX

COST REDUCTION						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0833	0,0811	0,0811	0,1176	0,0667	0,0860
BEMKA	0,3333	0,3243	0,3243	0,3529	0,2667	0,3203
SANTEL	0,3333	0,3243	0,3243	0,3529	0,2667	0,3203
ELSAN	0,0833	0,1081	0,1081	0,1176	0,2667	0,1368
ERIKOGLU	0,1667	0,1622	0,1622	0,0588	0,1333	0,1366
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Matrix shown below is for sub criteria ‘pricing structure’ of criterion ‘cost’. (Table-99)

TABLE-99 PAIRWISE COMPARISON MATRIX OF PRICING STRUCTURE

PRICING STRUCTURE					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**4,0000**	**0,5000**	**2,0000**	**4,0000**
BEMKA	0,2500	1,0000	**0,2500**	**0,5000**	**1,0000**
SANTEL	2,0000	4,0000	1,0000	**3,0000**	**4,0000**
ELSAN	0,5000	2,0000	0,3333	1,0000	**2,0000**
ERIKOGLU	0,2500	1,0000	0,2500	0,5000	1,0000
TOTAL	4,0000	12,0000	2,3333	7,0000	12,0000

The table shown below is calculation of the weights according to Pricing Structure Pairwise Comparison Matrix. (Table-100)

TABLE-100 CALCULATION OF THE WEIGHTS ACCORDING TO PRICING STRUCTURE PAIRWISE COMPARISON MATRIX

PRICING STRUCTURE						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,2500	0,3333	0,2143	0,2857	0,3333	0,2833
BEMKA	0,0625	0,0833	0,1071	0,0714	0,0833	0,0815
SANTEL	0,5000	0,3333	0,4286	0,4286	0,3333	0,4048
ELSAN	0,1250	0,1667	0,1429	0,1429	0,1667	0,1488
ERIKOGLU	0,0625	0,0833	0,1071	0,0714	0,0833	0,0815
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Again a matrix will be formed for criteria of criterion ‘cost’ to make pairwise comparison between each criterion of criterion ‘cost’. (Table-101)

TABLE-101 PAIRWISE COMPARISON MATRIX OF COST

COST		
	CR	PS
CR	1,0000	**5,0000**
PS	0,2000	1,0000
TOTAL	1,2000	6,0000

The table shown below is calculation of the weights according to Cost Pairwise Comparison Matrix. (Table-102)

TABLE-102 CALCULATION OF THE WEIGHTS ACCORDING TO COST PAIRWISE COMPARISON MATRIX

COST			
	CR	PS	TOTAL
CR	0,8333	0,8333	0,8333
PS	0,1667	0,1667	0,1667
TOTAL	1,0000	1,0000	1,0000

Now it's turn of third criterion 'delivery'.

Matrix shown below is for sub criteria 'compliance with due date and quantity' of criteria 'delivery'. (Table-103)

TABLE-103 PAIRWISE COMPARISON MATRIX OF COMPLIANCE WITH DUE DATE AND QUANTITY

COMPLIANCE WITH DUE DATE AND QUANTITY					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1429**	**0,2000**	**0,2000**	**0,1429**
BEMKA	7,0000	1,0000	**3,0000**	**3,0000**	**1,0000**
SANTEL	5,0000	0,3333	1,0000	**1,0000**	**0,3333**
ELSAN	5,0000	0,3333	1,0000	1,0000	**0,5000**
ERIKOGLU	7,0000	1,0000	3,0000	2,0000	1,0000
TOTAL	25,0000	2,8095	8,2000	7,2000	2,9762

The table shown below is calculation of the weights according to Compliance with due date and quantity Pairwise Comparison Matrix. (Table-104)

TABLE-104 CALCULATION OF THE WEIGHTS ACCORDING TO COMPLIANCE WITH DUE DATE AND QUANTITY PAIRWISE COMPARISON MATRIX

COMPLIANCE WITH DUE DATE AND QUANTITY						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0400	0,0508	0,0244	0,0278	0,0480	0,0382
BEMKA	0,2800	0,3559	0,3659	0,4167	0,3360	0,3509
SANTEL	0,2000	0,1186	0,1220	0,1389	0,1120	0,1383
ELSAN	0,2000	0,1186	0,1220	0,1389	0,1680	0,1495
ERIKOGLU	0,2800	0,3559	0,3659	0,2778	0,3360	0,3231
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

The other matrix is for sub criteria ‘delivery to company addresses of criteria ‘delivery’. (Table-105)

TABLE-105 PAIRWISE COMPARISON MATRIX OF COMPLIANCE DELIVERY TO COMPANY ADDRESS

DELIVERY TO COMPANY ADDRESS					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1111**	**0,1429**	**0,1111**	**0,1111**
BEMKA	9,0000	1,0000	**2,0000**	**1,0000**	**1,0000**
SANTEL	7,0000	0,5000	1,0000	**0,5000**	**0,3333**
ELSAN	9,0000	1,0000	2,0000	1,0000	**1,0000**
ERIKOGLU	9,0000	1,0000	3,0000	1,0000	1,0000
TOTAL	35,0000	3,6111	8,1429	3,6111	3,4444

The table shown below is calculation of the weights according to Delivery to Company Address Pairwise Comparison Matrix. (Table-106)

TABLE-106 CALCULATION OF THE WEIGHTS ACCORDING TO DELIVERY TO COMPANY ADDRESS PAIRWISE COMPARISON MATRIX

DELIVERY TO COMPANY ADDRESS						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0286	0,0308	0,0175	0,0308	0,0323	0,0280
BEMKA	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
SANTEL	0,2000	0,1385	0,1228	0,1385	0,0968	0,1393
ELSAN	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
ERIKOGLU	0,2571	0,2769	0,3684	0,2769	0,2903	0,2939
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

A matrix will be formed for criteria of criterion ‘delivery’ to make pairwise comparison between each criterion of criterion ‘delivery’. (Table-107)

TABLE-107 PAIRWISE COMPARISON MATRIX OF DELIVERY

DELIVERY		
	CWDDAQ	DTCA
CWDDAQ	1,0000	**2,0000**
DTCA	0,5000	1,0000
TOTAL	1,5000	3,0000

The table shown below is calculation of the weights according to Delivery Pairwise Comparison Matrix. (Table-108)

TABLE-108 CALCULATION OF THE WEIGHTS ACCORDING TO DELIVERY PAIRWISE COMPARISON MATRIX

DELIVERY			
	CWDDAQ	DTCA	TOTAL
CWDDAQ	0,6667	0,6667	0,6667
DTCA	0,3333	0,3333	0,3333
TOTAL	1,0000	1,0000	1,0000

Last and fourth criterion ‘service’ will be compared as follows;

Matrix shown below is for sub criteria ‘Level of Cooperation and Information Exchange’ of criteria ‘service’. (Table-109)

TABLE-109 PAIRWISE COMPARISON MATRIX OF LEVEL OF COOPERATION AND INFORMATION EXCHANGE

LEVEL OF COOPERATION AND INFORMATION EXCHANGE					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1111**	**0,1429**	**0,1111**	**0,1111**
BEMKA	9,0000	1,0000	**2,0000**	**1,0000**	**1,0000**
SANTEL	7,0000	0,5000	1,0000	**0,5000**	**0,3333**
ELSAN	9,0000	1,0000	2,0000	1,0000	**1,0000**
ERIKOGLU	9,0000	1,0000	3,0000	1,0000	1,0000
TOTAL	35,0000	3,6111	8,1429	3,6111	3,4444

The table shown below is calculation of the weights according to Level of Cooperation and Information Exchange Pairwise Comparison Matrix. (Table-110)

TABLE-110 CALCULATION OF THE WEIGHTS ACCORDING TO LEVEL OF COOPERATION AND INFORMATION EXCHANGE PAIRWISE COMPARISON MATRIX

LEVEL OF COOPERATION AND INFORMATION EXCHANGE						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0286	0,0308	0,0175	0,0308	0,0323	0,0280
BEMKA	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
SANTEL	0,2000	0,1385	0,1228	0,1385	0,0968	0,1393
ELSAN	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
ERIKOGLU	0,2571	0,2769	0,3684	0,2769	0,2903	0,2939
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

The other matrix is for sub criteria ‘Production Facility and Capacity’ of criteria ‘service’. (Table-111)

TABLE-111 PAIRWISE COMPARISON MATRIX OF PRODUCTION FACILITY AND CAPACITY

PRODUCTION FACILITY AND CAPACITY					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1111**	**0,1111**	**0,1111**	**0,1111**
BEMKA	9,0000	1,0000	**1,0000**	**1,0000**	**1,0000**
SANTEL	9,0000	1,0000	1,0000	**1,0000**	**1,0000**
ELSAN	9,0000	1,0000	1,0000	1,0000	**1,0000**
ERIKOGLU	9,0000	1,0000	1,0000	1,0000	1,0000
TOTAL	37,0000	4,1111	4,1111	4,1111	4,1111

The table shown below is calculation of the weights according to Production Facility and Capacity Pairwise Comparison Matrix. (Table-112)

TABLE-112 CALCULATION OF THE WEIGHTS ACCORDING TO PRODUCTION FACILITY AND CAPACITY PAIRWISE COMPARISON MATRIX

PRODUCTION FACILITY AND CAPACITY						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0270	0,0270	0,0270	0,0270	0,0270	0,0270
BEMKA	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
SANTEL	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
ELSAN	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
ERIKOGLU	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

A matrix will be formed for criteria of criterion ‘service’ to make pairwise comparison between each criterion of criterion ‘service’. (Table-113)

TABLE-113 PAIRWISE COMPARISON MATRIX OF SERVICE

SERVICE		
	RRITIQC	RFQP
RRITIQC	1,0000	**0,5000**
RFQP	2,0000	1,0000
TOTAL	3,0000	1,5000

The table shown below is calculation of the weights according to Service Pairwise Comparison Matrix. (Table-114)

TABLE-114 CALCULATION OF THE WEIGHTS ACCORDING TO SERVICE PAIRWISE COMPARISON MATRIX

SERVICE			
	RRITIQC	RFQP	TOTAL
RRITIQC	0,3333	0,3333	0,3333
RFQP	0,6667	0,6667	0,6667
TOTAL	1,0000	1,0000	1,0000

All weights are calculated of the criteria and sub criteria, next step is rating the alternative suppliers.

Tables which is including all weights of sub criteria will be formed. (Table-115/116)

TABLE-115 WEIGHTS OF SUB CRITERIA ACCORDING COMPANIES

CRITERIA								
	RRITIC	RFQP	CR	PS	CWDDAQ	DTCA	LOCAIE	PFAC
ASAR	0,2000	0,2875	0,0860	0,2833	0,0382	0,0280	0,0280	0,0270
BEMKA	0,2000	0,1103	0,3203	0,0815	0,3509	0,2694	0,2694	0,2432
SANTEL	0,2000	0,2627	0,3203	0,4048	0,1383	0,1393	0,1393	0,2432
ELSAN	0,2000	0,2026	0,1368	0,1488	0,1495	0,2694	0,2694	0,2432
ERIKOGLU	0,2000	0,1369	0,1366	0,0815	0,3231	0,2939	0,2939	0,2432

TABLE-116 WEIGHTS OF SUB CRITERIA ACCORDING CRITERIA

QUALITY		COST		DELIVERY		SERVICE	
RRITIC	RFQP	CR	PS	CWDDAQ	DTCA	LOCAIE	PFAC
0,8333	0,1667	0,8333	0,1667	0,6667	0,3333	0,3333	0,6667

The model's last pairwise comparison matrix which contributes the calculation of the weights of criteria according to each other has to be formed by decision maker. (Table-117)

TABLE-117 PAIRWISE COMPARISON MATRIX OF CRITERIA ACCORDING TO EACH OTHER

CRITERIA				
	QUALITY	COST	DELIVERY	SERVICE
QUALITY	1,0000	**2,0000**	**4,0000**	**5,0000**
COST	0,5000	1,0000	**3,0000**	**4,0000**
DELIVERY	0,2500	0,3333	1,0000	**2,0000**
SERVICE	0,2500	0,2500	0,5000	1
TOTAL	2,0000	3,5833	8,5000	12,0000

The table shown below is calculation of the weights according to Criteria Pairwise Comparison Matrix. (Table-118)

TABLE-118 CALCULATION OF THE WEIGHTS ACCORDING TO CRITERIA PAIRWISE COMPARISON MATRIX

CRITERIA					
	QUALITY	COST	DELIVERY	SERVICE	TOTAL
QUALITY	0,5000	0,5581	0,4706	0,4167	0,4863
COST	0,2500	0,2791	0,3529	0,3333	0,3038
DELIVERY	0,1250	0,0930	0,1176	0,1667	0,1256
SERVICE	0,1250	0,0698	0,0588	0,0833	0,0842
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000

Finally last step will be computing the overall score of each supplier. In this step decision maker can start with calculating the overall score of Asar. Decision maker will multiply weight of Rejection Rate in the Incoming Quality

Control for Asar (Table-115) with the weight of Rejection Rate in the Incoming Quality Control for criteria quality (Table-116) and again will multiply this multiplication with total weight of quality. (Table-118) Numerical values of these calculation are 0,2000 . 0,8333 . 0,4863 . Then this calculation will be made for all sub criteria. After these calculations all these multiplications will be added and decision maker will reach the overall score of Asar. Alternative suppliers' overall scores will be calculated like this calculation and all overall scores will come out. (Table-119)

TABLE-119 OVERALL SCORES OF ALTERNATIVE SUPPLIERS FOR 1.05 MM HO MATERIAL

ASAR	0,1471
BEMKA	0,2371
SANTEL	0,2389
ELSAN	0,1847
ERIKOGLU	0,1921
TOTAL	1,0000

Based on these scores developed by AHP, Santel should be selected as the 1.05 mm HO supplier company for Mega Electronics.

3.3.6 Calculating the weights of criteria and sub criteria by using pairwise comparison for the type of enamelled copper wire *1.15 mm HO*.

In this step pairwise comparison matrixes will be formed for all criteria and sub criteria of 1.15 mm HO type enamelled copper wire to calculate the weights according to hierarchy tree.

First matrix is for sub criteria ‘rejection rate in the incoming quality control’ of criteria ‘quality’. (Table-120)

TABLE-120 PAIRWISE COMPARISON MATRIX OF REJECTION RATE IN THE INCOMING QUALITY CONTROL

REJECTION RATE IN THE INCOMING QUALITY CONTROL					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,2000**	**0,1429**	**0,3333**	**3,0000**
BEMKA	5,0000	1,0000	**0,3333**	**3,0000**	**7,0000**
SANTEL	7,0000	3,0000	1,0000	**5,0000**	**9,0000**
ELSAN	3,0000	0,3333	0,2000	1,0000	**5,0000**
ERIKOGLU	0,3333	0,1429	0,1111	0,2000	1,0000
TOTAL	16,3333	4,6762	1,7873	9,5333	25,0000

The table shown below is calculation of the weights according to Rejection Rate in the Incoming Quality Control Pairwise Comparison Matrix. (Table-121)

TABLE-121 CALCULATION OF THE WEIGHTS ACCORDING TO REJECTION RATE IN THE INCOMING QUALITY CONTROL PAIRWISE COMPARISON MATRIX

REJECTION RATE IN THE INCOMING QUALITY CONTROL						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0612	0,0428	0,0799	0,0350	0,1200	0,0678
BEMKA	0,3061	0,2138	0,1865	0,3147	0,2800	0,2602
SANTEL	0,4286	0,6415	0,5595	0,5245	0,3600	0,5028
ELSAN	0,1837	0,0713	0,1119	0,1049	0,2000	0,1344
ERIKOGLU	0,0204	0,0305	0,0622	0,0210	0,0400	0,0348
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Second matrix is for sub criteria ‘remedy for quality problems’ of criteria ‘quality’. (Table-122)

TABLE-122 PAIRWISE COMPARISON MATRIX OF REMEDY FOR QUALITY PROBLEMS

REMEDY FOR QUALITY PROBLEMS					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**2,0000**	**2,0000**	**2,0000**	**1,0000**
BEMKA	0,5000	1,0000	**0,5000**	**0,3333**	**1,0000**
SANTEL	0,5000	2,0000	1,0000	**2,0000**	**3,0000**
ELSAN	0,5000	3,0000	0,5000	1,0000	**2,0000**
ERIKOGLU	1,0000	1,0000	0,3333	0,5000	1,0000
TOTAL	3,5000	9,0000	4,3333	5,8333	8,0000

The table shown below is calculation of the weights according to Remedy for Quality Problems Pairwise Comparison Matrix. (Table-123)

TABLE-123 CALCULATION OF THE WEIGHTS ACCORDING TO REMEDY FOR QUALITY PROBLEMS PAIRWISE COMPARISON MATRIX

REMEDY FOR QUALITY PROBLEMS						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,2857	0,2222	0,4615	0,3429	0,1250	0,2875
BEMKA	0,1429	0,1111	0,1154	0,0571	0,1250	0,1103
SANTEL	0,1429	0,2222	0,2308	0,3429	0,3750	0,2627
ELSAN	0,1429	0,3333	0,1154	0,1714	0,2500	0,2026
ERIKOGLU	0,2857	0,1111	0,0769	0,0857	0,1250	0,1369
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Up to this line, the weights of sub criteria of criterion ‘quality’ are calculated. Now a matrix will be formed for criteria of criterion ‘quality’ to make pairwise comparison between each criterion of criterion ‘quality’. (Table-124)

TABLE-124 PAIRWISE COMPARISON MATRIX OF QUALITY

QUALITY		
	RRITIQC	RFQP
RRITIQC	1,0000	**5,0000**
RFQP	0,2000	1,0000
TOTAL	1,2000	6,0000

The table shown below is calculation of the weights according to Quality Pairwise Comparison Matrix. (Table-125)

TABLE-125 CALCULATION OF THE WEIGHTS ACCORDING TO QUALITY PAIRWISE COMPARISON MATRIX

QUALITY			
	RRITIQC	RFQP	TOTAL
RRITIQC	0,8333	0,8333	0,8333
RFQP	0,1667	0,1667	0,1667
TOTAL	1,0000	1,0000	1,0000

Our model will continue with other criteria and their sub criteria by the same way.

Matrix shown below is for sub criteria ‘cost reduction’ of criteria ‘cost’. (Table-126)

TABLE-126 PAIRWISE COMPARISON MATRIX OF COST REDUCTION

COST REDUCTION					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,2500**	**0,2500**	**1,0000**	**0,5000**
BEMKA	4,0000	1,0000	**1,0000**	**3,0000**	**2,0000**
SANTEL	4,0000	1,0000	1,0000	**3,0000**	**2,0000**
ELSAN	1,0000	0,3333	0,3333	1,0000	**2,0000**
ERIKOGLU	2,0000	0,5000	0,5000	0,5000	1,0000
TOTAL	12,0000	3,0833	3,0833	8,5000	7,5000

The table shown below is calculation of the weights according to Remedy for Quality Problems Pairwise Comparison Matrix. (Table-127)

TABLE-127 CALCULATION OF THE WEIGHTS ACCORDING TO COST REDUCTION PAIRWISE COMPARISON MATRIX

COST REDUCTION						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0833	0,0811	0,0811	0,1176	0,0667	0,0860
BEMKA	0,3333	0,3243	0,3243	0,3529	0,2667	0,3203
SANTEL	0,3333	0,3243	0,3243	0,3529	0,2667	0,3203
ELSAN	0,0833	0,1081	0,1081	0,1176	0,2667	0,1368
ERIKOGLU	0,1667	0,1622	0,1622	0,0588	0,1333	0,1366
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Matrix shown below is for sub criteria ‘pricing structure’ of criterion ‘cost’. (Table-128)

TABLE-128 PAIRWISE COMPARISON MATRIX OF PRICING STRUCTURE

PRICING STRUCTURE					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**4,0000**	**0,5000**	**2,0000**	**4,0000**
BEMKA	0,2500	1,0000	**0,2500**	**0,5000**	**1,0000**
SANTEL	2,0000	4,0000	1,0000	**3,0000**	**4,0000**
ELSAN	0,5000	2,0000	0,3333	1,0000	**2,0000**
ERIKOGLU	0,2500	1,0000	0,2500	0,5000	1,0000
TOTAL	4,0000	12,0000	2,3333	7,0000	12,0000

The table shown below is calculation of the weights according to Pricing Structure Pairwise Comparison Matrix. (Table-129)

TABLE-129 CALCULATION OF THE WEIGHTS ACCORDING TO PRICING STRUCTURE PAIRWISE COMPARISON MATRIX

PRICING STRUCTURE						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,2500	0,3333	0,2143	0,2857	0,3333	0,2833
BEMKA	0,0625	0,0833	0,1071	0,0714	0,0833	0,0815
SANTEL	0,5000	0,3333	0,4286	0,4286	0,3333	0,4048
ELSAN	0,1250	0,1667	0,1429	0,1429	0,1667	0,1488
ERIKOGLU	0,0625	0,0833	0,1071	0,0714	0,0833	0,0815
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

Again a matrix will be formed for criteria of criterion ‘cost’ to make pairwise comparison between each criterion of criterion ‘cost’. (Table-130)

TABLE-130 PAIRWISE COMPARISON MATRIX OF COST

COST		
	CR	PS
CR	1,0000	**5,0000**
PS	0,2000	1,0000
TOTAL	1,2000	6,0000

The table shown below is calculation of the weights according to Cost Pairwise Comparison Matrix. (Table-131)

TABLE-131 CALCULATION OF THE WEIGHTS ACCORDING TO COST PAIRWISE COMPARISON MATRIX

COST			
	CR	PS	TOTAL
CR	0,8333	0,8333	0,8333
PS	0,1667	0,1667	0,1667
TOTAL	1,0000	1,0000	1,0000

Now it’s turn of third criterion ‘delivery’.

Matrix shown below is for sub criteria ‘compliance with due date and quantity’ of criteria ‘delivery’. (Table-132)

TABLE-132 PAIRWISE COMPARISON MATRIX OF COMPLIANCE WITH DUE DATE AND QUANTITY

COMPLIANCE WITH DUE DATE AND QUANTITY					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1429**	**0,2000**	**0,2000**	**0,1429**
BEMKA	7,0000	1,0000	**3,0000**	**3,0000**	**1,0000**
SANTEL	5,0000	0,3333	1,0000	**1,0000**	**0,3333**
ELSAN	5,0000	0,3333	1,0000	1,0000	**0,5000**
ERIKOGLU	7,0000	1,0000	3,0000	2,0000	1,0000
TOTAL	25,0000	2,8095	8,2000	7,2000	2,9762

The table shown below is calculation of the weights according to Compliance with due date and quantity Pairwise Comparison Matrix. (Table-133)

TABLE-133 CALCULATION OF THE WEIGHTS ACCORDING TO COMPLIANCE WITH DUE DATE AND QUANTITY PAIRWISE COMPARISON MATRIX

COMPLIANCE WITH DUE DATE AND QUANTITY						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0400	0,0508	0,0244	0,0278	0,0480	0,0382
BEMKA	0,2800	0,3559	0,3659	0,4167	0,3360	0,3509
SANTEL	0,2000	0,1186	0,1220	0,1389	0,1120	0,1383
ELSAN	0,2000	0,1186	0,1220	0,1389	0,1680	0,1495
ERIKOGLU	0,2800	0,3559	0,3659	0,2778	0,3360	0,3231
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

The other matrix is for sub criteria ‘delivery to company addresses of criteria ‘delivery’. (Table-134)

TABLE-134 PAIRWISE COMPARISON MATRIX OF COMPLIANCE DELIVERY TO COMPANY ADDRESS

DELIVERY TO COMPANY ADDRESS					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1111**	**0,1429**	**0,1111**	**0,1111**
BEMKA	9,0000	1,0000	**2,0000**	**1,0000**	**1,0000**
SANTEL	7,0000	0,5000	1,0000	**0,5000**	**0,3333**
ELSAN	9,0000	1,0000	2,0000	1,0000	**1,0000**
ERIKOGLU	9,0000	1,0000	3,0000	1,0000	1,0000
TOTAL	35,0000	3,6111	8,1429	3,6111	3,4444

The table shown below is calculation of the weights according to Delivery to Company Address Pairwise Comparison Matrix. (Table-135)

TABLE-135 CALCULATION OF THE WEIGHTS ACCORDING TO DELIVERY TO COMPANY ADDRESS PAIRWISE COMPARISON MATRIX

DELIVERY TO COMPANY ADDRESS						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0286	0,0308	0,0175	0,0308	0,0323	0,0280
BEMKA	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
SANTEL	0,2000	0,1385	0,1228	0,1385	0,0968	0,1393
ELSAN	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
ERIKOGLU	0,2571	0,2769	0,3684	0,2769	0,2903	0,2939
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

A matrix will be formed for criteria of criterion ‘delivery’ to make pairwise comparison between each criterion of criterion ‘delivery’. (Table-136)

TABLE-136 PAIRWISE COMPARISON MATRIX OF DELIVERY

DELIVERY		
	CWDDAQ	DTCA
CWDDAQ	1,0000	**2,0000**
DTCA	0,5000	1,0000
TOTAL	1,5000	3,0000

The table shown below is calculation of the weights according to Delivery Pairwise Comparison Matrix. (Table-137)

TABLE-137 CALCULATION OF THE WEIGHTS ACCORDING TO DELIVERY PAIRWISE COMPARISON MATRIX

DELIVERY			
	CWDDAQ	DTCA	TOTAL
CWDDAQ	0,6667	0,6667	0,6667
DTCA	0,3333	0,3333	0,3333
TOTAL	1,0000	1,0000	1,0000

Last and fourth criterion ‘service’ will be compared as follows;

Matrix shown below is for sub criteria ‘Level of Cooperation and Information Exchange’ of criteria ‘service’. (Table-138)

TABLE-138 PAIRWISE COMPARISON MATRIX OF LEVEL OF COOPERATION AND INFORMATION EXCHANGE

LEVEL OF COOPERATION AND INFORMATION EXCHANGE					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1111**	**0,1429**	**0,1111**	**0,1111**
BEMKA	9,0000	1,0000	**2,0000**	**1,0000**	**1,0000**
SANTEL	7,0000	0,5000	1,0000	**0,5000**	**0,3333**
ELSAN	9,0000	1,0000	2,0000	1,0000	**1,0000**
ERIKOGLU	9,0000	1,0000	3,0000	1,0000	1,0000
TOTAL	35,0000	3,6111	8,1429	3,6111	3,4444

The table shown below is calculation of the weights according to Level of Cooperation and Information Exchange Pairwise Comparison Matrix. (Table-139)

TABLE-139 CALCULATION OF THE WEIGHTS ACCORDING TO LEVEL OF COOPERATION AND INFORMATION EXCHANGE PAIRWISE COMPARISON MATRIX

LEVEL OF COOPERATION AND INFORMATION EXCHANGE						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0286	0,0308	0,0175	0,0308	0,0323	0,0280
BEMKA	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
SANTEL	0,2000	0,1385	0,1228	0,1385	0,0968	0,1393
ELSAN	0,2571	0,2769	0,2456	0,2769	0,2903	0,2694
ERIKOGLU	0,2571	0,2769	0,3684	0,2769	0,2903	0,2939
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

The other matrix is for sub criteria ‘Production Facility and Capacity’ of criteria ‘service’. (Table-140)

TABLE-140 PAIRWISE COMPARISON MATRIX OF PRODUCTION FACILITY AND CAPACITY

PRODUCTION FACILITY AND CAPACITY					
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU
ASAR	1,0000	**0,1111**	**0,1111**	**0,1111**	**0,1111**
BEMKA	9,0000	1,0000	**1,0000**	**1,0000**	**1,0000**
SANTEL	9,0000	1,0000	1,0000	**1,0000**	**1,0000**
ELSAN	9,0000	1,0000	1,0000	1,0000	**1,0000**
ERIKOGLU	9,0000	1,0000	1,0000	1,0000	1,0000
TOTAL	37,0000	4,1111	4,1111	4,1111	4,1111

The table shown below is calculation of the weights according to Production Facility and Capacity Pairwise Comparison Matrix. (Table-141)

TABLE-141 CALCULATION OF THE WEIGHTS ACCORDING TO PRODUCTION FACILITY AND CAPACITY PAIRWISE COMPARISON MATRIX

PRODUCTION FACILITY AND CAPACITY						
	ASAR	BEMKA	SANTEL	ELSAN	ERIKOGLU	TOTAL
ASAR	0,0270	0,0270	0,0270	0,0270	0,0270	0,0270
BEMKA	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
SANTEL	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
ELSAN	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
ERIKOGLU	0,2432	0,2432	0,2432	0,2432	0,2432	0,2432
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000

A matrix will be formed for criteria of criterion ‘service’ to make pairwise comparison between each criterion of criterion ‘service’. (Table-142)

TABLE-142 PAIRWISE COMPARISON MATRIX OF SERVICE

SERVICE		
	RRITIQC	RFQP
RRITIQC	1,0000	**0,5000**
RFQP	2,0000	1,0000
TOTAL	3,0000	1,5000

The table shown below is calculation of the weights according to Service Pairwise Comparison Matrix. (Table-143)

TABLE-143 CALCULATION OF THE WEIGHTS ACCORDING TO SERVICE PAIRWISE COMPARISON MATRIX

SERVICE			
	RRITIQC	RFQP	TOTAL
RRITIQC	0,3333	0,3333	0,3333
RFQP	0,6667	0,6667	0,6667
TOTAL	1,0000	1,0000	1,0000

All weights are calculated of the criteria and sub criteria, next step is rating the alternative suppliers.

Tables which is including all weights of sub criteria will be formed. (Table-144/145)

TABLE-144 WEIGHTS OF SUB CRITERIA ACCORDING COMPANIES

	CRITERIA							
	RRITIC	RFQP	CR	PS	CWDDAQ	DTCA	LOCAIE	PFAC
ASAR	0,0678	0,2875	0,0860	0,2833	0,0382	0,0280	0,0280	0,0270
BEMKA	0,2602	0,1103	0,3203	0,0815	0,3509	0,2694	0,2694	0,2432
SANTEL	0,5028	0,2627	0,3203	0,4048	0,1383	0,1393	0,1393	0,2432
ELSAN	0,1344	0,2026	0,1368	0,1488	0,1495	0,2694	0,2694	0,2432
ERIKOGLU	0,0348	0,1369	0,1366	0,0815	0,3231	0,2939	0,2939	0,2432

TABLE-145 WEIGHTS OF SUB CRITERIA ACCORDING CRITERIA

QUALITY		COST		DELIVERY		SERVICE	
RRITIC	RFQP	CR	PS	CWDDAQ	DTCA	LOCAIE	PFAC
0,8333	0,1667	0,8333	0,1667	0,6667	0,3333	0,3333	0,6667

The model's last pairwise comparison matrix which contributes the calculation of the weights of criteria according to each other has to be formed by decision maker. (Table-146)

TABLE-146 PAIRWISE COMPARISON MATRIX OF CRITERIA ACCORDING TO EACH OTHER

	CRITERIA			
	QUALITY	COST	DELIVERY	SERVICE
QUALITY	1,0000	**2,0000**	**4,0000**	**5,0000**
COST	0,5000	1,0000	**3,0000**	**4,0000**
DELIVERY	0,2500	0,3333	1,0000	**2,0000**
SERVICE	0,2500	0,2500	0,5000	1
TOTAL	2,0000	3,5833	8,5000	12,0000

The table shown below is calculation of the weights according to Criteria Pairwise Comparison Matrix. (Table-147)

TABLE-147 CALCULATION OF THE WEIGHTS ACCORDING TO CRITERIA PAIRWISE COMPARISON MATRIX

CRITERIA					
	QUALITY	COST	DELIVERY	SERVICE	TOTAL
QUALITY	0,5000	0,5581	0,4706	0,4167	0,4863
COST	0,2500	0,2791	0,3529	0,3333	0,3038
DELIVERY	0,1250	0,0930	0,1176	0,1667	0,1256
SERVICE	0,1250	0,0698	0,0588	0,0833	0,0842
TOTAL	1,0000	1,0000	1,0000	1,0000	1,0000

Finally last step will be computing the overall score of each supplier. In this step decision maker can start with calculating the overall score of Asar. Decision maker will multiply weight of Rejection Rate in the Incoming Quality Control for Asar (Table-144) with the weight of Rejection Rate in the Incoming Quality Control for criteria quality (Table-145) and again will multiply this multiplication with total weight of quality. (Table-147) Numerical values of these calculation are 0,0678 . 0,8333 . 0,4863 . Then this calculation will be made for all sub criteria. After these calculations all these multiplications will be added and decision maker will reach the overall score of Asar. Alternative suppliers' overall scores will be calculated like this calculation and all overall scores will come out. (Table-148)

TABLE-148 OVERALL SCORES OF ALTERNATIVE SUPPLIERS FOR 1.15 MM HO MATERIAL

ASAR	0,0936
BEMKA	0,2615
SANTEL	0,3617
ELSAN	0,1581
ERIKOGLU	0,1252
TOTAL	1,0000

Based on these scores developed by AHP, Santel should be selected as the 1.15 mm HO supplier company for Mega Electronics.

3.4 Experimental Result

The results of each model were given at the end of the models.

As can be seen in the first model which is applied for 0.80 mm HO type enamelled copper wire ERIKOGLU is the most favorable supplier in the 0.80 mm HO type enamelled copper wire suppliers.

As you see in the second experimental model SANTEL is getting the biggest overall score 0,2716 so in these conditions MEGA must choose SANTEL for this type.

In the third model both suppliers SANTEL and ELSAN is very different than the others but according to numerical values, ELSAN should be chosen by Mega.

In the fourth application, overall scores of BEMKA and SANTEL is very close to each other, only third and fourth digits of overall scores are different.

In my opinion one of these two companies can be chosen by MEGA but according to numerical values, the favorable supplier for 1.05 mm HO type enamelled copper wire is SANTEL.

In the last model which is applied for 1.15 mm HO type enamelled copper wire, SANTEL is getting the biggest overall score third time.

Besides these results in the moment, these models can be formed again easily in excel software or expert choice software with the changing performance of the suppliers.

CONCLUSION

As can be seen in the business life supplier selection is crucial point for companies. For supplier selection in supply chain, some methods are developed. In this study analytic hierarchy process method has been presented by a case study. In this case, an analytic hierarchy process model is developed to solve the supplier selection problem in Mega Electronics Company.

After getting all data about raw materials, Pareto (ABC) Classification applied in Mega Electronics to choose mostly used raw materials in the company. As a result of classification five different raw material has been chosen. Because of already knowing our goal as 'selecting the best supplier', we studied together with company managers for determination of criteria and sub criteria, so we were ready to form hierarchy tree so we formed hierarchy tree for our model. We used excel program to make pairwise comparisons easily as you had seen in earlier pages. Alternative suppliers rated after calculations and we reached the overall scores for all kinds of raw material. Selected suppliers are also written in experimental results part.

As a conclusion this study aimed to demonstrate how the analytic hierarchy process method can help in solving supplier selection problems in practice.

APPENDIX A

ITEM NO	ITEM CODE	ITEM DESCRIPTION	DEMAND QUANTITY	DEMAND AMOUNT (TL)	CUMULATIVE DEMAND (TL)	CPI	CUM.PER. OF TOT.DEMAND
1	ETH080	0.80 MM EM	11.218	163.731.728.930	163.731.728.930	0,003134796	0,08474
2	ETH110	1.10 MM EM	9.648	140.953.980.555	304.685.709.485	0,006269592	0,15769
3	ETH028	0.28 MM EM	7.331	123.317.845.045	428.003.554.530	0,009404389	0,22152
4	ETH105	1.05 MM EM	8.616	122.084.087.580	550.087.642.110	0,012539185	0,28470
5	ETH115	1.15 MM EM	8.886	121.984.672.290	672.072.314.400	0,015673981	0,34784
6	SSRL050	SİLİSLİ RU	133.177	106.833.342.081	778.905.656.481	0,018808777	0,40313
7	ETH017	0.17 MM EM	4.573	87.997.902.245	866.903.558.726	0,021943574	0,44868
8	ETH026	0.26 MM EM	5.115	86.287.269.960	953.190.828.686	0,02507837	0,49334
9	ETH018	0.18 MM EM	3.826	73.832.327.645	1.027.023.156.331	0,028213166	0,53155
10	ETH085	0.85 MM EM	5.041	73.630.000.750	1.100.653.157.081	0,031347962	0,56966
11	ETH060	0.60 MM EM	2.618	38.864.782.200	1.139.517.939.281	0,034482759	0,58977
12	ETH150	1.50 MM EM	2.478	37.792.472.645	1.177.310.411.926	0,037617555	0,60933
13	ETH090	0.90 MM EM	2.693	35.861.159.875	1.213.171.571.801	0,040752351	0,62789
14	ETH180	1.80 MM EM	1.857	33.843.415.550	1.247.014.987.351	0,043887147	0,64541
15	ETB017	0.17 MM EM	1.398	28.524.820.970	1.275.539.808.321	0,047021944	0,66017
16	EMTRIBT137	TRIAC, BT1	54.871	27.514.180.200	1.303.053.988.521	0,05015674	0,67441
17	ETH075	0.75 MM EM	1.710	25.048.464.390	1.328.102.452.911	0,053291536	0,68738
18	ETH025	0.25 MM EM	1.439	24.048.964.565	1.352.151.417.476	0,056426332	0,69982
19	ETH065	0.65 MM EM	1.604	24.030.061.015	1.376.181.478.491	0,059561129	0,71226
20	ETB085	0.85 MM EM	1.322	20.800.427.080	1.396.981.905.571	0,062695925	0,72303
21	MOTORİN	MOTORİN	198	17.695.552.525	1.414.677.458.096	0,065830721	0,73218
22	YEMEK1	YEMEK-TABL	9.939	17.393.250.000	1.432.070.708.096	0,068965517	0,74119
23	BALBOYA	ÖZEL BALAS	5.708	17.263.739.628	1.449.334.447.724	0,072100313	0,75012
24	ETH170	1.70 MM EM	864	16.515.736.670	1.465.850.184.394	0,07523511	0,75867
25	ETB020	0.20 MM EM	918	15.981.473.230	1.481.831.657.624	0,078369906	0,76694
26	ETB018	0.18 MM EM	795	15.656.582.350	1.497.488.239.974	0,081504702	0,77504
27	P-POLİA66B	POLİAMİD 6	9.245	15.560.702.500	1.513.048.942.474	0,084639498	0,78310
28	ELEKTRİK	ŞEBEKE ELE	16	13.933.392.263	1.526.982.334.737	0,087774295	0,79031
29	ETB080	0.80 MM EM	861	12.972.241.570	1.539.954.576.307	0,090909091	0,79702
30	ETH020	0.20 MM EM	657	12.916.863.850	1.552.871.440.157	0,094043887	0,80371
31	KON60uF	60 uF KOND	3.691	12.246.738.000	1.565.118.178.157	0,097178683	0,81005
32	ETH300	3.00 MM EM	792	11.613.796.595	1.576.731.974.752	0,10031348	0,81606
33	ETB005	0.05 MM EM	227	11.507.133.130	1.588.239.107.882	0,103448276	0,82201
34	ETB022	0.22 MM EM	643	11.347.201.105	1.599.586.308.987	0,106583072	0,82789
35	ETH200	2.00 MM EM	739	10.986.508.605	1.610.572.817.592	0,109717868	0,83357
36	DKP	DKP SAÇ	10.300	9.617.525.000	1.620.190.342.592	0,112852665	0,83855
37	ETH250	2.50 MM EM	538	9.328.411.900	1.629.518.754.492	0,115987461	0,84338
38	EMKON022MF	KONDANSATÖ	74.712	8.996.718.965	1.638.515.473.457	0,119122257	0,84803
39	ETB028	0.28 MM EM	471	8.302.970.490	1.646.818.443.947	0,122257053	0,85233
40	ETB010	0.10 MM EM	312	7.924.836.960	1.654.743.280.907	0,12539185	0,85643
41	ETH040	0.40 MM EM	449	7.196.450.750	1.661.939.731.657	0,128526646	0,86016
42	TELEFON	TELEFON Gİ	159	6.983.884.247	1.668.923.615.904	0,131661442	0,86377

43	KLM110İ	1 NO KLEME	129.000	6.966.000.000	1.675.889.615.904	0,134796238	0,86738
44	ETB060	0.60 MM EM	440	6.623.098.950	1.682.512.714.854	0,137931034	0,87081
45	ETH035	0.35 MM EM	434	6.378.006.870	1.688.890.721.724	0,141065831	0,87411
46	ETH030	0.30 MM EM	372	6.350.916.240	1.695.241.637.964	0,144200627	0,87739
47	KLM110	1-NO BALAS	120.000	6.300.000.000	1.701.541.637.964	0,147335423	0,88065
48	ETB008	0.08 MM EM	174	6.243.635.890	1.707.785.273.854	0,150470219	0,88389
49	EMTRIBT138	TRIAC, BT1	19.438	6.146.606.100	1.713.931.879.954	0,153605016	0,88707
50	SSRL050047	0.50x47.5	6.350	5.809.457.139	1.719.741.337.093	0,156739812	0,89007
51	ETH022	0.22 MM EM	314	5.713.013.315	1.725.454.350.408	0,159874608	0,89303
52	BALTİNER	BALAST BOY	3.120	5.654.578.800	1.731.108.929.208	0,163009404	0,89596
53	ETH260	2.60 MM EM	343	5.277.055.000	1.736.385.984.208	0,166144201	0,89869
54	SSRL050051	0.50x51.5	5.496	5.028.153.769	1.741.414.137.977	0,169278997	0,90129
55	ETH070	0.70 MM EM	323	4.909.163.830	1.746.323.301.807	0,172413793	0,90383
56	TAŞIMAP	PERSONEL T	247	4.810.000.000	1.751.133.301.807	0,175548589	0,90632
57	ETB006	0.06 MM EM	99	4.702.499.880	1.755.835.801.687	0,178683386	0,90876
58	ETH240	2.40 MM EM	321	4.666.533.635	1.760.502.335.322	0,181818182	0,91117
59	P-POLİA66N	POLİAMİD 6	2.000	4.641.500.000	1.765.143.835.322	0,184952978	0,91357
60	ETB035	0.35 MM EM	252	4.114.884.660	1.769.258.719.982	0,188087774	0,91570
61	EMVAR7K250	VARİSTÖR,	46.667	4.053.150.000	1.773.311.869.982	0,191222571	0,91780
62	KLM102	1-NO 2'Lİ	75.000	4.050.000.000	1.777.361.869.982	0,194357367	0,91990
63	ETH160	1.60 MM EM	293	4.039.650.145	1.781.401.520.127	0,197492163	0,92199
64	ETH320	3.20 MM EM	290	3.956.813.585	1.785.358.333.712	0,200626959	0,92404
65	ETB040	0.40 MM EM	220	3.811.663.340	1.789.169.997.052	0,203761755	0,92601
66	ETH024	0.24 MM EM	220	3.761.656.510	1.792.931.653.562	0,206896552	0,92795
67	MTR0050045	50 VA TRAF	1.230	3.571.800.000	1.796.503.453.562	0,210031348	0,92980
68	ETH055	0.55 MM EM	243	3.529.971.675	1.800.033.425.237	0,213166144	0,93163
69	EMKON01MF	KONDANSATÖ	46.000	3.508.427.000	1.803.541.852.237	0,21630094	0,93345
70	KLA26x21	26x21 DOPE	100.000	3.500.000.000	1.807.041.852.237	0,219435737	0,93526
71	ETH050	0.50 MM EM	210	3.299.126.280	1.810.340.978.517	0,222570533	0,93697
72	ÇELİKASP	L-2023 ÇEL	53	3.227.831.400	1.813.568.809.917	0,225705329	0,93864
73	EMDIADB3	DİAC, DB3-	56.350	3.000.564.750	1.816.569.374.667	0,228840125	0,94019
74	ETB007	0.07 MM EM	71	2.897.134.120	1.819.466.508.787	0,231974922	0,94169
75	ETB012	0.12 MM EM	123	2.635.393.215	1.822.101.902.002	0,235109718	0,94305
76	POL-340/M	ÖZEL DÖKÜM	2.486	2.609.775.000	1.824.711.677.002	0,238244514	0,94440
77	ETH230	2.30 MM EM	173	2.600.779.185	1.827.312.456.187	0,24137931	0,94575
78	ETH095	0.95 MM EM	164	2.542.977.860	1.829.855.434.047	0,244514107	0,94707
79	ETH270	2.70 MM EM	171	2.515.432.560	1.832.370.866.607	0,247648903	0,94837
80	ETH280	2.80 MM EM	162	2.276.731.735	1.834.647.598.342	0,250783699	0,94955
81	DOĞALGAZ	DOĞALGAZ T	3	2.259.809.828	1.836.907.408.170	0,253918495	0,95071
82	ETH045	0.45 MM EM	143	2.135.879.020	1.839.043.287.190	0,257053292	0,95182
83	SS084	84 mm SİLİ	1.948	2.109.761.164	1.841.153.048.354	0,260188088	0,95291
84	MBL0020MGK	20 W BALAS	1.660	2.108.200.000	1.843.261.248.354	0,263322884	0,95400
85	BTM19x50	18 mm MASK	2.400	2.073.940.800	1.845.335.189.154	0,26645768	0,95508
86	KLM503Sİ	SİGORTALI	1.500	2.051.638.500	1.847.386.827.654	0,269592476	0,95614
87	KB0026/40	26-40 W YA	30.000	2.040.000.000	1.849.426.827.654	0,272727273	0,95719
88	ETB065	0.65 MM EM	125	1.992.439.120	1.851.419.266.774	0,275862069	0,95823
89	SS150	150 MM SİL	1.772	1.979.648.884	1.853.398.915.658	0,278996865	0,95925
90	ETH015	0.15 MM EM	107	1.979.381.740	1.855.378.297.398	0,282131661	0,96027
91	MTR0060084	60 VA TRAF	150	1.891.500.000	1.857.269.797.398	0,285266458	0,96125

92	VERNİK	RP-100 HAV	756	1.875.136.500	1.859.144.933.898	0,288401254	0,96222
93	GAL100	1.00 mm GA	1.966	1.837.480.000	1.860.982.413.898	0,29153605	0,96318
94	EKMEK	EKMEK BEDE	9.032	1.805.806.935	1.862.788.220.833	0,294670846	0,96411
95	TSEMARKA	TSE MARKAK	3	1.685.425.200	1.864.473.646.033	0,297805643	0,96498
96	PBP0.190	0.190 mm P	371	1.642.448.930	1.866.116.094.963	0,300940439	0,96583
97	MBL0018MGK	18 W BALAS	1.804	1.624.180.000	1.867.740.274.963	0,304075235	0,96667
98	ETH130	1.30 MM EM	115	1.570.737.360	1.869.311.012.323	0,307210031	0,96749
99	KLM102M	1-NO 2'Lİ	29.566	1.555.173.000	1.870.866.185.323	0,310344828	0,96829
100	MBL0040MGK	40 W BALAS	1.200	1.524.000.000	1.872.390.185.323	0,313479624	0,96908
101	KLM204	2-NO 4'LÜ	8.000	1.467.747.000	1.873.857.932.323	0,31661442	0,96984
102	YEMEK3	YEMEK (EKM	823	1.440.250.000	1.875.298.182.323	0,319749216	0,97058
103	EMDIOBA159	DİOD, BA15	44.750	1.428.583.500	1.876.726.765.823	0,322884013	0,97132
104	ETH120	1.20 MM EM	91	1.391.279.200	1.878.118.045.023	0,326018809	0,97204
105	ÇELİK2379	L-2379 ÇEL	190	1.341.730.500	1.879.459.775.523	0,329153605	0,97274
106	NAKLİYE1	SATIŞ NAKL	1	1.339.619.000	1.880.799.394.523	0,332288401	0,97343
107	SSRL050052	0.50x52.5	1.402	1.282.654.946	1.882.082.049.469	0,335423197	0,97410
108	MMB04003	400 W META	79	1.163.910.000	1.883.245.959.469	0,338557994	0,97470
109	TETKİK	MUHTELİF M	6	1.097.881.356	1.884.343.840.825	0,34169279	0,97527
110	ETB015	0.15 MM EM	56	1.089.099.220	1.885.432.940.045	0,344827586	0,97583
111	EMKON2022M	KONDANSATÖ	5.370	1.057.669.830	1.886.490.609.875	0,347962382	0,97638
112	ETH125	1.25 MM EM	68	1.044.146.640	1.887.534.756.515	0,351097179	0,97692
113	KL345x145x	345x145x76	6.356	1.016.960.000	1.888.551.716.515	0,354231975	0,97744
114	ETH220	2.20 MM EM	65	1.003.388.265	1.889.555.104.780	0,357366771	0,97796
115	SS192	192 MM SİL	850	1.002.288.659	1.890.557.393.439	0,360501567	0,97848
116	PB1.00	1.00 mm AV	220	996.174.841	1.891.553.568.280	0,363636364	0,97900
117	KL0000R	SCHRİNK RU	535	963.000.000	1.892.516.568.280	0,36677116	0,97950
118	SS060	60 mm SİLİ	891	950.681.460	1.893.467.249.740	0,369905956	0,97999
119	MUHTELİF	MUHTELİF Y	11	877.956.075	1.894.345.205.815	0,373040752	0,98044
120	ETH350	3.50 MM EM	69	875.438.460	1.895.220.644.275	0,376175549	0,98090
121	ETH032	0.32 mm EM	59	847.888.150	1.896.068.532.425	0,379310345	0,98133
122	KBNY1.00	1.00 mm NY	11.700	811.500.000	1.896.880.032.425	0,382445141	0,98175
123	EMDIR33KOH	DİRENÇ, 33	98.500	792.911.000	1.897.672.943.425	0,385579937	0,98216
124	SUMENBA	MENBA SUYU	591	780.500.000	1.898.453.443.425	0,388714734	0,98257
125	ETH140	1.40 MM EM	51	778.434.120	1.899.231.877.545	0,39184953	0,98297
126	PB0.20	0.20 mm AV	165	718.150.572	1.899.950.028.117	0,394984326	0,98334
127	POL-PARA	PARAFİN	75	712.792.725	1.900.662.820.842	0,398119122	0,98371
128	KL250x155x	250x155x15	3.840	709.620.000	1.901.372.440.842	0,401253918	0,98408
129	SS120	120 MM SİL	610	707.363.012	1.902.079.803.854	0,404388715	0,98445
130	SS066	66 mm SİLİ	578	702.464.968	1.902.782.268.822	0,407523511	0,98481
131	ETH290	2.90 MM EM	54	678.340.050	1.903.460.608.872	0,410658307	0,98516
132	SUİSKİ	ŞEBEKE SU	8	676.501.106	1.904.137.109.978	0,413793103	0,98551
133	EMDION4007	DİOD, N400	61.000	654.070.000	1.904.791.179.978	0,4169279	0,98585
134	KL345x190x	345x190x76	3.133	639.132.000	1.905.430.311.978	0,420062696	0,98618
135	ÇELİKC45	C-45 LAMA	486	631.800.000	1.906.062.111.978	0,423197492	0,98651
136	TİNER	İNCELTİCİ,	285	611.220.000	1.906.673.331.978	0,426332288	0,98682
137	NOTER	NOTER ONAY	42	608.992.563	1.907.282.324.541	0,429467085	0,98714
138	KL345x170x	345x170x76	3.287	591.660.000	1.907.873.984.541	0,432601881	0,98744
139	ÇELİKİ	İMALAT ÇEL	539	584.700.000	1.908.458.684.541	0,435736677	0,98775
140	ETH210	2.10 MM EM	31	568.861.300	1.909.027.545.841	0,438871473	0,98804

141	YEMEK2	YEMEK-KAHV	290	507.500.000	1.909.535.045.841	0,44200627	0,98830
142	KL270x260x	270x260x85	2.321	497.526.200	1.910.032.572.041	0,445141066	0,98856
143	ETH190	1.90 MM EM	31	482.446.965	1.910.515.019.006	0,448275862	0,98881
144	KL345x135x	345x135x76	3.075	476.625.000	1.910.991.644.006	0,451410658	0,98906
145	TAŞIMAK	TAŞIMA BE	77	471.870.360	1.911.463.514.366	0,454545455	0,98930
146	KL310x140x	310x140x80	3.165	458.925.000	1.911.922.439.366	0,457680251	0,98954
147	TAMBAK2	RENO TAMİR	5	453.354.700	1.912.375.794.066	0,460815047	0,98977
148	POL-340/EM	ÖZEL DÖKÜM	420	441.000.000	1.912.816.794.066	0,463949843	0,99000
149	MMB1000	1000 W MET	7	434.097.000	1.913.250.891.066	0,467084639	0,99023
150	KL760x610x	760x610x59	205	430.500.000	1.913.681.391.066	0,470219436	0,99045
151	EMKON1.5MF	KONDANSATÖ	1.800	418.051.800	1.914.099.442.866	0,473354232	0,99067
152	PB0.80	0.80 mm AV	96	408.022.739	1.914.507.465.605	0,476489028	0,99088
153	BTP45x40	45 mm P.P.	564	407.755.640	1.914.915.221.245	0,479623824	0,99109
154	EMDIR18KOH	DİRENÇ, 18	48.000	396.312.000	1.915.311.533.245	0,482758621	0,99129
155	VM4x65	65 mm M4 C	9.500	395.675.000	1.915.707.208.245	0,485893417	0,99150
156	ÇELİKSAÇ	MUHTELİF S	503	377.250.000	1.916.084.458.245	0,489028213	0,99169
157	GIDA18	% 18 KDV B	3	347.970.443	1.916.432.428.688	0,492163009	0,99187
158	POL-COB	%8 COBALT(	25	329.392.250	1.916.761.820.938	0,495297806	0,99204
159	TAMBAK1	KAMYONET T	8	316.197.314	1.917.078.018.252	0,498432602	0,99221
160	KBNY0.75	0.75 mm NY	5.700	309.000.000	1.917.387.018.252	0,501567398	0,99237
161	SS048	48 mm SİLİ	228	303.335.760	1.917.690.354.012	0,504702194	0,99253
162	POL-STR	STREN (İNC	180	299.067.390	1.917.989.421.402	0,507836991	0,99268
163	POL-340/MD	ÖZEL DÖKÜM	280	294.000.000	1.918.283.421.402	0,510971787	0,99283
164	ETH021	0.21 MM EM	14	290.716.855	1.918.574.138.257	0,514106583	0,99298
165	AFLO36W	36 W FLORE	369	279.450.000	1.918.853.588.257	0,517241379	0,99313
166	SM04	M4 SOMUN	60.000	277.862.000	1.919.131.450.257	0,520376176	0,99327
167	EMDIR100KO	DİRENÇ, 10	11.200	277.380.000	1.919.408.830.257	0,523510972	0,99341
168	VM4x06	06 mm M4 V	36.000	255.600.000	1.919.664.430.257	0,526645768	0,99355
169	YMMKB01.5	01.5 mm Sİ	10.000	251.260.000	1.919.915.690.257	0,529780564	0,99368
170	ETH100	1.00 MM EM	20	248.410.125	1.920.164.100.382	0,532915361	0,99381
171	KBNY1.50	1.50 mm NY	2.600	240.200.000	1.920.404.300.382	0,536050157	0,99393
172	KIRTASİYE	MUHTELİF K	11	239.672.481	1.920.643.972.863	0,539184953	0,99405
173	MBL0018KSK	18 W BALAS	232	237.660.000	1.920.881.632.863	0,542319749	0,99418
174	MTR0075084	75 VA TRA	31	233.280.000	1.921.114.912.863	0,545454545	0,99430
175	BTM15x50	15 mm MASK	320	232.256.000	1.921.347.168.863	0,548589342	0,99442
176	MBL0058MGK	58 W BALAS	100	232.000.000	1.921.579.168.863	0,551724138	0,99454
177	MMB0070	70 W METAL	62	229.518.000	1.921.808.686.863	0,554858934	0,99466
178	ACB0400W	400 W CIVA	30	229.200.000	1.922.037.886.863	0,55799373	0,99478
179	SERİKLISE	SERİGRAF K	9	225.000.000	1.922.262.886.863	0,561128527	0,99489
180	SERİBOYAK	SERİGRAF B	4	222.025.567	1.922.484.912.430	0,564263323	0,99501
181	TTP040x39	PİRİNÇ ŞER	36	216.000.000	1.922.700.912.430	0,567398119	0,99512
182	SERİBOYAS	SERİGRAF B	4	203.020.372	1.922.903.932.802	0,570532915	0,99522
183	MMB00703	70 W METAL	23	200.100.000	1.923.104.032.802	0,573667712	0,99533
184	KL260x205x	260x208x85	1.045	193.325.000	1.923.297.357.802	0,576802508	0,99543
185	MBLE13	7-13 W ELE	40	191.880.000	1.923.489.237.802	0,579937304	0,99553
186	KBFV0.75	2x0.75 mmı	3.200	190.000.000	1.923.679.237.802	0,5830721	0,99562
187	MSB04003	400 W SODY	15	187.500.000	1.923.866.737.802	0,586206897	0,99572
188	POL-MEK	MEK PEROKS	30	186.655.620	1.924.053.393.422	0,589341693	0,99582
189	VM5x65	65 mm M5 C	4.000	183.400.000	1.924.236.793.422	0,592476489	0,99591

190	P-TERMOPNT	TERMO PLAS	32	170.480.000	1.924.407.273.422	0,595611285	0,99600
191	SS032	32 MM SİLİ	136	169.951.944	1.924.577.225.366	0,598746082	0,99609
192	VM4x10	10 mm M4 C	30.000	166.500.000	1.924.743.725.366	0,601880878	0,99618
193	KL265x235x	265x235x85	785	164.065.000	1.924.907.790.366	0,605015674	0,99626
194	KL1100x550	1100x550x3	54	158.232.582	1.925.066.022.948	0,60815047	0,99634
195	MTRBAY302	10 VA ÖZEL	35	153.562.500	1.925.219.585.448	0,611285266	0,99642
196	PB1.50	1.50 mm AV	35	146.611.465	1.925.366.196.913	0,614420063	0,99650
197	KL240x160x	240x160x85	1.076	144.506.800	1.925.510.703.713	0,617554859	0,99657
198	VM4x60	60 mm M4 C	20.000	142.000.000	1.925.652.703.713	0,620689655	0,99665
199	İLAN	İLAN BEDEL	4	140.677.968	1.925.793.381.681	0,623824451	0,99672
200	AFLO18W	18 W FLORE	135	139.750.000	1.925.933.131.681	0,626959248	0,99679
201	SM08	M8 SOMUN	8.000	139.020.000	1.926.072.151.681	0,630094044	0,99686
202	KLM503	5-NO KLEME	100	138.404.800	1.926.210.556.481	0,63322884	0,99693
203	ETB025	0.25 MM EM	7	136.807.500	1.926.347.363.981	0,636363636	0,99701
204	TTP100x30	PİRİNÇ ŞER	23	135.600.000	1.926.482.963.981	0,639498433	0,99708
205	IGNITOR	ATEŞLEYİCİ	41	133.342.000	1.926.616.305.981	0,642633229	0,99714
206	SS108	108 mm SİL	111	125.942.598	1.926.742.248.579	0,645768025	0,99721
207	STARTER20	STARTER-20	460	123.875.000	1.926.866.123.579	0,648902821	0,99727
208	MBL0026KSK	26 W BALAS	83	120.350.000	1.926.986.473.579	0,652037618	0,99734
209	ETB055	0.55 MM EM	8	119.312.150	1.927.105.785.729	0,655172414	0,99740
210	KL1090x540	1090x540x3	54	118.800.000	1.927.224.585.729	0,65830721	0,99746
211	KL1050x490	1050x490x4	53	116.600.000	1.927.341.185.729	0,661442006	0,99752
212	KL1090x530	1090x530x4	53	116.600.000	1.927.457.785.729	0,664576803	0,99758
213	KL1090x500	1090x500x3	52	114.400.000	1.927.572.185.729	0,667711599	0,99764
214	VM3x45	45 mm M3 C	10.000	113.410.000	1.927.685.595.729	0,670846395	0,99770
215	ETB050	0.50 MM EM	7	111.425.325	1.927.797.021.054	0,673981191	0,99776
216	SAÇLEVHA	PLATİNE SA	101	111.100.000	1.927.908.121.054	0,677115987	0,99781
217	KL245x170x	245x170x16	566	110.370.000	1.928.018.491.054	0,680250784	0,99787
218	YAĞ-MADENİ	SHELL TELL	3	110.218.305	1.928.128.709.359	0,68338558	0,99793
219	PBM0.40	0.40 mm Mİ	11	106.978.410	1.928.235.687.769	0,686520376	0,99798
220	MTR0500120	500 VA TRA	5	104.100.000	1.928.339.787.769	0,689655172	0,99804
221	TSEVİZE	TSE VİZE Ü	2	100.000.000	1.928.439.787.769	0,692789969	0,99809
222	KÖŞEBENT50	50x50 KÖŞE	138	99.360.000	1.928.539.147.769	0,695924765	0,99814
223	KIR11x24	11x24 BİLG	16.000	96.000.000	1.928.635.147.769	0,699059561	0,99819
224	LH60x40x1.	LEHİM TELİ	10	94.000.000	1.928.729.147.769	0,702194357	0,99824
225	SERİSLOW	SERİGRAF B	5	92.546.245	1.928.821.694.014	0,705329154	0,99829
226	YMK4.0	4.0 mm CAM	2.000	91.650.000	1.928.913.344.014	0,70846395	0,99833
227	SERİTİNER	SERİGRAF B	5	90.863.587	1.929.004.207.601	0,711598746	0,99838
228	NAKLİYE2	ALIŞ NAKLİ	1	90.000.000	1.929.094.207.601	0,714733542	0,99843
229	SERİBICAK	SERİGRAF S	7	89.549.267	1.929.183.756.868	0,717868339	0,99847
230	EMDIR47OHM	DİRENÇ, 47	42.000	87.052.000	1.929.270.808.868	0,721003135	0,99852
231	BTM25x50	25 mm MASK	96	81.285.504	1.929.352.094.372	0,724137931	0,99856
232	SM03	M3 SOMUN	21.000	81.120.000	1.929.433.214.372	0,727272727	0,99860
233	KIRKARTUŞ	XEROX KART	3	79.353.447	1.929.512.567.819	0,730407524	0,99864
234	TÜPGAZ45	TÜPGAZ 45	1	76.271.186	1.929.588.839.005	0,73354232	0,99868
235	KL1060x500	1060x500x4	25	73.255.825	1.929.662.094.830	0,736677116	0,99872
236	BTP12x66	12 mm P.P.	280	66.383.240	1.929.728.478.070	0,739811912	0,99876
237	OTOYOL	OTOYOL GEÇ	27	66.101.695	1.929.794.579.765	0,742946708	0,99879
238	VM6x65	65 mm M6 C	1.000	65.450.000	1.929.860.029.765	0,746081505	0,99882

239	KLM202	2-NO 2'Lİ	700	64.236.200	1.929.924.265.965	0,749216301	0,99886
240	LS	LEHİM SUYU	10	62.000.000	1.929.986.265.965	0,752351097	0,99889
241	YMMKB32.0	32.0 mm DA	20	61.401.760	1.930.047.667.725	0,755485893	0,99892
242	VM5x50	50 mm M5 C	3.000	57.900.000	1.930.105.567.725	0,75862069	0,99895
243	MTR0300108	300 VA TRA	4	56.080.000	1.930.161.647.725	0,761755486	0,99898
244	BTM12x50	12 mm MASK	96	55.737.600	1.930.217.385.325	0,764890282	0,99901
245	VM3x40	40 mm M3 C	4.200	55.230.000	1.930.272.615.325	0,768025078	0,99904
246	GIDA08	% 8 KDV BE	2	54.364.000	1.930.326.979.325	0,771159875	0,99907
247	VM4x50	50 mm M4 C	4.000	53.400.000	1.930.380.379.325	0,774294671	0,99909
248	KIR210x20	210x20 M F	48	52.800.000	1.930.433.179.325	0,777429467	0,99912
249	EMDIR1MOHM	DİRENÇ, 1M	25.000	51.445.000	1.930.484.624.325	0,780564263	0,99915
250	SS036	36 mm SİLİ	38	50.555.960	1.930.535.180.285	0,78369906	0,99917
251	LP1000	LEHİM PAST	3	50.514.360	1.930.585.694.645	0,786833856	0,99920
252	BTP19x66	19 mm P.P.	144	49.990.752	1.930.635.685.397	0,789968652	0,99923
253	PB0.10	0.10 mm AV	11	49.572.705	1.930.685.258.102	0,793103448	0,99925
254	MBL0040KSK	40 W BALAS	33	47.850.000	1.930.733.108.102	0,796238245	0,99928
255	MMB0150	150 W META	7	47.730.000	1.930.780.838.102	0,799373041	0,99930
256	VSAP8X1000	1000 mm M8	2.050	46.625.000	1.930.827.463.102	0,802507837	0,99932
257	TAŞIMAYD	YURT DIŞI	1	46.581.484	1.930.874.044.586	0,805642633	0,99935
258	KIRA4	A4 FOTOKOP	15	45.000.000	1.930.919.044.586	0,808777429	0,99937
259	VM8x90	90 mm M8 C	500	44.000.000	1.930.963.044.586	0,811912226	0,99939
260	VS95	29x95 mm S	10.000	41.700.000	1.931.004.744.586	0,815047022	0,99942
261	İŞÇİLİK	MONTAJ İŞÇ	55	41.250.000	1.931.045.994.586	0,818181818	0,99944
262	SS150U	150 MM SİL	33	41.243.895	1.931.087.238.481	0,821316614	0,99946
263	KL1020x510	1020x510x6	14	41.023.262	1.931.128.261.743	0,824451411	0,99948
264	AMB250W	250 W META	2	40.500.000	1.931.168.761.743	0,827586207	0,99950
265	MTR0250108	250 VA TRA	3	40.020.000	1.931.208.781.743	0,830721003	0,99952
266	PB0.40	0.40 mm AV	8	37.710.190	1.931.246.491.933	0,833855799	0,99954
267	MMB02503	250 W META	3	37.650.000	1.931.284.141.933	0,836990596	0,99956
268	KBNY0.35	0.35 mm NY	600	37.000.000	1.931.321.141.933	0,840125392	0,99958
269	MMB01503	150 W META	4	36.420.000	1.931.357.561.933	0,843260188	0,99960
270	DOĞALGAZ-2	DOĞALGAZ S	4	36.168.833	1.931.393.730.766	0,846394984	0,99962
271	YAĞ-GRES	GRES YAĞI-	1	36.100.000	1.931.429.830.766	0,849529781	0,99964
272	SS300	300 MM SİL	33	35.970.000	1.931.465.800.766	0,852664577	0,99965
273	KLM102PBK	1-NO 2'Lİ	400	35.906.400	1.931.501.707.166	0,855799373	0,99967
274	KL1100x540	1100x540x4	12	35.162.796	1.931.536.869.962	0,858934169	0,99969
275	AMB070W	070 W META	1	33.000.000	1.931.569.869.962	0,862068966	0,99971
276	VM4x40	40 mm M4 C	3.000	32.700.000	1.931.602.569.962	0,865203762	0,99973
277	ETB075	0.75 MM EM	2	30.237.210	1.931.632.807.172	0,868338558	0,99974
278	VM4x35	35 mm M4 C	3.000	30.000.000	1.931.662.807.172	0,871473354	0,99976
279	PUL08	M8 PUL	4.000	29.625.000	1.931.692.432.172	0,87460815	0,99977
280	SS250	250 MM SİL	26	28.340.000	1.931.720.772.172	0,877742947	0,99979
281	YMMKB19.1	19.1 mm DA	20	27.405.300	1.931.748.177.472	0,880877743	0,99980
282	ET17X25	17x25 BİLG	7.204	25.056.000	1.931.773.233.472	0,884012539	0,99981
283	AFLO30W	30 W FLORE	2	24.000.000	1.931.797.233.472	0,887147335	0,99983
284	LP0250	LEHİM PAST	5	21.754.875	1.931.818.988.347	0,890282132	0,99984
285	AMB400W	400 W META	1	21.500.000	1.931.840.488.347	0,893416928	0,99985
286	MTR0040060	40 VA TRAF	10	21.100.000	1.931.861.588.347	0,896551724	0,99986
287	TÜPGAZ12	TÜPGAZ 12	1	18.644.068	1.931.880.232.415	0,89968652	0,99987

288	MMB0250	250 W META	2	18.088.000	1.931.898.320.415	0,902821317	0,99988
289	SM03.5	3.5 mm SOM	3.000	17.062.000	1.931.915.382.415	0,905956113	0,99989
290	MTR0025066	25 VA TRAF	3	16.020.000	1.931.931.402.415	0,909090909	0,99990
291	TÜPGAZ02	TÜPGAZ 2 K	3	15.254.238	1.931.946.656.653	0,912225705	0,99990
292	AMB150W	150 W META	1	15.000.000	1.931.961.656.653	0,915360502	0,99991
293	KBB2.5X100	KABLO BAĞI	5.000	14.000.000	1.931.975.656.653	0,918495298	0,99992
294	ÇELİKC	CIVA ÇELİĞ	1	13.900.000	1.931.989.556.653	0,921630094	0,99993
295	VM5x15	15 mm M5 C	2.000	13.000.000	1.932.002.556.653	0,92476489	0,99993
296	TOPFİŞ	TOPRAKLI K	11	10.500.000	1.932.013.056.653	0,927899687	0,99994
297	MTR0020066	20 VA TRAF	2	10.120.000	1.932.023.176.653	0,931034483	0,99994
298	VM3x15	15 mm M3 C	2.000	9.140.000	1.932.032.316.653	0,934169279	0,99995
299	AFLO32W	32 W FLORE	5	8.500.000	1.932.040.816.653	0,937304075	0,99995
300	KBA3x0.75	3x0.75 mm	25	8.250.000	1.932.049.066.653	0,940438871	0,99996
301	YMMKB06.4	06.4 mm DA	20	7.978.760	1.932.057.045.413	0,943573668	0,99996
302	STARTER40	STARTER-40	25	7.500.000	1.932.064.545.413	0,946708464	0,99996
303	TOPPRİZ	TOPRAKLI P	6	7.500.000	1.932.072.045.413	0,94984326	0,99997
304	MBL0013MGK	13 W BALAS	7	6.390.000	1.932.078.435.413	0,952978056	0,99997
305	VSAP8X90	90 mm M8 S	10	6.000.000	1.932.084.435.413	0,956112853	0,99998
306	KBNY0.55	0.55 mm NY	100	5.500.000	1.932.089.935.413	0,959247649	0,99998
307	MTR0025066	25 VA TRAF	1	5.340.000	1.932.095.275.413	0,962382445	0,99998
308	PARK BEDE.		2	5.084.746	1.932.100.360.159	0,965517241	0,99998
309	APLC10	10 W PLC A	1	5.000.000	1.932.105.360.159	0,968652038	0,99999
310	ET225x350	225x35 BİL	3.600	4.320.000	1.932.109.680.159	0,971786834	0,99999
311	TSEPOSTA	TSE POSTA,	2	4.198.264	1.932.113.878.423	0,97492163	0,99999
312	AFLO40W	40 W FLORE	4	3.600.000	1.932.117.478.423	0,978056426	0,99999
313	AHAL50W	12/50 W HA	3	3.450.000	1.932.120.928.423	0,981191223	0,99999
314	AFLO20W	20 W FLORE	4	3.400.000	1.932.124.328.423	0,984326019	1,00000
315	TOPPÇER	TOPRAKLI P	4	3.400.000	1.932.127.728.423	0,987460815	1,00000
316	GIDA01	% 1 KDV BE	1	1.450.000	1.932.129.178.423	0,990595611	1,00000
317	MBL0026MGK	26 W BALAS	1	1.270.000	1.932.130.448.423	0,993730408	1,00000
318	MBL0032MGK	32 W BALAS	1	1.270.000	1.932.131.718.423	0,996865204	1,00000
319	MBL0013KSK	13 W BALAS	1	900.000	1.932.132.618.423	1	1,00000
			1.794.668	1.932.132.618.423			

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APPENDIX B

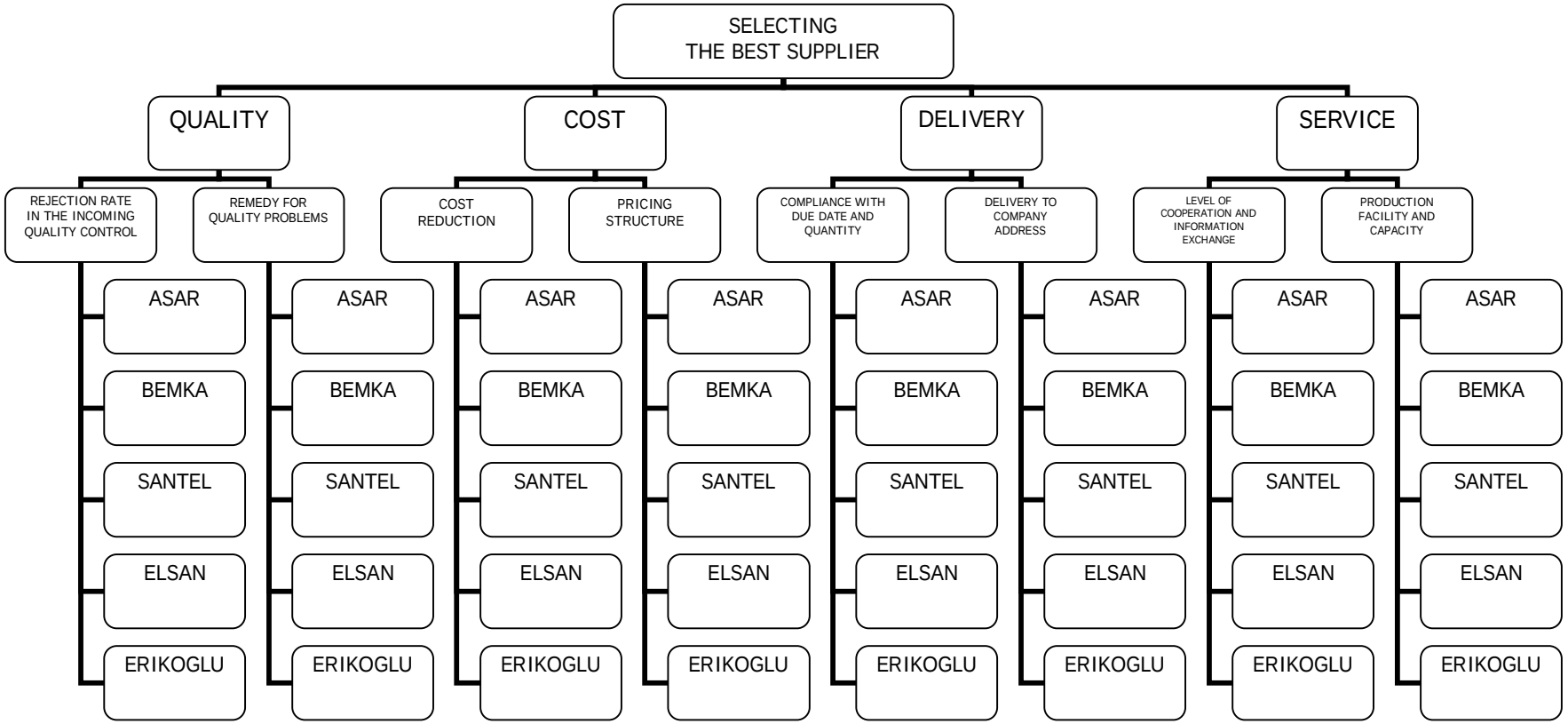

FIGURE-3 HIERARCHY TREE OF THE MODEL

APPENDIX C

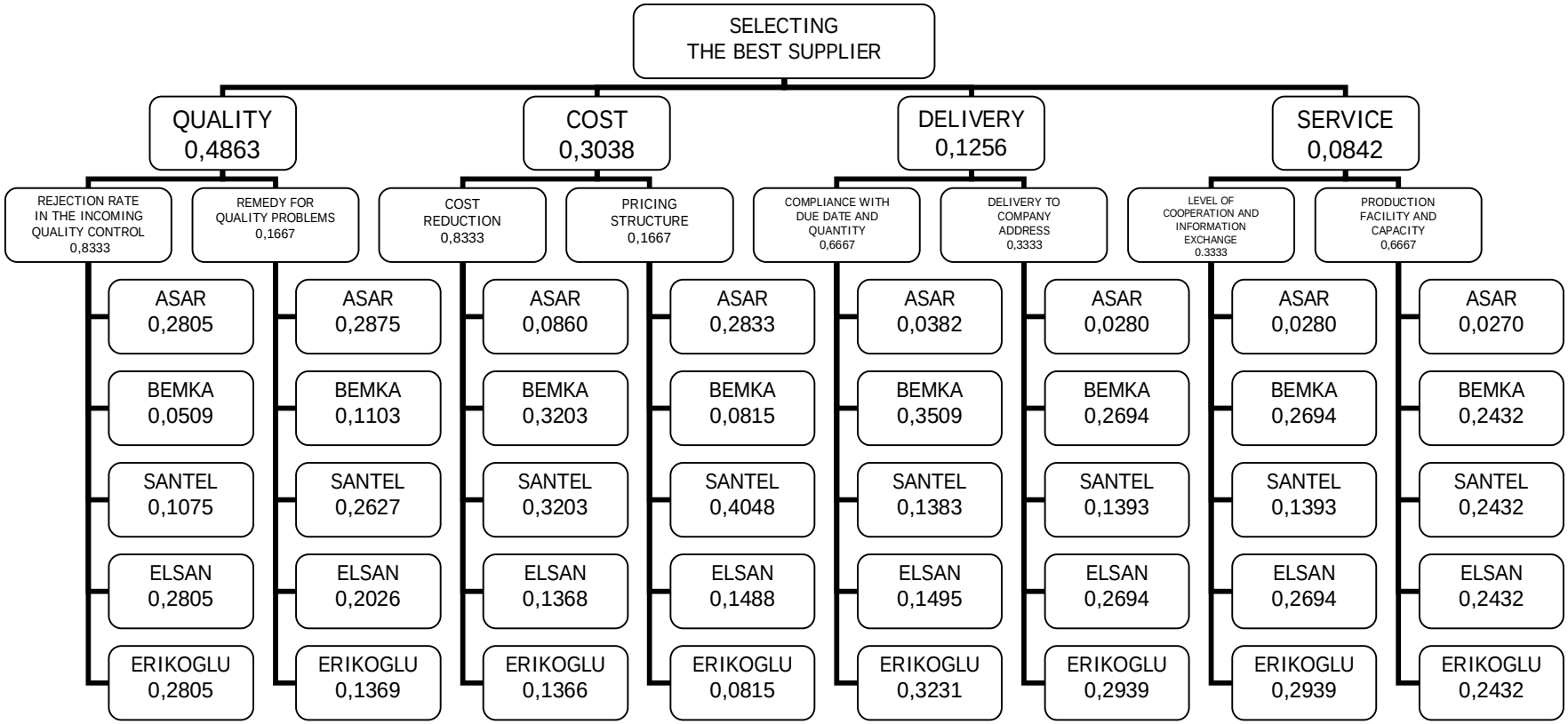

FIGURE-4 HIERARCHY TREE OF RAW MATERIAL ENAMELLED COPPER WIRE 0,80 MM HO

APPENDIX D

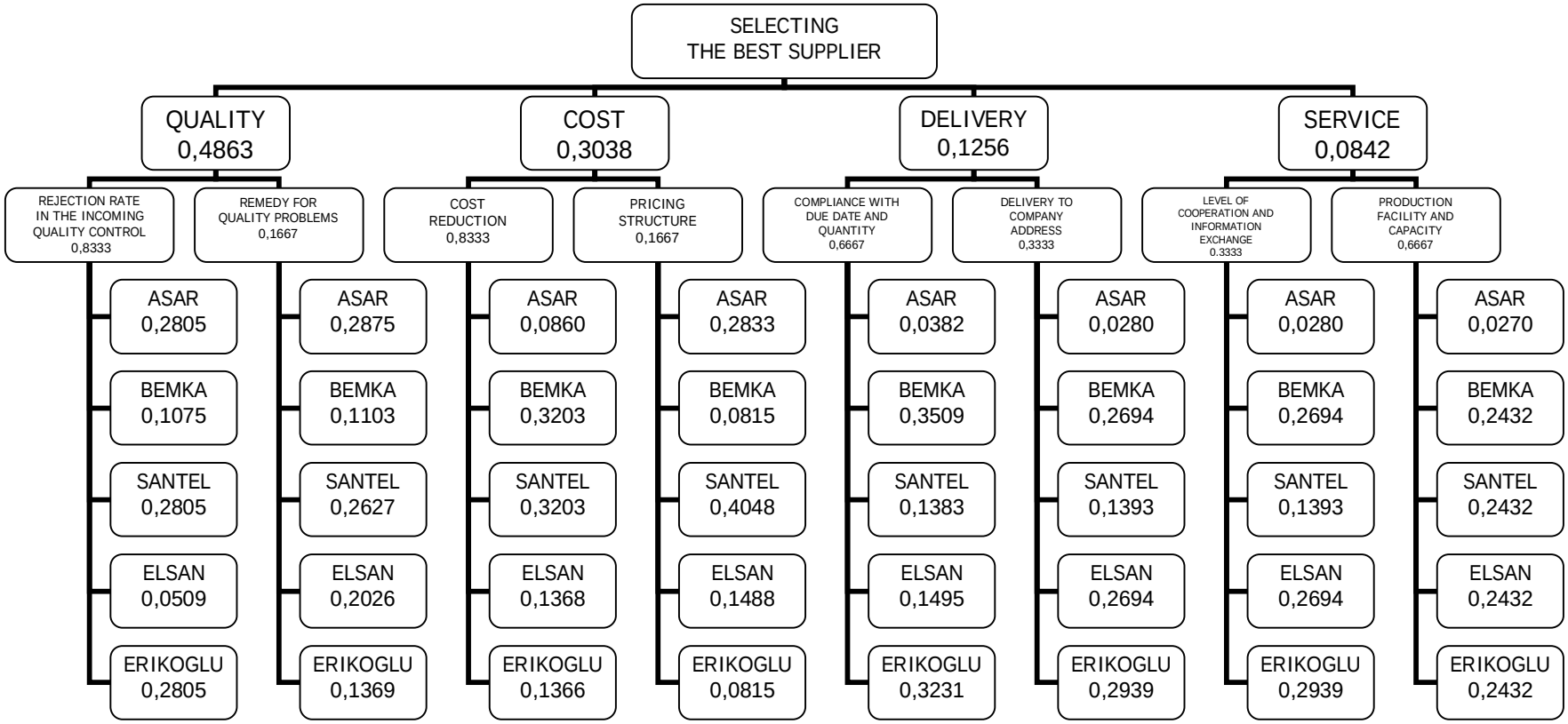

FIGURE-5 HIERARCHY TREE OF RAW MATERIAL ENAMELLED COPPER WIRE 1,10 MM HO

APPENDIX E

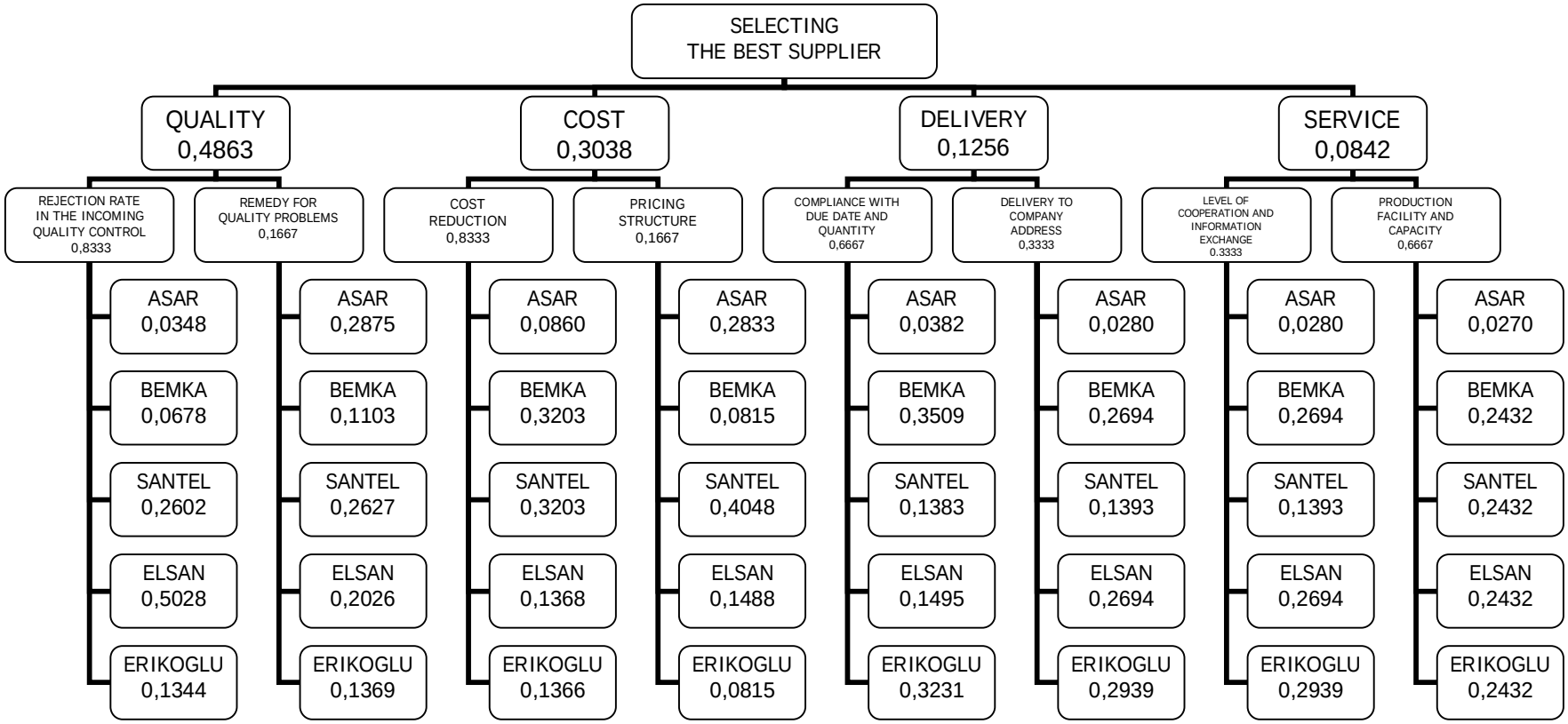

FIGURE-6 HIERARCHY TREE OF RAW MATERIAL ENAMELLED COPPER WIRE 0,28 MM HO

APPENDIX F

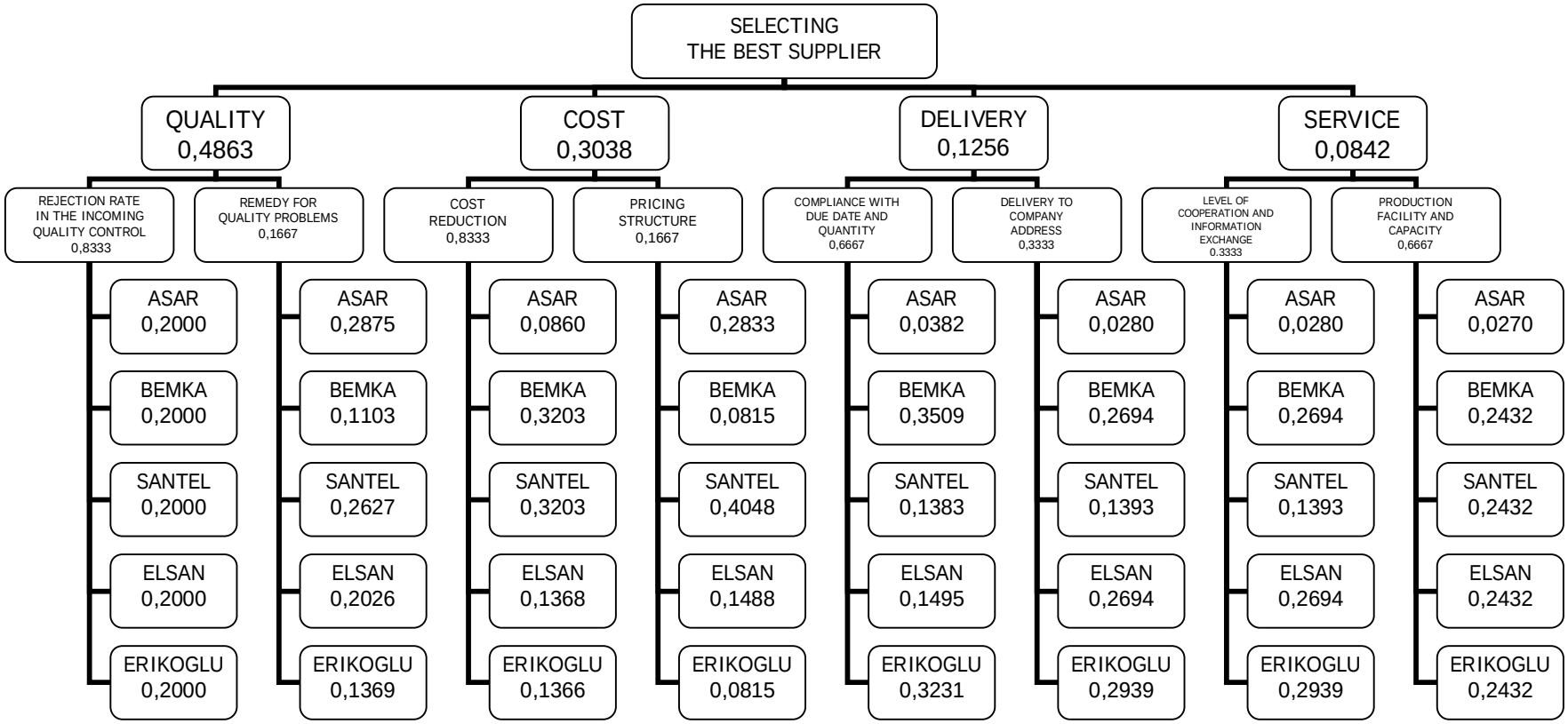

FIGURE-7 HIERARCHY TREE OF RAW MATERIAL ENAMELLED COPPER WIRE 1,05 MM HO

APPENDIX G

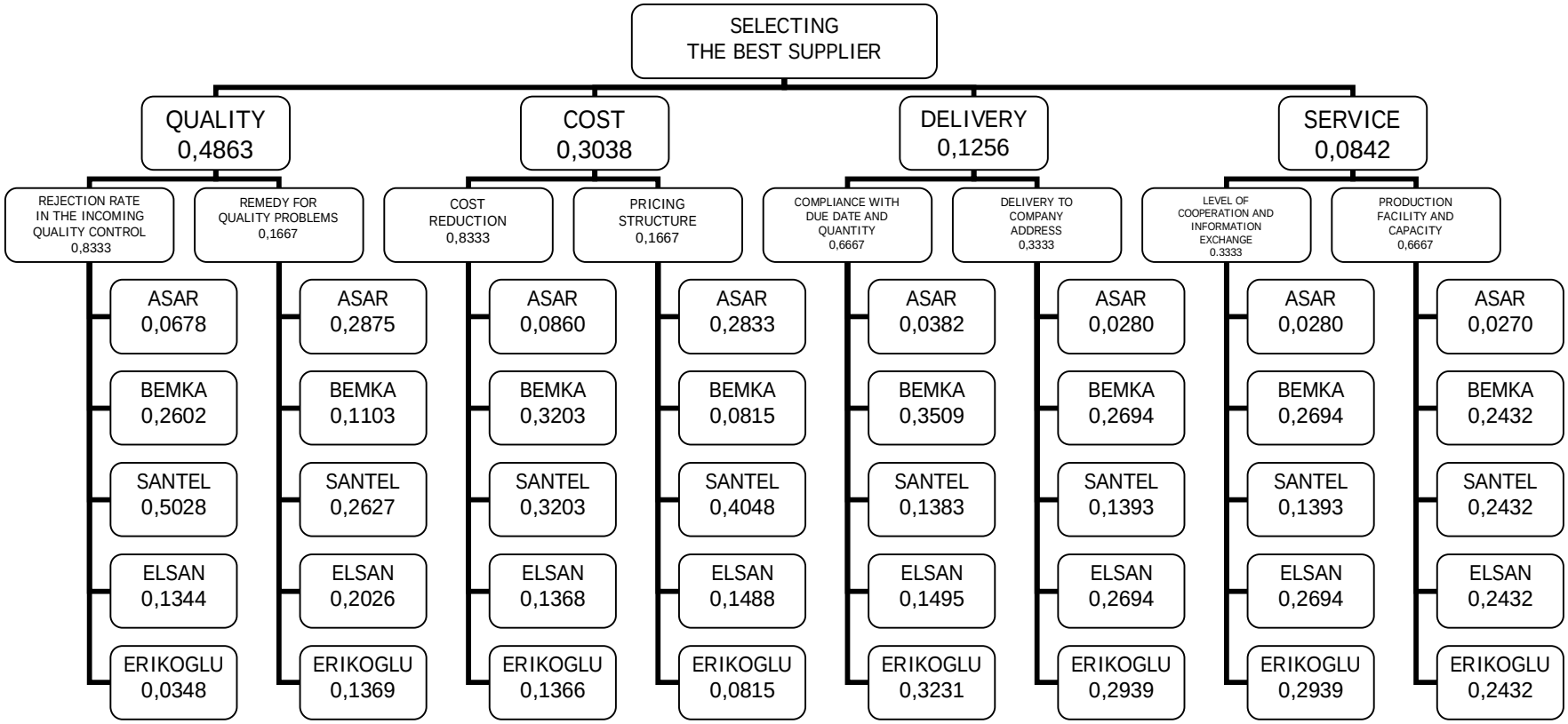

FIGURE-8 HIERARCHY TREE OF RAW MATERIAL ENAMELLED COPPER WIRE 1,15 MM HO