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Implementation of Value engineering concept using Artificial Neural Network with the aid of Hybrid Model (ABC & PSO)

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Abstract - Recent years many countries to launch the eco friendly nature in house, companies etc. In demand of electrical energy, low consumption power system to be utilized for providing the both heating and cooling operation. Some of the companies and organizations are utilizing the centralized air conditioner for providing the both operation but this system may be operating at high electrical power. So researchers are planning to tell how to use the air conditioner and in future what type of air conditioner to use for home and official purpose. In this paper presents Value engineering technique. Here optimization model is value engineering using Artificial Neural Network (ANN) with aid of Hybrid model of Artificial Bee colony (ABC) and Particle Swarm Optimization (PSO). Some of easily available source to be utilized for provides the both operation. In this process is to finding the wherever majority of sources available, that source corresponding scheme is selected with the low operational cost and energy consumption. This also implies that privileges of policy for renewable energy utilization system are necessary to help promote the energy saving and environment friendly scheme of majority of sources. The experimental shows that the optimization of value engineering in providing variable room temperature is good when compared to the previous techniques.

Key words: ***Value engineering, Artificial Neural Network, function parameter, Expenditure cost, Artificial Bee Colony (ABC), Particle Swarm Optimization (PSO)***

1. Introduction

Worth Engineering is a capacity situated orderly utilization of perceived procedures which recognize the capacity of the item or administration, make a monitory quality for that capacity and give the important capacity dependability at the least general expense [1]. Quality designing is an alternate named in "Worth administration" and "Worth control". As a rule quality building is connected to any item handle method framework or administration in any sort of business or monetary movement including human services, administration, development, industry and in the administration

area. Especially included expense does not enhance quality or the capacity to perform the fundamental capacities, then esteem is diminished. [2].

The worth designing procedure comprises of a few stages, including the data stage, capacity investigation stage, inventiveness stage, assessment stage, presentation stage and usage stage. Imagination relies on upon the human cerebrum and can't be electronic effortlessly by ordinary Programming [3] [4]. In the stage of the capacity Evaluation, one of the most noteworthy stages of the VE work arrangement, either without a doubt the assessment by sum of cash or the relative assessment by rating will be utilized, to assess the capacity of things and to focus the need of change in the worth [5].It has turned into a standard practice for some administration organizations and private designing firms and foremen since its first reception in the 1950s [6]. It is connected in development industry from 1960s Value designing studies on various offices were completed, and more valuable VE proposition (VEPs) were created and connected. VEPs allude to the exceptionally refined specialists' information, including the innovative and inventive thoughts delivered by specialists from a wide mixed bag of fields [7].

The worth investigation procedure was therefore brought into development by the US Navy and the Army Corps of Engineers around 1963 through the reception of motivating force procurements and imparting conditions in development contracts [8].Value designing is to enhance the execution yields and Inputs, by having a theoretical way to esteem building studies alongside undertaking administration, venture examination, esteem examination, and quality administration [9].The practical advancement of every last one of sources, improvement that satisfies the needs of the present era without trading off the capacity without bounds era to address their own particular issues, paying little heed to setting points on the grounds that the continuation of the improvement is the most vital aim[10].

With the developing increment in rivalry, in the latest decades, organizations tried to make higher esteem in their items for clients. Japanese organizations, in the same way as Toyota, succeeded in doing as such, with results of higher quality at a lower expense [11]. The VE application was just a choice of the undertaking administration. There was not the engagement of the Company Management. Albeit a hefty portion of these applications were effective and the Company had great investment funds in this ventures [12]. The use of Value Engineering (VE) in the development business has been seen in various nations as far and wide as possible, and is perceived as a standout amongst the best procedures for attaining to 'best-value-for-money'. [13].

A capable assignment of the obliged assets is in this manner key and the expense proficiency needs to be upgraded. The "Quality" of a plant can be characterized as the solid execution of "capacities" to address client issues at the least general "expenses". [14]. It is fundamentally utilized for sparing time, sparing cash, assemble collaboration and fulfill client. It is help to learn enhance your profession abilities and to get learning for contrasting the methodology between associations with different associations. Its last result is enhancing quality alongside dispensing with superfluous expense and without harms the key capacities and expanding productivity.

II. Contribution of This Work

- ✓ To reduce the operation time based on the available energy sources and corresponding function parameters.
- ✓ To increase both operations function parameters efficiency.

III. Literature review for previous works

In 2012, Li Ma et al. [15] have proposed a multi-target molecule swarm analyzer (MOPSO) with a changed gathering variable and upgraded neighbourhood seek capacity. The proposed

parameter-less imparting technique was acquainted with appraisal the thickness of particles' neighbourhood in the pursuit space. At first, in the system decides the gathering component of the arrangements; in later stages, it adequately manages the whole swarm to merge nearly to the genuine Pareto front. Moreover, the angle plunge look strategy was connected. The calculation's execution on two designing outline issues was highlighted and contrasted and different methodologies. The acquired results exhibit that the calculation was equipped for adequately looking along the Pareto ideal front and effectively getting exchange off answers for the designing configuration issues.

In 2009, Sakhawat Hossen et al. [16] have introduced a transformative advancement model taking into account the molecule swarm enhancement calculation that joins the running conduct of an arachnid. The pursuit space was partitioned into a few portions like the net of a bug. The social data offering among the swarms are made solid and versatile. The principle centre was wellness of the swarms changing in accordance with the learning variables of the PSO. The customary molecule swarm improvement calculations focalizes quickly amid the beginning phase of a pursuit, however in course of time gets to be relentless impressively and could get caught in al neighbourhood optima. Then again in the model the swarm was given the knowledge of an arachnid which empowers them to evade untimely union furthermore help them to escape from nearby optima. In the methodologies had been accept utilizing a progression of benchmark test capacities with high measurements.

In 2012, Houshang Taghizadeh et al. [17] have proposed an association were in dynamic environment and consistently was defying with expanding changes. So their directors with impression of world condition have no option aside from setting up the different devices of advancement to forerun the worldwide rivalry. A standout amongst the hugest apparatuses was worth designing. In the proposed paper the hierarchical variables influencing the execution of worth designing was concentrated on. The number of inhabitants in the study incorporates all official directors of Tabriz producing who go to the MBA course. The t-test had used to research the variables influencing the usage of worth designing. The outcomes demonstrates that administration help, assets accessibility, authoritative technique, hierarchical structure, correspondence and data innovation, and authoritative society have beneficial outcome on usage of quality designing.

In 2012, Alrijadjis Djoewahir et al. [18] have proposed the ultrasonic engine (USM) system used the quality building. In the procedure displays non-linearity that relates the info and yield. It likewise causes genuine trademark changes amid operation. PID controller had been broadly utilized as the control plan for USM. In the paper propose a changed PSO with nonlinear diminishing idleness weight (PSO-NDW) for ideal self tuning of PID controller in situating control of USM. A changed PSO utilizes the technique that nonlinearly diminishes the estimation of dormancy weight from a vast worth to a little esteem. In the system was to enhance the execution of the standard PSO calculation in worldwide hunt and calibrating of the arrangements. The execution of PSO-NDW based PID controller had been assessed on the USM servo framework. The outcomes show that the proposed adjusted PSO could be enhancing the precision of USM.

In 2008, Ling Wang et al. [19] have proposed a novel likelihood paired molecule swarm improvement (PBPSO) calculation for discrete twofold advancement issues. In PBPSO, a novel upgrading system was received to upgrade the swarm and inquiry the worldwide arrangement, which further streamline the reckonings and enhance the streamlining capacity. To explore the execution of the proposed PBPSO, the multidimensional rucksack issues were utilized as the test benchmarks. The test results show that PBPSO have a superior execution for taking care of the multidimensional backpack issue as far as joined rate and worldwide pursuit capacity.

In 2011, Marwan Al-Nsour et al. [20] have exhibited the waste administration have gotten to be progressively well known investment. In the paper, the machine of worth building in Great Amman Municipality was examined by utilizing the Travelling sales representative module. The harmony programming used for taking care of the issue and An AutoCAD guide was given to highlight the junk accumulation holders and all conceivable courses to these areas. A numerical model

was created to indicate how the genuine accumulation was being done; at long last, the ideal arrangement was assessed by every directing improvement calculation.

In 2012, Tamer M. Khalil et al. [21] have proposed the Particle Swarm Optimization (PSO) for tackling nonlinear advancement issues had increased expanding consideration lately. The system for Particle Swarm Optimization was presented in 1995, and then it adjusted to pursuit in paired space in 1997. Designing advancement undertakings regularly oblige improvement techniques equipped for select the estimations of the state variables from a set of accessible qualities (standard qualities). In the paper demonstrates that a straightforward adjustment to the twofold PSO to look in a chose space (specific PSO). In the technique connected to a capacitor arrangement issue to choose the ideal capacitor sizes from a set of accessible sizes.

In 2012, Habeeb Adekunle Quadri [22] have proposed the strategy of worth building (VE) – additionally alluded to as Value Management (VM) and Value Analysis (VA) – as an inventive choice making device in the venture administration office (PMO). The Wall Street crash in the 1930s prompted the rise of corporate administration in a urgent offer to contain organization issues. In the method have reverberate with the progressing worldwide monetary subsidence given the observing and training cost (boost) emerging from the same office issue. The current financial allotment requires outstanding deliberate designing way to choice making to advance authoritative rare assets and relieve inexorable dangers. Going forward, the learning administration process that associations utilized to attain to current industry situating, might not get them where they have to be to stay aggressive in the new and level worldwide business.

In 2012, M.A. Youssef et al. [23] have portrayed as General Authority for Educational Buildings (GAEB) in Egypt was in charge of new development and upkeep of the instructive building. Hence, GAEB ought to apply advancement procedures to spare cost and upgrade the profit from the accessible plan with the same quality level or more. Here to apply esteem building strategy on instructive building to amplify the use of the accessible development and support plan. The paper proposed that GAEB ought to develop a worth building division included in association structure. At long last it makes general inferences about the utilization of worth designing (VE) in the GAEB in Egypt. Additionally, to get the ideal set of exercises, options for expense sparing and amplify the usage of the accessible stores for new development and support meets expectations.

In 2008, F. Jariri et al. [24] have proposed the need to join three well known configuration cost administration routines, called: Quality Function Deployment (QFD), Value Engineering (VE) and Target Costing (TC) into a solitary model had been tended to. Every technique performs extremely well in expense administration methodology as configuration exercises. These strategies have been joined into a scientific programming model, keeping in mind the end goal to accomplish the most extreme advantage of every strategy. The model, basically, advances consumer loyalty subject to target cost. The device was blended whole number zero-one nonlinear programming. The expert ought to be sure that the quality arrangement would be accomplished rather than when the strategies are connected successively. A straightforward vehicles outline case was figured and comprehended to demonstrate the execution of the model.

In 2012, Amit Sharma et al. [25] have introduced the essentials of Value Engineering and diverse stages that could be executed to an item for that streamlining. Quality Engineering could be enhancing the item taken a toll by lessening the superfluous expenses connected with the item. It investigates every piece of the Value designing employment arrangement for the fruitful utilization of the system. In the paper had been examined and an examination had completed by the procedure to accomplish the item improvement. Different instruments were used for the investigation of the item while assessing the item at diverse stages.

IV. Preliminaries

4.1. Artificial Neural Network

Artificial Neural Networks are non-direct mapping device taking into account the capacity of the human mind. It is comprised of numerous fake neurons and every information has the own weight connected with it. A fake neuron is a gadget has numerous inputs and one yield. The neuron has two modes of operation; the preparation mode and the testing mode. In the preparation mode, the neuron can be prepared to flame (or not), for specific info designs. In the testing mode, when a prepared data example is recognized at the information, its related yield turns into the current yield. The accessible wellsprings of the India environment say beneath, [25], [26]

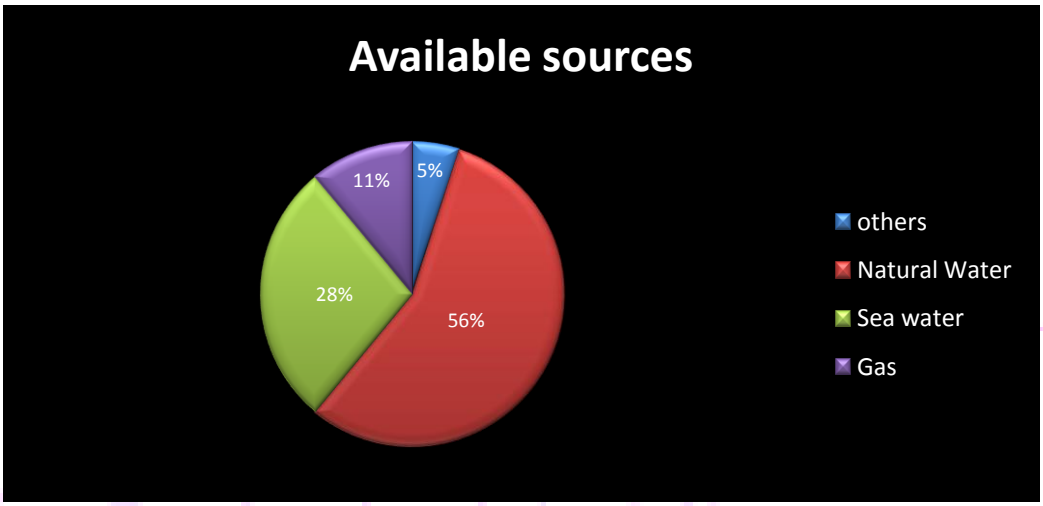


Fig: Chart for available sources in India

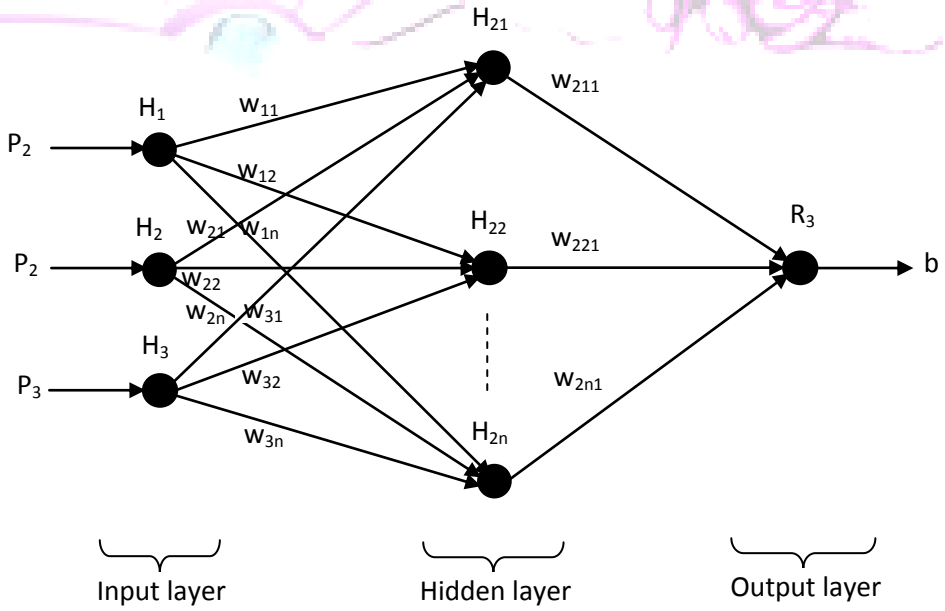


Fig: Artificial Neural Network

So here we need to use the numerous data one yield model ANN. The inputs are natural source, Area size and burden (warming and cooling) connected to ANN, the yield of the framework is burden relating expense. In ANN framework, we need to give all the qualities to be anticipated. The operation of this method both cooling and warming condition in different room temperatures. In cooling condition, introduce the calculation parameters like Data division, Training, Performance and subordinate are irregular, Levenberg-Marquardt, mean squared blunder and default. At that point to set all the parameters like time, angle quality, Mu and acceptance checks. All the setup to complete, then click on the methodology execution. It will give the best approval execution diagram. In this same thing happen on warming and plan determination conditions too. Along these lines, in this both condition acceptance execution chart demonstrates that preparation and testing conditions are closes to best execution values. Let to give the anticipated qualities may be give the better result to esteem building ideas. In Scheme choice segment likewise gives the great aftereffect of different room temperatures with the capacity parameters and building zone. The last set of result to be nourished to the cross breed model improvement.

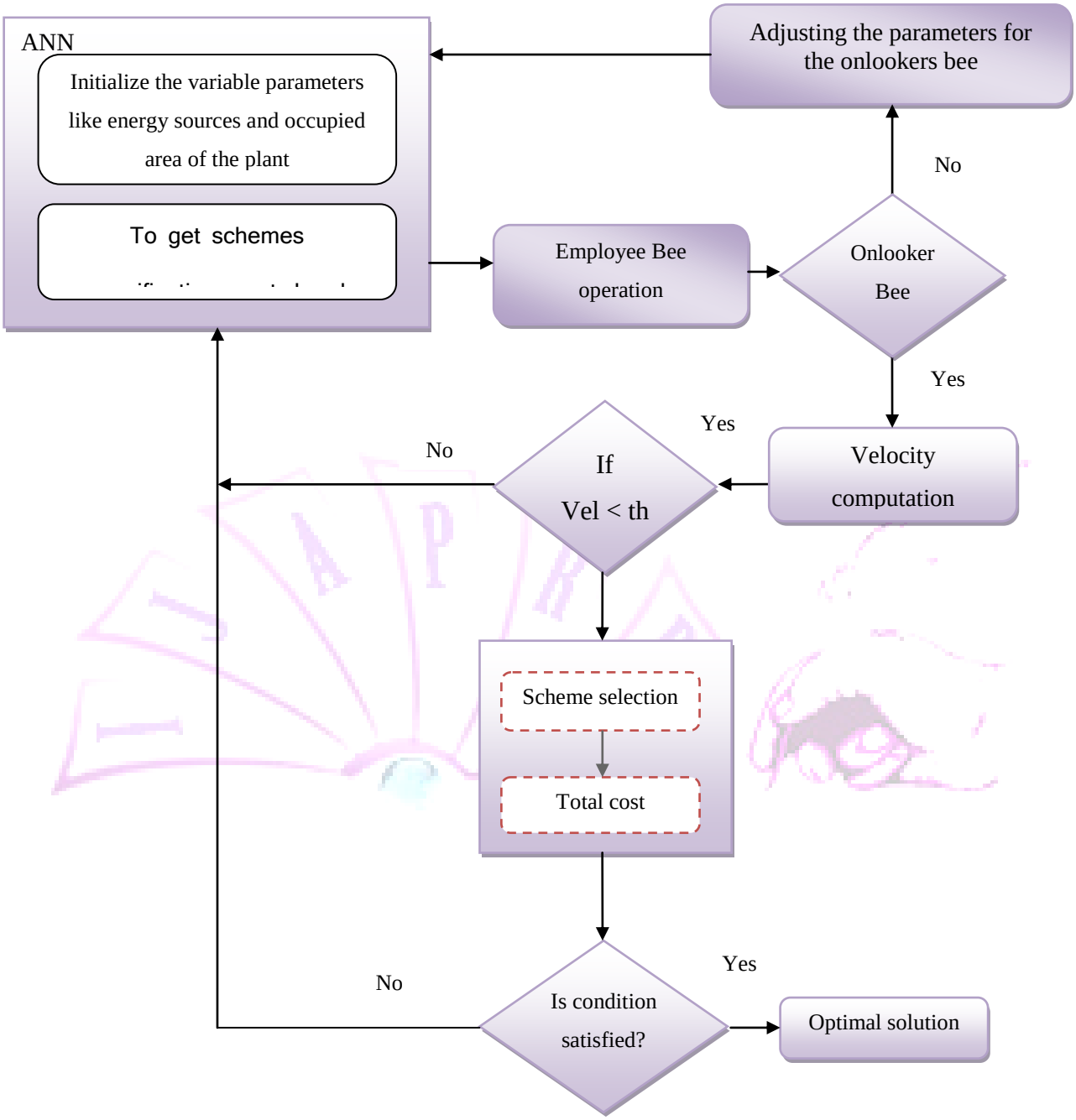
4.2. Artificial bee colony algorithm

As a sort of social bugs, honey bees are experiencing the settlements and creating the numerous peculiarities. In these peculiarities are honey bee scrounging, honey bee move, ruler honey bee, assignment choice, aggregate choice making, home site determination, mating, and pheromone and route frameworks. In the ABC calculation comprises of utilize honey bee, spectator honey bee and scout honey bee. This model was presented by Dervis Karaboga in 2005, and is in view of examine practices of genuine honey bees on discovering nectar sums and offering the data of sustenance sources to alternate honey bees in the hive. Utilize honey bee is to seeking the nourishment position encompassing spot. A honey bee tend to the moving region to acquire the sustenance sources from the utilize honey bee, which is speaks to as passerby honey bee. A honey bee, which is haphazardly seeking the sustenance sources it is spoken to as spectator honey bee. Every sustenance source has one utilize honey bee. In this way, the quantity of utilize honey bee is equivalent to the quantity of sustenance sources. On the off chance that until condition fulfilled or most extreme cycle happened just giving the target arrangements. Every utilize honey bee is never forgetting the past nourishment position that data is going to passerby honey bee. In passerby honey bee, discovering the likelihood for sustenance position in light of nectar sum. In the event that the utilize honey bees are discovering the new position, and then disregarded past position. Consequently, Artificial Bee Colony Algorithm framework consolidates neighbourhood look techniques, did by utilized and spectator honey bees, with worldwide pursuit strategies, oversaw by spectators and scouts, endeavouring to adjust investigation and misuse process.

4.3. Particle swarm optimization

Particle swarm optimization (PSO) strategy was initially composed and presented by Eberhart and Kennedy in 1995. PSO is a populace built pursuit calculation situated in light of the recreation of the social conduct of winged animals, honey bees or a school of fishes. It is may be utilized to discover the ideal answers for numerical and subjective issues. Inside the swarm every individual is spoken to by a vector in multidimensional hunt space. This vector has the one allocated quality which is decides the following development of the molecule, this procedure is called speed vector. One illustration is gathering of fledglings are moving towards the sustenance hotspots for living. This calculation additionally decides how to upgrade the speed of a molecule. Every molecule overhauls its speed taking into account current speed and the best position it has investigated in this way; furthermore in light of the worldwide best position investigated by swarm.

V. Optimization of proposed technique



At first we need to gather all the satisfactory data about the whole structures. After that to be examined all the necessities like what measure of temperature specifically range and how much power burden to be given to the used framework. In this ANN, all variable inputs are connected. The yield is before going to the yield side we need to set target esteem and discovering lapse esteem. In yield side we need to take all the plans determination comparing capacity variable, aggregate expense and sufficient cooling and warming heap of the coveted zone of the structures. In this all the yields are sustained to the Hybrid model improvement.

In crossover model, at first all the inputs are connected to ABC. This operation gives some sum yield, which is applying to PSO streamlining procedure. It is for discovering precise cost and plans. In PSO, Scheme choice and Total expense of the ordinary plants are under the speed processing operation. In plan determination is principally in light of the weight estimation of the distinctive capacity component. In capacity elements are: the possessed region of gear plant (F1), framework movability (F2), viability of framework control (F3), security and assurance execution (F4), plant commotion level (F5), supplies administration life (F6), gear disappointment rate (F7), vitality sparing property (F8), environment insurance execution (F9) and benefits of approach (F10). Taking into account show of the methodology we need to put the score (degree) for every capacity elements. The relative level of significance that one capacity component is against an alternate is spoken to by 1, 3, 5, 7 and 9, which can be translated as similarly critical, marginally vital, clearly essential, emphatically imperative and totally essential individually. So 2, 4, 6 and 8 are the medium estimations of every neighbouring pair of above odd numbers separately. For this situation the greatest trademark base of the last judgment network (λ_max) is 10.571, the consistency record (CI) is 0.0634 and the irregular list (RI) is 1.49, therefore the consistency proportion (CR) is 0.0426 (<0.1). So the network has acceptable consistency. The aggregate expense is contains the first cost, framework working expense and framework support cost. This expense of the framework is variable because of region of the framework and comparing Loading element. On the off chance that the upgrade arrangement is fulfilled for all environments that is the yield of our proposed strategy.

5.1. Objective Function

$$A_y = \sum \left(O_x . M_{xy} \right) \quad \text{- (1)}$$

$$R_y = Fun_{th} \left(A_y + t_y \right) \quad \text{- (2)}$$

$$M_{xy} = M_{xy}^{*} + SR.e_y.A_y \quad \text{- (3)}$$

$$e_y = R_y.(1 - R_y)(d_y - R_y) \quad \text{- (4)}$$

$$e_y = R_y \left(1 - R_y \right). \sum \left(e_x . M_{yz} \right) \quad \text{- (5)}$$

$$M_{xy} = M_{xy}^{*} + (1 - C).SR.e_y.O_y + C\left(M_{xy}^{*} - M_{xy}^{**} \right) \quad \text{- (6)}$$

$$V_x = \frac{F_x}{C_x} \quad \text{- (7)}$$

$$f_x = \sum_{y=1}^{v} O_y A_{xy} \qquad (x = 1,2,...., u) \quad \text{- (8)}$$

$$F_x = \frac{f_x}{\sum f_x} \quad \text{- (9)}$$

$$T_C = E_X + P \times DF_{sum} + C \times DF_{sum} - A \times DF \quad \text{- (10)}$$

$$DF_{sum} = \frac{(1+dr)^T - 1}{dr \times (1+dr)^T}$$

$$DF = \frac{1}{(1+dr)^T}$$

$$DF = \frac{1}{(1+dr)^T}$$

$$EUAC = T_C \times RF \quad \text{- (11)}$$

$$RF = \frac{dr \times (1+dr)^T}{(1+dr)^T - 1}$$

$$E_x = \frac{EUAC}{\sum EUAC_x} \quad \text{- (12)}$$

System operating cost

$$\mu_{E.R} = \vartheta_C / \vartheta_R \quad \text{- (13)}$$

$$\mu_{E.B} = \vartheta_h / \vartheta_B \quad \text{- (14)}$$

$$\phi_R = \frac{\vartheta_C}{\vartheta_R T_R} \quad \text{- (15)}$$

$$\phi_B = \frac{\vartheta_h}{\vartheta_B T_B} \quad \text{- (16)}$$

$$\phi_R = \vartheta_{E.R} / T_R \quad \text{- (17)}$$

$$\phi_B = \vartheta_{E.B} / T_B \quad \text{- (18)}$$

$$D_R = \left(\sum D_{R.N}\right) T_R \phi_R = \left(\sum D_{R.N}\right) \mu_{E.R} \quad \text{- (19)}$$

$$D_P = \left(\sum D_{I.N}\right) T_R \left(\phi_R + \frac{1-\phi_R}{v_p}\right) \quad \text{- (20)}$$

$$D_{CT} = \left(\sum D_{CT.N}\right) T_R \left(\phi_R + \frac{1-\phi_R}{v_{CT}}\right) \quad \text{- (21)}$$

$$D_B = \left(\sum D_{BN}\right) T_B \left(\phi_B + \frac{1-\phi_B}{v}\right) \quad \text{- (22)}$$

$$H_{fB} = \left(\sum H_{fB.N}\right) T_B \left(\phi_B + \frac{1-\phi_B}{v}\right) \quad \text{- (23)}$$

$$H_S = \left(H_{S.N}\right) \mu_{E.B} / 1000 \quad \text{- (24)}$$

$$H_{M.CT} = 0.02 \zeta_{CT.N} T_R v_{CT} \left(\phi_R + \frac{1-\phi_R}{v_{CT}}\right) \quad \text{- (25)}$$

System maintenance cost

$$I_d = E_x f \quad \text{- (26)}$$

$$f = \left(1-r\right)/T \quad \text{- (27)}$$

Where

x , y - each of inputs and layers respectively

O_x - x^{th} input of network

M_{xy} - established weight

A_y - Internal value of the operation

t_y - established threshold value

R_y - Resulting output

Fun_{th} - Activation function

q_C -annual cooling load (kJ/a)

q_R -maximum cooling output of the chillers (kJ/h)

q_h -annual heating load (kJ/a)

q_B -maximum heating output of the boilers (kJ/h)

ϕ_R -cooling load factor

T_R -annual accumulated cooling hours (h)

ϕ_B -heating load factor

T_B -annual accumulated heating hours (h)

D_R -annual electricity consumption of chillers/heat pumps (kWh)

$D_{R.N}$ -rated electric power of chillers/heat pumps (kW)

D_P -annual electricity consumption of condensing water pumps (kWh)

$D_{I.N}$ -rated electric power of condensing water pumps (kW)

v_p -number of condensing water pumps

D_{CT} -annual electricity consumption of cooling towers (kWh)

$D_{CT.N}$ -rated electric power of cooling towers (kW)

v_{CT} -numbers of cooling towers

D_B -annual electricity consumption of auxiliary facilities for boilers or LiBr absorption chillers/heat pumps (kWh)

$D_{B.N}$ -rated electric power of auxiliary facilities for boilers or LiBr absorption chillers/heat pumps (kWh)

v - Number of boilers or direct fired LiBr absorption heat pumps.

H_{fB} -annual natural gas consumption of boilers or direct-fired LiBr absorption heat pumps (m^3/h)

$H_{fB.N}$ -rated natural gas flow rate of boiler or direct-fired LiBr absorption heat pumps (m^3/h)

H_S -annual consumption of pressurized steam (t/h)

$H_{S.N}$ -rated flow rate of pressurized steam (t/h)

$H_{M.CT}$ -annual water consumption of cooling towers (m^3/a)

$\zeta_{CT.N}$ -rated water flow rate of cooling towers (m^3/h)

I_d -annual depreciation cost

r -residual rate

VI. Experimental results and discussion

This area was examined about the consequences of our proposed system for most extreme use of the vitality sources with low speculation contrasted and the current strategy. In this framework additionally focussing on the Building size, accessible sources and satisfactory cooling and warming heap of the whole building. Exploratory results underneath specified,

Table 1

Sources	Inputs			Existing technique				Proposed technique	
	Building area	Cooling load	Heating load	DCH system		ANN + GA		ANN+(ABC&PSO)	
				Cooling cost	Heating cost	Cooling cost	Heating cost	Cooling cost	Heating cost
0.56	20	105	150	24.26	29.93	24.26	29.93	22.6546	27.0125
	120	115	70			24.39	29.86	22.4584	27.1256
	96	127	78			24.123	29.658	22.5012	27.164
	90	100	55			23.998	30.154	22.016	27.3541
0.28	20	105	150	39.3	16.85	39.3	16.85	37.845	14.3546
	120	115	70			39.86	16.458	37.559	14.5456
	96	127	78			39.758	16.584	37.0145	14.9884
	90	100	55			39.025	16.845	37.245	14.7546
0.11	20	105	150	44.24	12.83	44.24	12.83	41.9984	10.7845
	120	115	70			44.19	12.99	41.7854	10.9845
	96	127	78			44.39	12.69	41.5461	10.5654
	90	100	55			44.02	12.7	41.8845	10.6542
0.05	20	105	150	58.2	17.85	58.2	17.85	56.0125	15.9846
	120	115	70			58.37	17.6	56.125	15.846
	96	127	78			58.02	17.73	56.3542	15.4757
	90	100	55			58.12	17.86	56.1565	15.8745

Table 1: optimization cost of existing and proposed technique in desired area of the building

Table 2

Sources	Proposed technique									
	if building area decrease					if building area increase				
	Building area	Cooling load	Heating load	Cooling cost	Heating cost	Building area	Cooling load	Heating load	Cooling cost	Heating cost
0.56	19	99.75	142.75	21.0143	26.4563	21	110.25	157.5	24.35465	28.98745
	119	114.002	69.416627	21.1459	26.3545	121	115.958329	70.583329	24.31546	28.98466
	95	125.6770824	77.1875	21.1546	26.0125	97	128.322917	78.8125	24.3021	28.9654
	89	98.888879	54.388879	20.999	26.145	91	101.11101	55.611101	24.31899	28.98012
0.28	19	99.75	142.75	36.0124	12.9585	21	110.25	157.5	39.0124	16.154
	119	114.002	69.416627	36.00025	12.9845	121	115.958329	70.583329	39.154	16.01254
	95	125.6770824	77.1875	35.9875	12.7546	97	128.322917	78.8125	39.1984	16.1894
	89	98.888879	54.388879	35.9542	12.8032	91	101.11101	55.611101	3930644	16.2546
0.11	19	99.75	142.75	40.13	9.0002	21	110.25	157.5	43.564	11.985
	119	114.002	69.416627	40.49	9.187	121	115.958329	70.583329	43.684	11.923
	95	125.6770824	77.1875	40.03	9.0241	97	128.322917	78.8125	43.6314	11.903
	89	98.888879	54.388879	40.35	9.2453	91	101.11101	55.611101	43.623	11.923
0.05	19	99.75	142.75	54.96	14.355	21	110.25	157.5	57.8546	17.021
	119	114.002	69.416627	55	15.248	121	115.958329	70.583329	57.7565	17.158
	95	125.6770824	77.1875	54.97	14.012	97	128.322917	78.8125	57.8265	17.12
	89	98.888879	54.388879	54.98	14.187	91	101.11101	55.611101	57.8456	17.102

Table 2: Proposed technique performance of variable area of the building

Cooling performance

Table 2:

Source	Building area	Cooling load	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	Scheme selection	Cooling cost
0.56	19	99.75	9	8	8	10	8	9	8	9	10	10	8.7722	21.0143
			10	7	5	10	5	10	5	7	10	10	5.553	21.0189
			8	6	6	10	6	5	6	6	10	10	4.7005	21.354
			5	5	10	10	10	8	7	5	10	10	7.4606	21.1245
			6	9	9	10	7	6	9	8	10	10	9.1754	21.189
			7	10	7	10	6	7	10	10	10	10	8.9976	20.989

(a)

Source	Building area	Cooling load	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	Scheme selection	Cooling cost
0.28	19	99.75	9	8	8	10	8	9	8	9	10	10	8.7722	36.0124
			10	7	5	10	5	10	5	7	10	10	5.553	36.15456
			8	6	6	10	6	5	6	6	10	10	4.7005	36.0985
			5	5	10	10	10	8	7	5	10	10	7.4606	36.121
			6	9	9	10	7	6	9	8	10	10	9.1754	36.0125
			7	10	7	10	6	7	10	10	10	10	8.9976	36.09321

(b)

Source	Building area	Cooling load	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	Scheme selection	Cooling cost
0.11	19	99.75	9	8	8	10	8	9	8	9	10	10	8.7722	40.19
			10	7	5	10	5	10	5	7	10	10	5.553	40.135
			8	6	6	10	6	5	6	6	10	10	4.7005	40.0985
			5	5	10	10	10	8	7	5	10	10	7.4606	40.157
			6	9	9	10	7	6	9	8	10	10	9.1754	40.128
			7	10	7	10	6	7	10	10	10	10	8.9976	40.115

(c)

Source	Building area	Cooling load	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	Scheme selection	Cooling cost
0.05	19	99.75	9	8	8	10	8	9	8	9	10	10	8.7722	54.96
			10	7	5	10	5	10	5	7	10	10	5.553	54.25
			8	6	6	10	6	5	6	6	10	10	4.7005	54.624
			5	5	10	10	10	8	7	5	10	10	7.4606	54.369
			6	9	9	10	7	6	9	8	10	10	9.1754	54.289
			7	10	7	10	6	7	10	10	10	10	8.9976	54.756

Table 2: shows that cooling performance of a, b, c and d are Natural water, sea water, natural gas and others respectively

Heating performance

Table 3:

Source	Building area	Heating load	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	Scheme selection	Heating cost
0.56	19	142.75	9	8	8	10	8	9	8	9	10	10	8.7722	26.4563
			10	7	5	10	5	10	5	7	10	10	5.553	26.4265
			8	6	6	10	6	5	6	6	10	10	4.7005	26.46859
			5	5	10	10	10	8	7	5	10	10	7.4606	26.442
			6	9	9	10	7	6	9	8	10	10	9.1754	26.4498
			7	10	7	10	6	7	10	10	10	10	8.9976	26.4665

(a)

Source	Building area	Heating load	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	Scheme selection	Heating cost
0.28	19	142.75	9	8	8	10	8	9	8	9	10	10	8.7722	12.9585
			10	7	5	10	5	10	5	7	10	10	5.553	12.9425
			8	6	6	10	6	5	6	6	10	10	4.7005	12.9524
			5	5	10	10	10	8	7	5	10	10	7.4606	12.9515
			6	9	9	10	7	6	9	8	10	10	9.1754	12.9536
			7	10	7	10	6	7	10	10	10	10	8.9976	12.95462

(b)

Source	Building area	Heating load	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	Scheme selection	Heating cost
0.11	19	142.75	9	8	8	10	8	9	8	9	10	10	8.7722	9.0002
			10	7	5	10	5	10	5	7	10	10	5.553	8.995465
			8	6	6	10	6	5	6	6	10	10	4.7005	8.9875
			5	5	10	10	10	8	7	5	10	10	7.4606	9.142
			6	9	9	10	7	6	9	8	10	10	9.1754	9.0154
			7	10	7	10	6	7	10	10	10	10	8.9976	9.087

(c)

Source	Building area	Heating load	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	Scheme selection	Heating cost
0.05	19	142.75	9	8	8	10	8	9	8	9	10	10	8.7722	14.355
			10	7	5	10	5	10	5	7	10	10	5.553	14.322
			8	6	6	10	6	5	6	6	10	10	4.7005	14.288
			5	5	10	10	10	8	7	5	10	10	7.4606	14.235
			6	9	9	10	7	6	9	8	10	10	9.1754	14.0215
			7	10	7	10	6	7	10	10	10	10	8.9976	14.198

(d)

Table 3: shows that Heating performance of a, b, c and d are Natural water, sea water, natural gas and others respectively

In aforementioned arrangement demonstrates that discovering the advanced plan to propelling the suitable area by using the capacity parameters and diverse sources. Here building zone and burden are variable for both operations like warming and cooling operation. Capacity parameter having the appraisals up to 10 because of the encompassing circumstance. Amid the plan determination, principally considered the capacity parameters of every plan. Plan determination additionally transforming, it is relies on upon the source, territory and capacity parameters. Every plan having the a few reaches up to 10. In this model we separate into the four plans. The underneath specified chart demonstrates to that the generally accepted methods to changing over plan determination and corresponding cost due to changing function parameters, and load of the separate operation.

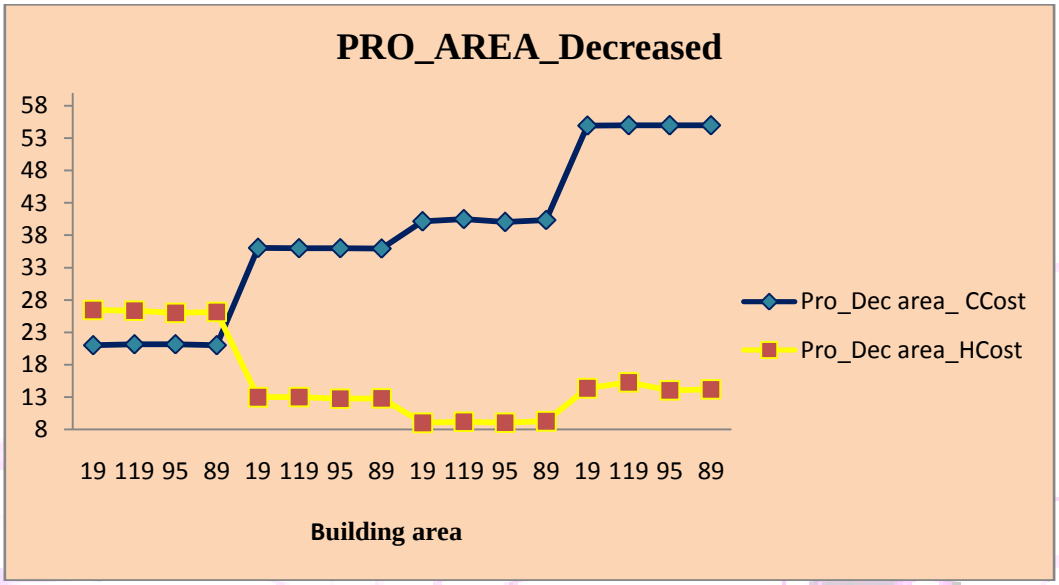


Fig: Proposed technique performance of reduced the area of the building

In the aforementioned chart demonstrates that proposed system execution of the decreased territory of the building size. X-hub alludes to the range of the building and Y-hub alludes to the expense to the both operation.

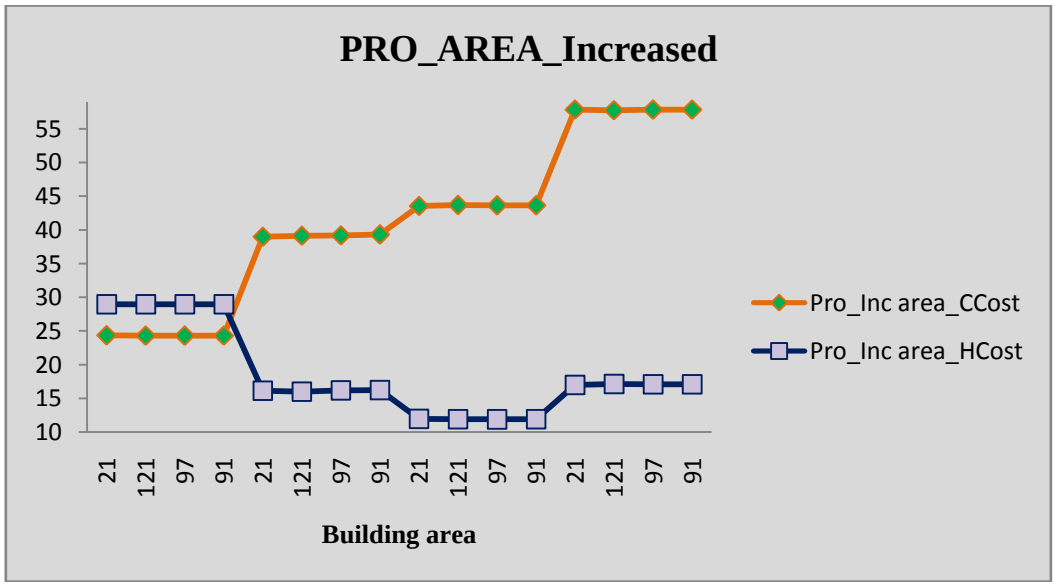


Fig: Proposed technique performance of the increasing area of the building

This diagram demonstrates that the proposed method execution of the expanding zone of the building size. X-pivot alludes to the region of the building and Y-hub alludes to the expense of both operations. Here we realized that the both operations expense expanded or diminished, that condition was relies on upon the accessible sources and territory of the building.

Cost analysis

In this segment specified that the expense examination of the proposed method contrasted and existing strategies.

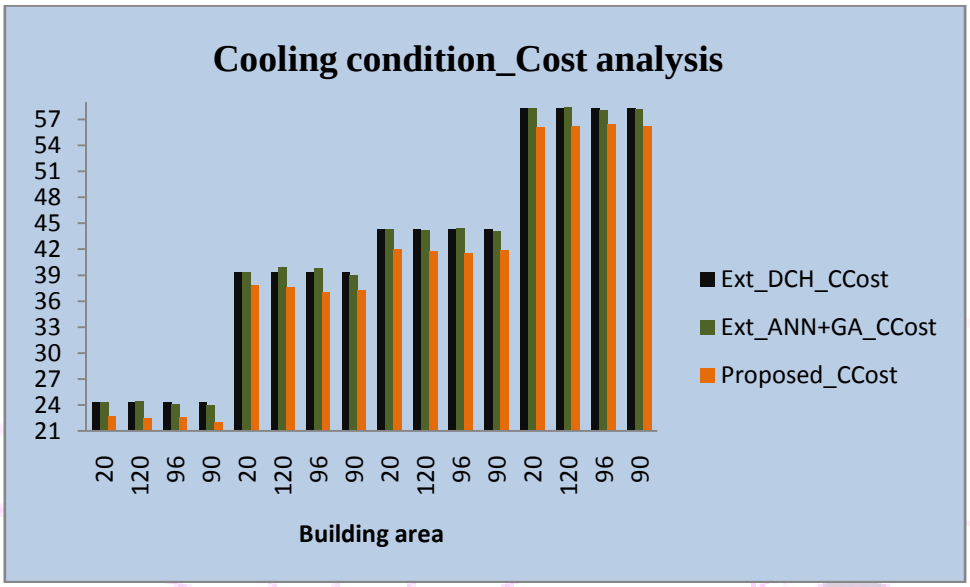


Fig: Cooling cost analysis_ comparison between the existing and proposed technique

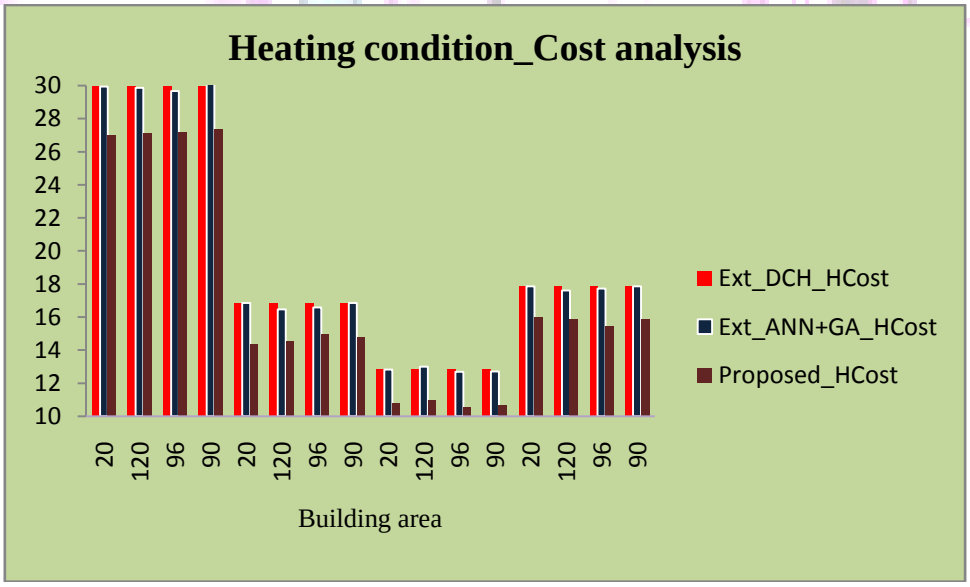


Fig: Heating Cost analysis_ comparison between existing and proposed technique

This proposed method essentially in view of the territory of the building and accessible sources. In the event that the expense of both operations is lessen among the current two systems. So in this framework is effectiveness is high for real utilization of accessible sources.

VII. Conclusion

Existing techniques provides desired room temperature by utilizing the available sources on particular location. This technique provides better result for plant total cost and selecting appropriate schemes. Our proposed techniques utilized the optimized source for the desired location. The ultimate air of this proposed technique is to reduce operation time and increasing the functioning factor efficiency. In order to achieve this process we have to judge the entire function factor for selecting the major utilized scheme to be launched. Our proposed techniques show efficient results, when compare to that of our previous work and existing paper experimental result.

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