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Server Selection by using Weighted Sum and Revised Weighted Sum Decision Models

S.Sarika
G.G.S. IP University, Dwarka, New Delhi

ABSTRACT

The role of the information technology is growing rapidly in the world of business, to communicate with the customers effectively. Computer network is the back bone of any organization. It helps in effective utilization of resources such as time, money etc. Server plays an important role in the network, to store the data. A wide variety of servers exist in the market. This paper focuses on the evaluation of actual worth of the server of IBM, HP, and Sun micro systems, based on the real cost of the parameters. The selection of the appropriate server depends on the requirements of application in business organization, which becomes a very difficult task. To select the server from several alternatives, based on the worth calculated by considering the objective parameters like processor, memory, hard disk etc. and the subjective parameters such as after sales service, product quality, brand name etc. by using the weighted sum model and revised weighted sum decision models. On the basis of calculated actual worth, the ranking has been done by using weighted sum model and, revised weighted sum decision model after normalization, resulting IBM at the top, following HP and SMS servers.

Keywords: Server *selection, Role of server, weighted sum model, discrete alternatives, Revised weighted sum decision model.*

1. INTRODUCTION

Servers are extensively used by many organizations to perform critical tasks such as sharing files and web documents. Server can be defined as a high speed computer that offers memory and processing support to computers connected on a network, dedicated to a particular purpose and stores all information and performs the critical functions of the application. There are several manufacturers producing servers with different parameters. The leading suppliers of the servers, IBM, HP and Sun micro system companies having share of 75 percent of the world server market. It is difficult to select a server simply considering the cost as a parameter. The objective parameters like processors, memory, hard disks etc., quantitative in nature, can be numerically defined and the subjective parameters such as after sales service, product quality, brand name etc. qualitative in nature need to be considered. In this paper the focus is on to evaluate and select the server by considering the actual worth of the server of IBM, HP, SMS by using the weighted sum model and by revised weighted sum decision model.

2. LITERATURE REVIEW

Several researchers have proposed various evaluation and selection models for selecting the computers, robots, server virtualization, and mobile phones etc. Hotteling (1929) proposed that eevery attribute can be either horizontally or vertically differentiated. Lancaster (1966) proposed that a product is composed of several attributes and consumers attach value to these attributes considered as parameters. Bartholomew O. Nnaji et al (1988) has developed multi attribute utility theory for selection of the robot. He found that evaluation and selection of robots for a particular task, a multi attribute problem, where the evaluator must take into account all the hardware and software features of the robot. Chon-HuatGoh et al. (1996) has presented a revised weighted sum model that incorporates the values assigned by a group of experts on different factors in selecting robots. Benjamin B.M. Shao et al. (2001) has examined the grosch's law for economies of scale on computing power. He has used hedonic model to a cross sectional data, a set of 48 server appliance products which reveals that the deciding factors for price are main memory, catch memory, brand name, CPU speed and hard disk capacity without considering the software aspect. Janis Gradins, Larissazaitaseva (2005) has implemented multi attribute comparing approach to evaluation and selection the application server. He has used software systems implementation using client server technology. Koksalan et al (1988) has proposed multiple attribute utility function is assessed by a feedback process based on the answers of the decision maker. His algorithm has been implemented to select a house among a number of alternatives. Multi–criteria decision making aims to find the best opinion from all the feasible alternatives in the presence of multiple, usually conflicting, decision criteria (2007). Nick Craswell and Peter Bailly et al evaluated various selection models based on application web search servers.

In the literature, there exist the different approaches to select the server. Chon-Hoat et al., has used robotic selection through revised weighted sum decision model (RWSDM). He has not calculated the actual worth of the product. In our study, the calculation of actual worth and rank of the servers will be by using weighted sum model (WSM) and RWSDM.

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3. PARAMETERS CONSIDERED FOR EVALUATION AND SELECTION

i. Objective Parameters

The objective parameters refer to the quantitative aspects of the server like processor, memory, and storage devices etc.

a. Processor (P_1)

Processor is one of the main components of the server that affects overall system performance. There are many processors available for the customer like Itanium series (multi core), AMD processor, Pentium, Celeron, Core i3 etc. The number of processor cores also has a dramatic effect on performance. Each processor core acts as if it's a separate processor. Most server computers use dual-core (two processor cores) or quad-core (four cores) chips.

b. Internal memory (IM_2)

Internal memory is the main memory for the server. Many different types of mainmemories are available to meet the customers' requirement. The total memory capacity of the server depends on the motherboard. Servers can support at least 12GB of memory, some can supports up to 32GB and it varies with respect to processor.

c. Secondary Memory (SM_3)

The hard disk acts as a secondary storage mechanism to support other functions. This device is stores and retrieves digital information, preliminary server data. The quantity of hard drive space determines the amount of software that can be installed as well as the quantity of data that can be stored locally. Since software continues to expand its use of this resource, it is important to overbuy for the future (i.e. buy a hard drive that is larger than needed to meet today's requirements).

d. Operating System (OS_4)

The operating system is the primary determinant of the user interface of the server and thus affects the user friendliness or ease of use of the systems. In addition, there is value for using the industry standard OS availability for application software and compatibility with other systems in the organization like Linex, UNIX, Solaries, Windows NT a few.

e. PCI slots (Peripheral component interconnection) (PC_5)

It supplies a high speed data path between the CPU and peripheral device. It is used for adding new devices through which one can expand the features of the server. Generally these PCI slots are used for network cards, sound cards, modems, TV tuner cards and USB cards and USB slots etc.

f. Network controllers (NC_6)

The network connection is one of the most important parts of any server. The network controller manages the input and traffic from the clients (other computers).

g. Storage controllers (SC_7)

A separate storage controller is often required when server needs to store, maintain the data over a period of years. This controller should be making the data available to the end user and when it is required.

h. High quality input output devices (I/O_8)

The key board and the mouse are the primary ways in which users interact with a system and high quality devices are healthier and more pleasant for users. For example, the mouse should be smooth to move and sensitive to small hand motions so users don't waste time and physical energy. In addition, brand name devices also tend to be more durable.

ii. Subjective parameters

a. After sales service (ASS_9)

Customers expect high quality service, especially as they focus on getting good value for their money in a difficult economic environment and are willing to spend more with those that deliver excellent service.

b. Service quality (SQ_{10})

A common definition of service quality is that the service should correspond to the customers' expectations and satisfy their needs and requirements. The type and length of warranty are important because system downtime can be costly and inconvenient. On-site support is preferred and local service being the next-best. In addition, technical support (over the telephone or internet) that is oriented toward end user is valuable.

c. Product quality (PQ_{11})

Product quality is more important when purchasing a server. Quality consciousness is defined as an awareness of and desire for high quality products, and the need to make the best or perfect choice (Sproles and Kendall (1986)). This indicates that quality

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characteristics are also related to performance. Product quality encompasses the features and characteristics of a product or service that gets on its ability to satisfy their needs.

d. Brand name/Brand loyalty (BL_{12})

According to Kohli and Thakhor (1997) brand name is the creation of an image or the development of a brand identity and is an expensive and time consuming processes. Brand name is important for the firm to attract the customers to purchase the product and influence repeat purchasing behavior. Wolfe and Ferl and defined brand loyalty as a customer decision expressed through intention or behavior, to repurchase a brand on a regular basis. It occurs because the customer perceives that the brand offers the right product features, image or level of quality of the right place.

e. Training of staff (TS_{13})

Trained staff may help to select a better server. The requirements are going to change frequently, and the staff may help in selecting the right server.

4. ESTIMATING THE ACTUAL WORTH OF THE SERVERS BY WSM AND RWSM

i. Weighted Sum Model (WSM)

The weighted sum model is a general model. It has been used for different applications like robotics, processor etc. It is a very common method, especially in single dimensional approach. We consider a domain of product characteristics which is estimated on to the unit interval, i.e. each value from [0 to 1] internal represents an amount of the product characteristics. The alternatives are denoted as S_i (for i=1,2,3, . . .m) and the criteria as C_j (for j=1,2, . . .n). Finally each criteria is associated with a weight of importance (the biggest weight indicating the highest importance) denoted w_j (for j=1,2,3, ... n). It is assumed that the decision maker knows the relative weights and the values for each alternative in terms of each criteria (S_{ij}), customarily weights are normalized so that they add up to one. The higher the weight, the more important and criterion is assumed to be in relation to the others. The weights will be varying based on the importance of the server application (hardware) of the customer requirements.

Table 1: Multiple Criteria Decision Attributes Generic Decision Matrix Structure

Alternatives	Criteria1	Criteria2	Criteria3	Criteria n
Alternative1	x_{11}	x_{12}	x_{13}.....	x_{1m}
Alternative2	x_{21}	x_{22}	x_{23}	x_{2m}
Alternative3	x_{31}	x_{32}	x_{33}.....	x_{3m}
Weightage	w_1	w_2	w_3.....	w_m

In the weighted sum method, the score of an alternative is equal to the sum of the performance of an alternative under each criterion (w_j) multiplied by the relative weight assigned to that criterion (w_j). The alternative with the optimal score (highest and lowest) represents the optimal choice based on the worth calculation of the server. However, this method can be particularly sensitive to the selection of the servers. If there are M alternatives and N criteria then, the best alternative is the one that satisfies (in maximization case) the following expression (Fish burn, 1967)

The WSM is defined by equation

$$A^*Max= \sum_{i=1}^{n} a_{ij} \; w_j \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where n is number of criteria, a_{ij} is the value of weight assigned to the j^{th} criteria. Performance of each alternative under each criteria (a_{ij}).Relative weights for each criterion (w_j).

Step1: The overall performance/cost has been calculated by each criteria (a_{ij}).

Step2: Relative weights for each criterion (w_j) Their relative weights of the ten criteria's were determined to be: W_1=0.2, W_2=0.1, W_3=0.05….W_n=0.02. The corresponding (a_{ij}) values are assumed to be as follows. We have considered the objective and subjective parameters for estimating the actual worth of the server.

Table 2, shows the objective performance capability of the server to calculate the actual worth of the server.

Table 2: Entry Level Servers of Three Companies

Objective parameter					
Criteria	**IBM server**	**HP server**	**SMS server**	**Wipro**	**HCL**
Processor	Power-ii 13550	Intel itanium 2 5500	AMD opteron1000 4900	Intel Xenon 5490	Intel Xenon 6900
Internal memory	8GB	12GB	4GB	2GB	2GB
Hard disks	512 GB	512 GB	512GB	512 GB	512GB
Operating system	5000	5500	5000	5000	5000

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PCI slots	5	4	8	3	4
Network controllers	5	3	2	2	2
Storage controllers	5	2	3	1	1
Memory	6	6	5	3	3

slots					
I/O devices	2	2	2	1	1
Cost	38,050	36,000	29,400	29000	32000

Table 3, explains every parameter costs

Table 3: Costs of the Each Parameter

Parameter	P	IM	SC	HD	NC	OS	MS	PCI	BL
PQIBM server	13,550	6000	2000	3500	2000	5000	1000	4000	1000
HP server	5500	12000	4000	3500	2000	5000	1000	2000	1000
SMS server	4900	8000	2000	3500	2000	5000	1000	2000	1000

Table 4 shows, the relative weights for each criterion (w_j) mean the relative importance of the parameter to the customer.

Table 4: Relative Weights Of The Parameters

Parameter	P	IM	SC	HD	NC	OS	MS	PCI	I/O	PQ	ASS	SQ	TS	BL
Weights	(w_1)	(w_2)	(w_3)	(w_4)	(w_5)	(w_6)	(w_7)	(w_8)	(w_9)	(w_{10})	(w_{11})	(w_{12})	(w_{13})	(w_{14})
Weights	0.2	0.15	0.1	0.15	0.04	0.1	0.02	0.02	0.02	0.05	0.05	0.02	0.05	0.03

The cost of each parameter and the weights of each parameter have been given in table 5.

Table 5: The Weights and Costs of Each Parameter

Alternatives														
	P	IM	SC	HD	NC	OS	MS	PCI	I/O	PQ	ASS	SQ	TS	BL
	(W_1)	(W2)	(W3)	(W4)	(W6)	(W7)	(W_8)	(W_9)	(W_{10})	(W_{11})	(W_{12})	(W_{13})	(W_{14})	(W_{15})
	0.2	0.15	0.1	0.15	0.04	0.1	0.02	0.02	0.02	0.2				
IBM server	13,550	6000	2000	3500	2000	5000	1000	4000	1000	5000				
HP server	5500	12000	4000	3500	2000	5000	1000	2000	1000	3000				
SMS server	4900	8000	2000	3500	2000	5000	1000	2000	1000	1000				

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When equation 1 is applied on the data, in table 5 the scores of the three alternatives values shown in table 6.

Table 6: The Calculations of the Weights

Alternatives	W_1	W_1	W_1	W_1	W_1	W_1	W_1	W_1	W_1	W_1	Total Weight
IBM	2710	900	200	525	80	500	20	80	20	800	5835
HP	1100	1800	400	525	80	500	20	40	20	600	5085
SMS	980	1200	200	525	80	500	20	40	20	200	3765

By using the equation 1, and putting the values to calculate the actual worth of server A_1 (IBM), A_2 (HP) and A_3 (SMS) companies by using WSM.

A_1=13550*0.2+6000*0.15+2000*0.1+3500*0.15+2000*0.04+5000*0.1+1000*0.02+4000*0.02+1000*0.02+5000*0.2=5835

Similarly, by using the equation 1, A_2 and A_3 are calculated.

A_2=5085

And A_3 = 3765

Selection based on weighted sum model, the best alternative (in the maximization case) is alternative A (because it has the highest WSM score; 5835). Moreover, the following ranking is derived: A1>A2>A3 (Where ">" stands for better than"). On the basis of calculated data, the IBM at first rank following HP and SMS server with score 5085, 5085 and 3735 respectively.

ii. Revised Weighted Sum Decision Model

For calculating the actual worth and ranking the entry level servers of IBM, HP and SMS, Wipro and HCL companies the experts' views calculated are from those who are using the servers (companies/organization, universities, designing centers, colleges, banks etc.) in India. Data is collected from various sources of parameters such as processor, network controllers, and storage devices etc. The sample of this study has views of ten experts have given the weight to every parameter on the basis of importance. For weighted sum decision model, the data of the objective and subjective parameter for the server that satisfy the critical values are normalized to one. For each parameter, a server with a higher value is preferred to one with a lower value. The experts assign any real number between 1 and 9, where in objective and subjective criteria, 1 indicates the worst performance and 9 the best. Saaty gave several reasons why the upper limit of 9 is reasonable. In this model, the highest and lowest values of the expert opinions are eliminated, and the remaining values for the subjective and objective parameter for each server are used in the normalization. The weights for both the subjective and objective parameters are also assigned by the experts. The basic steps in reaching the final decision on the server selection are as follows.

The objective or quantitative parameters are processor (p), network controllers (NC), storage memory(SM), and hard disk (HD) respectively. This parameter's cost obtained from the vendors.

Let, P_i, NC_i, SM_i, HD_i (i=1,2,3, . . ,n)

Subjective or qualitative parameters are the after sales service (ASS_i), service quality (SQ), brand loyalty (BN), and training of user staff (TS) respectively.

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Let, ASS_{ij}, SQ_{ij}, TS_{ij}, PQ_{ij}, and BL_{ij}
(i=1,2,….n; j=1,2,….m)

The data are obtained from experts' who are using entry level servers. For each criterion, any real number between 1 and 9 and 15 may be assigned by experts according to their opinion on the server, where 1 indicates strongly disagree, 9 indicates strongly agree. be the values assigned on after sales service, service quality, trained staff, product quality, brand name for server I from expert j, respectively.
The basic requirements of objective parameters are as follows

Table 7: Basic Critical Values of Objective Criteria

Objective parameters	
Processor	2.6 GHz
Internal memory	4GB
Hard disks	438 GB
Hard disk upgrade	4.5 TB
Network controllers	3
Storage controllers	4
Memory slots	6
Operating system	1
PCI slots	6
Cost	80000

Step 1: Parameters Test by Experts

The same example has been considered in this test. Server i(i=1,2, . . ,n) considered if all its objective parameters meet the customer requirements. That is, server i passes the application test if all the following conditions are satisfies. In this step each parameter which will be individually evaluated is called the performance variable of the evaluated system. In the case of server parameters can be conveniently grouped in the following four sets of performance variables which shows the customer's preference greater than for processor, network controllers and hard disk capacity etc. as shown in the table2, from the objective server four wipro does not meet the internal memory that is too low while the server five (HCL) storage capacity is low; thus, both the servers are eliminated from further consideration. The objective parameters are:

$$p_i \geq p_c, Nc_i \geq Nc_c, HD \leq HD_c$$

Step 2: Normalization of Objective and Subjective Data

The values assigned to the servers for each objective parameter are normalized to one, where server with a higher value is preferred. Normalizing the data ensures that all the criteria are based on the importance of the parameter the weights are distributed. There by preventing one criterion from dominating the others because of its inherent numerical values. The formula normalizing these criteria is as follows.

$$\begin{aligned} Np_i &= p_i/(p_1 + p_2 + ... + p_n), \\ Nim_i &= im_i/(im_1 + im_2 + ... + im_n), \\ Nhd_i &= /(hd_1 + hd_2 + ... + hd_n), \\ Nnc_i &= Nc_i/(Nc_1 + Nc_2 + ... + Nc_n), \\ Nc_i &= 1/c_i\left(1/c_1 + 1/c_2 + ... 1/c_n\right) \end{aligned} \quad (2)$$

Where $Np_i, Nim_i, Nnc_i, Nhd_i$ are the normalized values with respect to importance of the parameters like processor, network controllers, storage controllers etc. for server i,=1,2, ...,n.

For accurate results of the objective and subjective parameters values like the highest and lowest values assigned by the experts for each server are eliminated in the evaluation process. With elimination of the extreme values, the revised value of the after sales service of server i:

$$Rass_i = \left[\begin{matrix}(ass_{i1} + ass_{i2} + ass_{i3} + ... ass_{im}) - \max(ass_{i1}, ass_{i2}, ..., ass_{in}) \\ - \min(ass_{i1}, ass_{i2}, ... ass_{in})/(m-2)\end{matrix}\right] \quad (3)$$

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And revised value of the after sales service for server i:

$$Rsq_i = \begin{bmatrix} (sq_{i1} + sq_{i2} + sq_{i3} + \ldots\ldots sq_{im}) - \max(sq_{i1}, sq_{i2}, \ldots\ldots, sq_{in}) \\ -\min(sq_{i1}, sq_{i2}, \ldots\ldots sq_{in})/(m-2) \end{bmatrix}$$

This method eliminates extreme opinions that may adversely affect the final decision. If the experts share similar opinions, then the impact of this elimination is minimal. Furthermore, let NPSi, Nsqi be the normalized value for the after sales service and service quality of server I, respectively. Using the methodology similar to that for Npi or Nnci, Rassi and Rsqi are converted to Nassi and Nsqi, respectively. That is:

$$Nas_i = Ras_i / (Ras_1 + Ras_2 + \ldots\ldots Ras_n)$$

And

$$Nsq_i = Rsq_i / (Rsq_1 + Rsq_2 + \ldots\ldots Rsq_n), \text{ for } i=1,2,3, \ldots\ldots n.$$

Step 3: Convert the Weights of the Parameters

In this step, all the experts assign a value, between 1 to 9, to every subjective and objective parameters to indicate their relative importance. The extreme values for each criterion are again eliminated and the revised weights are normalized.

Let W_{kj} be the value assigned to criterion k from expert j. With the elimination of extreme values the revised weight for criterion k:

$$Rw_i = \begin{bmatrix} (w_{k1} + w_{k2} + w_{k3} + \ldots\ldots w_{km}) - \max(w_{k1}, w_{k2}, \ldots\ldots, w_{kn}) \\ -\min(w_{k1}, w_{k2}, \ldots\ldots w_{kn})/(m-2) \end{bmatrix}, \text{ for i=1,2,….,n.} \quad (5)$$

The normalized weight for criterion k:

$$Nw_k = Rw_k / (Rw_1 + Rw_2 + \ldots\ldots Rw_{10}) \quad (6)$$

Step 4: Calculate the Preference and Selection of the Server

Let PRE_i denote the preference for server i(i=1,2,3, . . .,n). It is the weighted average of the objective and subjective parameters, i.e.

$$PRE_i = \sum_k Nw_k * N(i)_k \quad (7)$$

Where $N(i)_k$ the normalized is value for server i with respect to criterion k.

The server with the highest preference is then selected. That is,

if server i is the best server then

$$pre_i = \max(pre_1, pre_2, pre_3 \ldots\ldots pre_n).$$

Note that this model assumes that the criteria are independent of each other. The solution using this model can involve a large number of calculations when the number of experts or attributes is large.

The critical values, performance of the server with respect to the objective parameters, and the experts' evaluation of the five subjective parameters are collected and given in Table 2 and Table 7 respectively.

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Table 8: The Experts' Evaluation of Subjective Criteria

Server			
	1	2	3
After sales service			
Expert 1	9	7	2
Expert 2	5	3	6
Expert 3	8	7	6
Expert 4	3	9	8
Expert 5	5	8	9
Brand name	30	34	31
Expert 1	9	6	5
Expert 2	7	7	8
Expert 3	3	9	5
Expert 4	3	5	3
Expert 5	9	2	9
Vendor support (Service quality)	31	29	30
Expert 1	1	7	8
Expert 2	6	7	5
Expert 3	8	7	3
Expert 4	7	9	7
Expert 5	7	8	9
Product quality	29	38	32
Expert 1	5	7	9
Expert 2	5	7	9
Expert 3	6	9	8
Expert 4	5	5	7
Expert 5	9	7	9
Training of staff	30	35	42
Expert 1	9	2	5
Expert 2	9	7	8
Expert 3	7	9	6
Expert 4	7	7	9
Expert 5	8	5	4

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Step 3: Normalization of Objective or Subjective Parameters

Using equation (2), the values of the objective parameter for each of the qualifying server are obtained as follows:

Table 9: Normalization of Objective Parameters

P	0.160541	0.395514386	0.443944719
IM	0.333333	0.5	0.166666667
SC	0.5	0.2	0.3
HD	0.333333	0.333333333	0.333333333
NC	0.5	0.3	0.2
OS	0.34375	0.3125	0.34375
MS	0.3529	0.3529	0.47058
PCI	0.352941	0.35294	0.470588
I/O	0.3333	0.3333	0.3333
Cost	0.2984	0.31539	0.3862

Normalized values for the subjective parameter for each of the servers are obtained using equations (3) and (4), and are as follows (1-9) scale:

Table 9: Normalization of Subjective Parameters

Subjective parameters of server			
Criteria SMS		IBM	HP
After sales service	0.666666667	0.588235294	0.645161
Brand name	0.591397849	0.632183908	0.611111
Vendor support (Service quality)	0.712643678	0.543859649	0.645833
Product quality	0.7	0.6	0.5
Trained staff	0.516666667	0.68888	0.645833

Note: If the extreme values were not eliminated, the values of the subjective parameter for each of the server would be:

Table 9: Without Normalization

Subjective parameters of Server			
Criteria	IBMHP***SMS***		
After sales service	0.63333	0.5588	0.6129
Brand name	0.61290323	0.65517241	0.63333333
Service quality	0.65517241	0.5	0.59375
Product quality	0.63333333	0.54285714	0.45238095
Trained staff	0.475	0.63333333	0.59375

Step 4: Obtain and Convert the Weights of the Factors

Assume the weights obtained from the ten individuals for each of the parameters are given in the following table (see Table 11).

Table 10: Subjective and Objective Ranks Obtained by the Experts

Experts	P	IM	SC	HD	NC	OS	MS	PCI	I/O	cost	PQ	ASS	SQ	TS	BL
Expert 1	9	8	9	8	9	7	5	9	5	6	8	8	9	7	5
Expert 2	8	5	4	6	6	9	8	7	5	3	8	5	7	9	2
Expert 3	6	9	8	5	8	4	7	8	6	8	7	5	6	6	9
Expert 4	7	6	8	9	7	5	6	6	7	8	5	5	7	8	9
Expert 5	5	9	8	6	9	8	9	5	9	3	8	5	9	4	6
Expert 6	4	9	7	5	8	6	9	3	8	5	4	5	3	1	4

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Expert 7	5	6	9	7	5	9	8	8	4	7	5	9	7	6	7
Expert 8	8	7	7	5	2	6	6	6	9	8	9	5	6	8	4
Expert 9	9	9	6	8	7	6	6	9	5	8	9	9	7	8	6
Expert 10	9	8	7	6	5	8	4	8	8	7	6	9	5	5	8

The weights are obtained using equation(5) and (6) and are as follows:

Table 11: Weights of Experts

Objective &Subjective Parameters	Weights
Processor	0.06959707
Internal memory	0.07570208
Storage controllers	0.07326007
Hard disks	0.06227106
Network controllers	0.06715507
Operating system	0.06715507
Memory slots	0.06715507
PCI slots	0.06959707
I/O devices	0.06471306
Cost	0.06349206
After sales service	0.06837607
Brand name	0.06227106
Service quality	0.06593407
Product quality	0.06349206
Training staff	0.05982906

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If the extreme values were not eliminated the weights would have been:

Table 12: Weights has Given without Elimination

Objective &Subjective Parameters	Weights
Processor	0.06958
Internal memory	0.075547
Storage controllers	0.072565
Hard disks	0.06461
Network controllers	0.0656
Operating system	0.06759
Memory slots	0.06759
PCI slots	0.06859
I/O devices	0.0656
Cost	0.06262
After sales service	0.05964
Brand name	0.06461
Service quality	0.06561
Product quality	0.06163
Training staff	0.06859

Step 5: Complete the Preference for the Server and Select the Server

The preference for the server when computed by using the equation (7) for the preference of server of IBM, HP and SMS by RWSM.

The value calculated of, server IBM is (0.439894), following HP (0.41835), and SMS (0.41649).

The selection of servers on the basis of calculated values, the IBM rank at the top following HP and SMS companies. Server IBM 0.42674, HP 0.40899, and SMS 0.4064.

5. CONCLUSION

Computer network helps in effective utilization of resources and, to communicate with the customer effectively. The server plays important role in network to store the data. Several manufacturers producing servers with different parameters, processor, memory, hard disks, after sales service, product quality, brand name etc. helps to evaluate and select the

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server by considering the actual worth of server of IBM, HP and SMS. In this paper a server selection procedure based on the weighted sum model and revised weighted sum model the calculated values of IBM is 5835, HP 5085, and SMS 3765 ranking IBM at top following of HP and SMS by WSM and by using the RWSDM the values of server IBM 0.4398, HP 0.41835, and SMS 0.42649 respectively and the raking of IBM at first rank followed by HP and SMS companies. Without eliminating the experts' ranks minimum and maximum the ranks of the server companies IBM 0.42674, HP 0.40899 and SMS 0.4064 respectively.

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