Industrial Engineering Letters
ISSN 2224-6096 (Paper) ISSN 2225-0581 (online)
Vol.5, No.2, 2015

Optimum Utilization of Resources by using Transportation Technique

Rajeev Saxena[1*] Neelu Tiwari[2]
1.ResearchScholar,Mewar University ,Chittorgarh,India
2. Jaipuria Institute Of Management,Ghaziabad—201012 ,India
*E-mail of the corresponding author: rksaxena99@yahoo.co.in

Abstract
This Paper deals with a study of national Games . When Games were held in India. Asian and Asian Games records were broken. It was the first National Game which was held under the Olympic Council of Asia. So Many athletes from 33 National Olympic Committees participated in this games, competing in 196 events in 21 sports and 23 disciplines.For smooth running of Games police force had been called for from the various central police bodies like CRPF ,BSF,ITBP and different states like Haryana ,Himachal Pradesh ,Uttar Pradesh ,Orissa and Gujrat .Besides this there were 10 battalions of Delhi Police available for disposition. These police force(outside and the local) had been placed at several places in the Union Region ofDelhi. The cost of transportation could be reduced by using Transportation problem .The analysis provide useful insight for the practising managers .The result of the model used in this case
Study or generalized as learning lessons for managers.
Keywords:– Transportation Problem, National Games.

Introduction

Network is a play-for-real gaming platform which offers the best and most popular Asian Games such as Mahjong – both Mass and Sichuan versions, and Dou Di Zhu. All games are offered in cash tables, tournaments and private table capabilities. After World War II, a number of Asian countries became independent. Many of the newly independent Asian countries wanted to see a new type of competition where Asian dominance would not be shown by violence but would be strengthened by mutual understanding. During the 1948 Summer Olympics in London, a conversation between sportsmen from China and the Philippines raised the idea of restoring the Far Eastern Games. However, the Indian International Olympic Committee representative Guru DuttSondhi thought that the restoration of the Games would not be sufficient to show the spirit of unity and level of achievement in Asian sports, so proposed to sports leaders the idea of having discussions about holding a wholly new competition — the Asian Games. This gave rise to the agreement to form the Asian Athletic Federation. A preparatory committee was set up to draft the charter for this new body. On 13 February 1949, the Asian Athletic Federation was formally inaugurated in New Delhi, alongside the name Asian Games Federation, with New Delhi announced as the first host city of the Asian Games which were scheduled to be held in 1950.The 9th Asian Games were held from November 19, 1982 to December 4, 1982 in Delhi, India. An incredible 74 Asian and Asian Games records were broken. This was also the first Asiad to be held under the aegis of the Olympic Council of Asia. A total of 3,411 athletes from 33 National Olympic Committees (NOCs) participated in these games, competing in 196 events in 21 sports and 23 disciplines.

Transportation Problem

The transportation problem deals with the transportation of a product manufactured at different plants or factories (supply origins) to a number of different warehouses (demand destinations) in such a way that total transportation cost is minimum.

TERMINOLOGY USED IN TRANSPORTATIONAL MODEL

-Feasible solution: Feasible solution is that solution WHICH SATISFIES THE REQUIREMENTS OF DEMAND AND SUPPLY (Requirement and Availability). This is the solution which simultaneously remove all the existing surplus and satisfies all the existing deficiencies.
Non negative values of xij where i=1, 2…….m and j=1, 2,…n which satisfy the constraints of supply and demand is called feasible solution. Basic feasible solution: A feasible solution is said to be basic if the number of positive allocations equal to m + n -1, m stands for rows and n stands for columns.
Optimal solution: A feasible solution will be considered as optimal solution if it minimizes the total transportation cost. Balanced transportation problem: In any transportation problem ,if total supply of all sources is exactly equal to the total demand in all the destinations.
Unbalanced transportation problem: In any transportation problem ,if total supply of all sources is not equal to the total demand in all the destinations is calledunbalanced.
Matrix terminology: In the matrix, the squares are called cells and form columns vertically and rows horizontally.

Degenerate basic feasible solution: If the no. of allocation in basic feasible solutions is less than (m+n-1).

Mathematical Model

a_i= Quantity of product available at origin i.
b_j= Quantity of product required at destination j.
c_{ij}= The cost of transporting one unit of product from source. Origini to destination j.
x_{ij}= The quantity transported from origin i to destination j.
$\sum_{i=1}^{m} a_i = \sum_{j=1}^{n} b_j$ this relation shows that total quantity available at the origin is equal to the total amount required at the destinations.

Min $z = \sum_{i=1}^{m} \sum_{j=1}^{n} c_{ij}x_{ij}$

sub to constraint $\sum_{j=1}^{n} x_{ij} = a_i$ for i = 1, 2, ... m
j= 1, 2, ... n
$\sum_{i=1}^{m} x_{ij} = b_j$ for i = 1, 2, ... m
j= 1, 2, ... n $x_{ij} \geq 0$

The bandobast had been arranged to conduct this evente.g Elections, Games, movement of celebrities, leaders of political parties for public meetings, mobilization of rescue teams to deal with natural calamities. These are some of the logistics problems where resources can be optimized by applying the transportation problems. These problems can be classified as :

1. Movement of resources from n no of points to one location
2. Movement of political / celebrities fromone location to n points.

Based upon these facts the problem is:

Place	**Force (Section)**	**Stadium**	**Force (Section)**
A	400	1	60
B	160	2	40
C	160	3	400
D	90	4	40
E	90	5	80
F	120	6	80
G	20	7	240
H	120	8	60
I	240	9	60
J	120	10	60
K	120	11	500
L	120	12	20
M	240	13	60
	Total = 2,000	14	200
		15	40
		16	20
		17	40
			Total = 2000

Police force is to be positioned at various fields on the day of events .The cost of transportation of one section, i.e 10 men from every location to each stadium has been calculated as shown in the matrix below.

Here It seems that the availability and requirement of force is equal,i.e 2000 .It will not be possible on any day during the election as all stadia are not having games on all the days .Hence, there will always be a surplus force available. Consequently dummy stadium will have to be planned everyday so as to absorb the utilised force. The cost (in Rs 100s for 10 persons – one section) matrix for the movement of the police force is given below :

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Force Availability
A	2	1	13	12	15	15	16	14	25	20	14	22	24	11	35	16	10	400
B	28	31	36	37	130	30	35	36	16	42	30	35	36	35	50	35	36	160
C	15	14	26	25	28	28	28	17	38	33	17	35	37	24	48	29	23	160
D	4	3	15	14	17	17	18	16	27	22	16	24	26	13	37	18	12	90
E	26	24	15	16	13	13	12	15	15	12	15	33	3	16	10	17	16	90
F	7	2	8	7	10	10	11	13	20	15	9	17	13	6	30	11	6	
G	11	6	4	3	6	6	7	9	16	11	5	13	15	2	26	7	4	20
H	13	8	3	4	4	4	5	5	21	16	2	25	25	1	24	10	2	120
I	15	12	5	6	2	2	4	5	16	10	12	12	12	4	22	4	3	240
J	4	1	11	10	13	13	14	14	23	18	12	20	22	9	33	14	8	120
K	19	16	3	4	7	7	6	5	21	12	8	18	18	5	30	8	8	120
L	10	12	16	17	13	13	15	16	20	20	15	25	25	14	35	18	12	120
M	30	28	18	19	15	15	15	16	6	22	15	12	12	20	20	20	20	240
Force Requirement	60	40	400	40	80	80	180	240	60	60	500	60	20	200	40	20	40	2000

Objective function :-

$2X_{11} + 1X_{12} +13X_{13}+12X_{14} + 15X_{15} +15X_{16} + 16X_{17}+14X_{18} +25X_{19} +20X_{1.10} +14X_{1.11}+22X_{1.12} +24X_{1.13} + 11X_{1.14} +35X_{1.15}+16X_{1.16}+10X_{1.17} =400$

$28X_{21} + 31X_{22} +36X_{23}+37X_{24} +130\ X_{25} +30X_{26} +35\ X_{27}+36X_{28} +16X_{29} +42X_{2.10} +30X_{2.11}+35X_{2.12} +36X_{2.13} +35X_{2.14} +50X_{2.15}+35X_{2.16}+36X_{2.17} =160$

$15X_{31} + 14X_{32} +26X_{33}+25X_{34} +28X_{35} +28X_{36} +28\ X_{37}+17X_{38} +38X_{39} +33X_{3.10} +17X_{3.11}+X_{3.12} +X_{3.13} + X_{3.14} +X_{3.15}+X_{3.16}+X_{3.17} =160$

$4X_{41} + 3X_{42} +15X_{43}+14X_{44} +17X_{45} +17X_{46} +18X_{47}+16X_{48} +27X_{49} +22X_{4.10} +16X_{4.11}+24X_{4.12} +26X_{4.13} + 13X_{4.14} +37X_{4.15}+18X_{4.16}+12X_{4.17} =90$

$26X_{51} + 24X_{52} +15X_{53}+16X_{54} +13X_{55} +13X_{56} +12X_{57}+15X_{58} +15X_{59} +12X_{5.10} +15X_{5.11}+33X_{5.12} +3X_{5.13} + 16X_{5.14} +10X_{5.15}+17X_{5.16}+16X_{5.17} =90$

$7X_{31} + 2X_{32} +8X_{33}+7X_{34} +10X_{35} +10X_{36} +11X_{37}+13X_{38} +13X_{39} +15X_{3.10} +9X_{3.11}+17X_{3.12} +13X_{3.13} + 6X_{3.14} +30X_{3.15}+11X_{3.16}+6X_{3.17} =120$

$11X_{31} + 6X_{32} +4X_{33}+3X_{34} +6X_{35} +6X_{36} +7X_{37}+9X_{38} +16X_{39} +11X_{3.10} +5X_{3.11}+13X_{3.12} +15X_{3.13} + 2X_{3.14} +26X_{3.15}+7X_{3.16}+4X_{3.17} =20$

$13X_{31} +8X_{32} +3X_{33}+4X_{34} +4X_{35} +4X_{36} +5\ X_{37}+5X_{38} +21X_{39} +16X_{3.10} +2X_{3.11}+25X_{3.12} +25X_{3.13} + 1X_{3.14} +24X_{3.15}+10X_{3.16}+2X_{3.17} =120$

$15X_{31} + 12X_{32} +5X_{33}+6X_{34} +2X_{35} +2X_{36} +4X_{37}+5X_{38} +16X_{39} +10X_{3.10} +12X_{3.11}+12X_{3.12} +12X_{3.13} +4X_{3.14} +22X_{3.15}+4X_{3.16}+3X_{3.17} =240$

$4X_{31} + 1X_{32} +11X_{33}+10X_{34} +13X_{35} +13X_{36} +14X_{37}+14X_{38} +23X_{39} +18X_{3.10} +12X_{3.11}+20X_{3.12} +22X_{3.13} + 9X_{3.14} +33X_{3.15}+14X_{3.16}+8X_{3.17} =120$

$19X_{31} + 16X_{32} +3X_{33}+4X_{34} +7X_{35} +7X_{36} +6X_{37}+5X_{38} +21X_{39} +12X_{3.10} +8X_{3.11}+18X_{3.12} +18X_{3.13} + 5X_{3.14} +30X_{3.15}+8X_{3.16}+8X_{3.17} =120$

$10X_{31} + 12X_{32} +16X_{33}+17X_{34} +13X_{35} +13X_{36} +15X_{37}+16X_{38} +20X_{39} +20X_{3.10} +15X_{3.11}+25X_{3.12} +25X_{3.13} + 14X_{3.14} +35X_{3.15}+18X_{3.16}+12X_{3.17} =120$

$30X_{31} + 28X_{32} +18X_{33}+19X_{34} +15X_{35} +15X_{36} +15X_{37}+16X_{38} +6X_{39} +22X_{3.10} +15X_{3.11}+12X_{3.12} +12X_{3.13} + 20X3_{.14} +20X_{3.15}+20X_{3.16}+20X_{3.17} =240$

Requirement Constraint:-

$X_{11} + X_{12} +X_{13}+X_{14} + X_{15} +X_{16} + X_{17}+X_{18} +X_{19} +X_{1.10} +X_{1.11}+X_{1.12} +X_{1.13} + X_{1.14} +X_{1.15}+X_{1.16}+X_{1.17} =400$

$X_{21} + X_{22} +X_{23}+X_{24} + X_{25} +X_{26} + X_{27}+X_{28} +X_{29} +X_{2.10} +X_{2.11}+X_{2.12} +X_{2.13} + X_{2.14} +X_{2.15}+X_{2.16}+X_{2.17} =160$

$X_{31} + X_{32} +X_{33}+X_{34} + X_{35} +X_{36} + X_{37}+X_{38} +X_{39} +X_{3.10} +X_{3.11}+X_{3.12} +X_{3.13} + X_{3.14} +X_{3.15}+X_{3.16}+X_{3.17} =160$

$X_{41} + X_{42} +X_{43}+X_{44} + X_{45} +X_{46} + X_{47}+X_{48} +X_{49} +X_{4.10} +X_{4.11}+X_{4.12} +X_{4.13} + X_{4.14} +X_{4.15}+X_{4.16}+X_{4.17} =90$

$X_{51} + X_{52} +X_{53}+X_{54} + X_{55} +X_{56} + X_{57}+X_{58} +X_{59} +X_{5.10} +X_{5.11}+X_{5.12} +X_{5.13} + X_{5.14} +X_{5.15}+X_{5.16}+X_{5.17} =90$

$X_{31} + X_{32} +X_{33}+X_{34} + X_{35} +X_{36} + X_{37}+X_{38} +X_{39} +X_{3.10} +X_{3.11}+X_{3.12} +X_{3.13} + X_{3.14} +X_{3.15}+X_{3.16}+X_{3.17} =120$

$X_{31} + X_{32} +X_{33}+X_{34} + X_{35} +X_{36} + X_{37}+X_{38} +X_{39} +X_{3.10} +X_{3.11}+X_{3.12} +X_{3.13} + X_{3.14} +X_{3.15}+X_{3.16}+X_{3.17} =20$

$X_{31} + X_{32} +X_{33}+X_{34} + X_{35} +X_{36} + X_{37}+X_{38} +X_{39} +X_{3.10} +X_{3.11}+X_{3.12} +X_{3.13} + X_{3.14} +X_{3.15}+X_{3.16}+X_{3.17} =120$

$X_{31} + X_{32} +X_{33}+X_{34} + X_{35} +X_{36} + X_{37}+X_{38} +X_{39} +X_{3.10} +X_{3.11}+X_{3.12} +X_{3.13} + X_{3.14} +X_{3.15}+X_{3.16}+X_{3.17} =240$

$X_{31} + X_{32} +X_{33}+X_{34} + X_{35} +X_{36} + X_{37}+X_{38} +X_{39} +X_{3.10} +X_{3.11}+X_{3.12} +X_{3.13} + X_{3.14} +X_{3.15}+X_{3.16}+X_{3.17} =120$

$X_{31} + X_{32} +X_{33}+X_{34} + X_{35} +X_{36} + X_{37}+X_{38} +X_{39} +X_{3.10} +X_{3.11}+X_{3.12} +X_{3.13} + X_{3.14} +X_{3.15}+X_{3.16}+X_{3.17} =120$

$X_{31} + X_{32} +X_{33}+X_{34} + X_{35} +X_{36} + X_{37}+X_{38} +X_{39} +X_{3.10} +X_{3.11}+X_{3.12} +X_{3.13} + X3_{.14} +X_{3.15}+X_{3.16}+X_{3.17} =240$

Requirement Constraints:-

X_{11} $+X_{31}$ $+X_{41}$ $+X_{51}$ $+X_{61}$ $+X_{71}$ $+X_{81}$ $+X_{91}$ $+X_{10.1}$ $+X_{11.1}$ $+X_{12}$ $+X_{13.1}=60$
X11 +X31 +X41 $+X_{51}$ $+X_{61}$ $+X_{71}$ $+X_{81}$ $+X_{91}$ $+X_{10.1}$ $+X_{11.1}$ $+X_{12.1}$ $+X_{13.1=40}$
X_{11} $+X_{31}$ $+X_{41}$ $+X_{51}$ $+X_{61}$ $+X_{71}$ $+X_{81}$ $+X_{91}$ $+X_{10.1}$ $+X_{11.1}$ $+X_{12.1}$ $+X_{13.1=400}$
X_{11} $+X_{31}$ $+X_{41}$ $+X_{51}$ $+X_{61}$ $+X_{71}$ $+X_{81}$ $+X_{91}$ $+X_{10.1}$ $+X_{11.1}$ $+X_{12.1}$ $+X_{13.1=40}$
X_{11} $+X_{31}$ $+X_{41}$ $+X_{51}$ $+X_{61}$ $+X_{71}$ $+X_{81}$ $+X_{91}$ $+X_{10.1}$ $+X_{11.1}$ $+X_{12.1}$ $+X_{13.1=80}$
X_{11} $+X_{31}$ $+X_{41}$ $+X_{51}$ $+X_{61}$ $+X_{71}$ $+X_{81}$ $+X_{91}$ $+X_{10.1}$ $+X_{11.1}$ $+X_{12.1}$ $+X_{13.1=80}$
X_{11} $+X_{31}$ $+X_{41}$ $+X_{51}$ $+X_{61}$ $+X_{71}$ $+X_{81}$ $+X_{91}$ $+X_{10.1}$ $+X_{11.1}$ $+X_{12.1}$ $+X_{13.1=180}$
X_{11} $+X_{31}$ $+X_{41}$ $+X_{51}$ $+X_{61}$ $+X_{71}$ $+X_{81}$ $+X_{91}$ $+X_{10.1}$ $+X_{11.1}$ $+X_{12.1}$ $+X_{13.1=240}$
X_{11} $+X_{31}$ $+X_{41}$ $+X_{51}$ $+X_{61}$ $+X_{71}$ $+X_{81}$ $+X_{91}$ $+X_{10.1}$ $+X_{11.1}$ $+X_{12.1}$ $+X_{13.1=60}$
X_{11} $+X_{31}$ $+X_{41}$ $+X_{51}$ $+X_{61}$ $+X_{71}$ $+X_{81}$ $+X_{91}$ $+X_{10.1}$ $+X_{11.1}$ $+X_{12.1}$ $+X_{13.1=60}$
X_{11} $+X_{31}$ $+X_{41}$ $+X_{51}$ $+X_{61}$ $+X_{71}$ $+X_{81}$ $+X_{91}$ $+X_{10.1}$ $+X_{11.1}$ $+X_{12.1}$ $+X_{13.1=500}$
X_{11} $+X_{31}$ $+X_{41}$ $+X_{51}$ $+X_{61}$ $+X_{71}$ $+X_{81}$ $+X_{91}$ $+X_{10.1}$ $+X_{11.1}$ $+X_{12.1}$ $+X_{13.1=60}$
X_{11} $+X_{31}$ $+X_{41}$ $+X_{51}$ $+X_{61}$ $+X_{71}$ $+X_{81}$ $+X_{91}$ $+X_{10.1}$ $+X_{11.1}$ $+X_{12.1}$ $+X_{13.1=20}$
X_{11} $+X_{31}$ $+X_{41}$ $+X_{51}$ $+X_{61}$ $+X_{71}$ $+X_{81}$ $+X_{91}$ $+X_{10.1}$ $+X_{11.1}$ $+X_{12.1}$ $+X_{13.1=200}$
X_{11} $+X_{31}$ $+X_{41}$ $+X_{51}$ $+X_{61}$ $+X_{71}$ $+X_{81}$ $+X_{91}$ $+X_{10.1}$ $+X_{11.1}$ $+X_{12.1}$ $+X_{13.1=40}$
X_{11} $+X_{31}$ $+X_{41}$ $+X_{51}$ $+X_{61}$ $+X_{71}$ $+X_{81}$ $+X_{91}$ $+X_{10.1}$ $+X_{11.1}$ $+X_{12.1}$ $+X_{13.1=20}$
X_{11} $+X_{31}$ $+X_{41}$ $+X_{51}$ $+X_{61}$ $+X_{71}$ $+X_{81}$ $+X_{91}$ $+X_{10.1}$ $+X_{11.1}$ $+X_{12.1}$ $+X_{13.1=40}$

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
A	60/120	40/40	40/520	40/ 480						120/ 2400				60/ 660			40/ 400
B						80/ 2400	20/700		60/ 960								
C								60/ 1020		40/ 1320	60/ 1020						
D										90/ 1980							
E										50/ 600					40/ 400		
F			120/960														
G														20 /40			
H														120/120			
I					80/ 160		60/240			80/ 800						20/80	
J			120/1320														
K			120/360														
L										120/ 2400							
M							160/2400					20/ 240	60/ 720				

From	To	Shipment	Cost per unit	Shipment cost
A	1	60	2	120
A	2	40	1	40
A	3	40	13	520
A	4	40	12	480
A	11	120	20	2400
A	14	60	11	660
A	17	40	10	400
B	6	80	30	2400
B	7	20	35	700
B	9	60	16	960
C	8	60	17	1020
C	11	40	33	1320
C	10	60	17	1020
D	11	90	22	1980
E	11	50	12	600
E	15	40	10	400
F	3	120	8	960
G	14	20	2	40
H	14	120	1	120
I	5	80	2	160
I	7	60	4	240
I	11	80	10	800
I	16	20	4	80
J	3	120	11	1320
K	3	120	3	360
L	11	120	20	2400
M	7	160	15	2400
M	12	20	12	240
M	13	60	12	720

We have taken places as A ,B,C,D---------etc .And Statium as Numbers 1,2,3-------

NPL---A	CS-----1
JK------B	DU----2
PP------C	IP----- 3
MT-----D	YV----4
PTS-----E	TKI--- 5
OPL----F	TKS---6
NK-----G	NS-----7
KMT---H	HS-----8
PST-----I	HB-----9
RPL----J	SV----10
SP------K	JLN---11
MN---- L	HK----12
MRN—M	GV----13
	AK----14
	TR-----15
	GC----16
	KS----17

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Iteration 1																	
A	60	(-6)	80	40	-4	-9	-3	-10	-33	200	-2	-12	-14	20	-18	-3	-1
B	-2	0	(-1)	-1	-95	80	(-2)	-8	60	(-2)	(-6)	-1	-2	20	-9	(-2)	-3
C	0	(-6)	0	0	-4	-9	-2	60	-33	100	(-8)	-12	-14	0	-18	-3	-1
D	0	(-6)	0	0	-4	-9	-3	-10	-33	90	-2	-12	-14	0	-18	-3	-1
E	-31	-24	-9	-11	-9	-14	-6	-18	-30	(-1)	-10	-30	50	-12	40	-11	-14
F	-10	40	80	0	-4	-9	-3	-14	-33	0	-2	-12	-8	0	-18	-3	-2
G	-18	-8	0	0	-4	-9	-3	-14	-33	0	-2	-12	-14	20	-18	-3	-4
H	-21	-11	0	-2	-3	-8	-2	-11	-39	-6	60	-25	-25	60	-17	-7	-3
I	-22	-14	-1	-3	80	-5	140	-10	-33	(-1)	-9	-11	-11	-2	-14	20	-3
J	-4	(-4)	120	0	-4	-9	-3	-12	-33	0	-2	-12	-14	0	-18	-3	-1
K	-27	-19	120	-2	-6	-11	-3	-11	-39	-2	-6	-18	-18	-4	-23	-5	-9
L	-5	-2	0	-2	(-1)	-4	(-1)	-9	-25	(-3)	0	-12	-12	80	-15	-2	40
M	-26	-19	-3	-5	-2	-7	100	-10	-12	110	-1	20	10	-7	-1	-5	-9
Iteration 2																	
A	60	(-6)	80	40	-4	-17	-3	-10	-41	220	-10	-12	-14	-8	-18	-3	-9
B	(-6)	(-8)	(-9)	(-7)	-87	80	(-10)	0	60	(-10)	(-6)	(-7)	(-6)	20	-1	(-10)	-3
C	0	(-6)	0	0	-4	-17	-2	60	-41	80	20	-12	-14	-8	-18	-3	-9
D	0	(-6)	0	0	-4	-17	-3	-10	-41	90	-10	-12	-14	-8	-18	-3	-9
E	-31	-24	-9	-11	-9	-22	-6	-18	-38	(-1)	-18	-30	50	-20	40	-11	-22
F	-10	40	80	0	-4	-17	-3	-14	-41	0	-10	-12	-8	-8	-18	-3	-10
G	-10	0	(-8)	(-8)	(-4)	-9	(-5)	-6	-33	(-8)	-2	-4	-6	20	-10	(-5)	-4
H	-13	-3	(-8)	(-6)	(-5)	-8	(-6)	-3	-39	(-2)	40	-17	-17	80	-9	(-1)	-3
I	-22	-14	-1	-3	80	-13	140	-10	-41	(-1)	-17	-11	-11	-10	-14	20	-11
J	-4	(-4)	120	0	-4	-17	-3	-12	-41	0	-10	-12	-14	-8	-18	-3	-9
K	-27	-19	120	-2	-6	-19	-3	-11	-47	-2	-14	-18	-18	-12	-23	-5	-17
L	-3	(-6)	(-8)	(-6)	(-9)	-4	(-9)	-1	-25	(-11)	0	-4	-4	80	-7	(-6)	40
M	-26	-19	-3	-5	-2	-15	100	-10	-20	110	-9	20	10	-15	-1	-5	-17
Iteration 3																	
A	60	(-6)	80	40	-4	-6	-3	-10	-30	220	-10	-12	-14	(-3)	-18	-3	(-2)
B	-5	-3	-2	-4	-98	80	-1	-11	60	-1	-5	-4	-5	20	-12	-1	-3
C	0	(-6)	0	0	-4	-6	-2	60	-30	40	60	-12	-14	(-3)	-18	-3	(-2)
D	0	(-6)	0	0	-4	-6	-3	-10	-30	90	-10	-12	-14	(-3)	-18	-3	(-2)
E	-31	-24	-9	-11	-9	-11	-6	-18	-27	(-1)	-18	-30	50	-9	40	-11	-11
F	-10	40	80	0	-4	-6	-3	-14	-30	0	-10	-12	-8	(-3)	-18	-3	(-1)
G	-21	-11	-3	-3	-7	-9	-6	-17	-33	-3	-13	-15	-17	20	-21	-6	-4
H	-24	-14	-3	-5	-6	-8	-5	-14	-39	-9	-11	-28	-28	120	-20	-10	-3
I	-22	-14	-1	-3	80	-2	140	-10	-30	(-1)	-17	-11	-11	(-1)	-14	20	0
J	-4	(-4)	120	0	-4	-6	-3	-12	-30	0	-10	-12	-14	(-3)	-18	-3	(-2)
K	-27	-19	120	-2	-6	-8	-3	-11	-36	-2	-14	-18	-18	-1	-23	-5	-6
L	-8	-5	-3	-5	-2	-4	-2	-12	-25	40	-11	-15	-15	40	-18	-5	40
M	-26	-19	-3	-5	-2	-4	100	-10	-9	110	-9	20	10	-4	-1	-5	-6
Iteration 4																	
A	60	40	40	40	-4	-6	-3	-10	-30	220	-10	-12	-14	(-3)	-18	-3	(-2)
B	-5	-9	-2	-4	-98	80	-1	-11	60	-1	-5	-4	-5	20	-12	-1	-3
C	0	0	0	0	-4	-6	-2	60	-30	40	60	-12	-14	(-3)	-18	-3	(-2)
D	0	0	0	0	-4	-6	-3	-10	-30	90	-10	-12	-14	(-3)	-18	-3	(-2)
E	-31	-30	-9	-11	-9	-11	-6	-18	-27	(-1)	-18	-30	50	-9	40	-11	-11
F	-10	-6	120	0	-4	-6	-3	-14	-30	0	-10	-12	-8	(-3)	-18	-3	(-1)
G	-21	-17	-3	-3	-7	-9	-6	-17	-33	-3	-13	-15	-17	20	-21	-6	-4
H	-24	-20	-3	-5	-6	-8	-5	-14	-39	-9	-11	-28	-28	120	-20	-10	-3
I	-22	-20	-1	-3	80	-2	140	-10	-30	(-1)	-17	-11	-11	(-1)	-14	20	0

J	-4	-2	120	0	-4	-6	-3	-12	-30	0	-10	-12	-14	(-3)	-18	-3	(-2)
K	-27	-25	120	-2	-6	-8	-3	-11	-36	-2	-14	-18	-18	-1	-23	-5	-6
L	-8	-11	-3	-5	-2	-4	-2	-12	-25	40	-11	-15	-15	40	-18	-5	40
M	-26	-25	-3	-5	-2	-4	100	-10	-9	110	-9	20	10	-4	-1	-5	-6
Iteration 5																	
A	60	40	40	40	-4	-9	-3	-10	-33	180	-10	-12	-14	40	-18	-3	(-2)
B	-2	-6	(-1)	-1	-95	80	(-2)	-8	60	(-2)	-2	-1	-2	20	-9	(-2)	0
C	0	0	0	0	-4	-9	-2	60	-33	40	60	-12	-14	0	-18	-3	(-2)
D	0	0	0	0	-4	-9	-3	-10	-33	90	-10	-12	-14	0	-18	-3	(-2)
E	-31	-30	-9	-11	-9	-14	-6	-18	-30	(-1)	-18	-30	50	-12	40	-11	-11
F	-10	-6	120	0	-4	-9	-3	-14	-33	0	-10	-12	-8	0	-18	-3	(-1)
G	-18	-14	0	0	-4	-9	-3	-14	-33	0	-10	-12	-14	20	-18	-3	-1
H	-21	-17	0	-2	-3	-8	-2	-11	-39	-6	-8	-25	-25	120	-17	-7	0
I	-22	-20	-1	-3	80	-5	140	-10	-33	(-1)	-17	-11	-11	-2	-14	20	0
J	-4	-2	120	0	-4	-9	-3	-12	-33	0	-10	-12	-14	0	-18	-3	(-2)
K	-27	-25	120	-2	-6	-11	-3	-11	-39	-2	-14	-18	-18	-4	-23	-5	-6
L	-8	-11	-3	-5	-2	-7	-2	-12	-28	80	-11	-15	-15	-3	-18	-5	40
M	-26	-25	-3	-5	-2	-7	100	-10	-12	110	-9	20	10	-7	-1	-5	-6
Iteration 6																	
A	60	40	40	40	-4	-9	-3	-10	-33	140	-10	-12	-14	40	-18	-3	40
B	-2	-6	(-1)	-1	-95	80	(-2)	-8	60	(-2)	-2	-1	-2	20	-9	(-2)	-2
C	0	0	0	0	-4	-9	-2	60	-33	40	60	-12	-14	0	-18	-3	0
D	0	0	0	0	-4	-9	-3	-10	-33	90	-10	-12	-14	0	-18	-3	0
E	-31	-30	-9	-11	-9	-14	-6	-18	-30	(-1)	-18	-30	50	-12	40	-11	-13
F	-10	-6	120	0	-4	-9	-3	-14	-33	0	-10	-12	-8	0	-18	-3	-1
G	-18	-14	0	0	-4	-9	-3	-14	-33	0	-10	-12	-14	20	-18	-3	-3
H	-21	-17	0	-2	-3	-8	-2	-11	-39	-6	-8	-25	-25	120	-17	-7	-2
I	-22	-20	-1	-3	80	-5	140	-10	-33	(-1)	-17	-11	-11	-2	-14	20	-2
J	-4	-2	120	0	-4	-9	-3	-12	-33	0	-10	-12	-14	0	-18	-3	0
K	-27	-25	120	-2	-6	-11	-3	-11	-39	-2	-14	-18	-18	-4	-23	-5	-8
L	-8	-11	-3	-5	-2	-7	-2	-12	-28	120	-11	-15	-15	-3	-18	-5	-2
M	-26	-25	-3	-5	-2	-7	100	-10	-12	110	-9	20	10	-7	-1	-5	-8
Iteration 7																	
A	60	40	40	40	-4	-7	-3	-10	-31	120	-10	-12	-14	60	-18	-3	40
B	-4	-8	-1	-3	-97	80	20	-10	60	0	-4	-3	-4	-2	-11	0	-4
C	0	0	0	0	-4	-7	-2	60	-31	40	60	-12	-14	0	-18	-3	0
D	0	0	0	0	-4	-7	-3	-10	-31	90	-10	-12	-14	0	-18	-3	0
E	-31	-30	-9	-11	-9	-12	-6	-18	-28	(-1)	-18	-30	50	-12	40	-11	-13
F	-10	-6	120	0	-4	-7	-3	-14	-31	0	-10	-12	-8	0	-18	-3	-1
G	-18	-14	0	0	-4	-7	-3	-14	-31	0	-10	-12	-14	20	-18	-3	-3
H	-21	-17	0	-2	-3	-6	-2	-11	-37	-6	-8	-25	-25	120	-17	-7	-2
I	-22	-20	-1	-3	80	-3	140	-10	-31	(-1)	-17	-11	-11	-2	-14	20	-2
J	-4	-2	120	0	-4	-7	-3	-12	-31	0	-10	-12	-14	0	-18	-3	0
K	-27	-25	120	-2	-6	-9	-3	-11	-37	-2	-14	-18	-18	-4	-23	-5	-8
L	-8	-11	-3	-5	-2	-5	-2	-12	-26	120	-11	-15	-15	-3	-18	-5	-2
M	-26	-25	-3	-5	-2	-5	80	-10	-10	130	-9	20	10	-7	-1	-5	-8
Iteration 8																	
NPL	60	40	40	40	-4	-7	-3	-10	-31	120	-10	-12	-14	60	-17	-3	40
A	-4	-8	-1	-3	-97	80	20	-10	60	0	-4	-3	-4	-2	-10	0	-4
B	0	0	0	0	-4	-7	-2	60	-31	40	60	-12	-14	0	-17	-3	0
C	0	0	0	0	-4	-7	-3	-10	-31	90	-10	-12	-14	0	-17	-3	0
D	-32	-31	-10	-12	-10	-13	-7	-19	-29	50	-19	-31	-1	-13	40	-12	-14

E	-10	-6	120	0	-4	-7	-3	-14	-31	0	-10	-12	-8	0	-17	-3	-1
F	-18	-14	0	0	-4	-7	-3	-14	-31	0	-10	-12	-14	20	-17	-3	-3
G	-21	-17	0	-2	-3	-6	-2	-11	-37	-6	-8	-25	-25	120	-16	-7	-2
H	-22	-20	-1	-3	80	-3	140	-10	-31	(-1)	-17	-11	-11	-2	-13	20	-2
I	-4	-2	120	0	-4	-7	-3	-12	-31	0	-10	-12	-14	0	-17	-3	0
J	-27	-25	120	-2	-6	-9	-3	-11	-37	-2	-14	-18	-18	-4	-22	-5	-8
K	-8	-11	-3	-5	-2	-5	-2	-12	-26	120	-11	-15	-15	-3	-17	-5	-2
L	-26	-25	-3	-5	-2	-5	80	-10	-10	80	-9	20	60	-7	0	-5	-8
Iteration 9																	
A	60	40	40	40	-3	-6	-2	-10	-30	120	-10	-11	-13	60	-17	-2	40
B	-5	-9	-2	-4	-97	80	20	-11	60	-1	-5	-3	-4	-3	-11	0	-5
C	0	0	0	0	-3	-6	-1	60	-30	40	60	-11	-13	0	-17	-2	0
D	0	0	0	0	-3	-6	-2	-10	-30	90	-10	-11	-13	0	-17	-2	0
E	-32	-31	-10	-12	-9	-12	-6	-19	-28	50	-19	-30	0	-13	40	-11	-14
F	-10	-6	120	0	-3	-6	-2	-14	-30	0	-10	-11	-7	0	-17	-2	-1
G	-18	-14	0	0	-3	-6	-2	-14	-30	0	-10	-11	-13	20	-17	-2	-3
H	-21	-17	0	-2	-2	-5	-1	-11	-36	-6	-8	-24	-24	120	-16	-6	-2
I	-23	-21	-2	-4	80	-3	60	-11	-31	80	-18	-11	-11	-3	-14	20	-3
J	-4	-2	120	0	-3	-6	-2	-12	-30	0	-10	-11	-13	0	-17	-2	0
K	-27	-25	120	-2	-5	-8	-2	-11	-36	-2	-14	-17	-17	-4	-22	-4	-8
L	-8	-11	-3	-5	-1	-4	-1	-12	-25	120	-11	-14	-14	-3	-17	-4	-2
M	-27	-26	-4	-6	-2	-5	160	-11	-10	-1	-10	20	60	-8	-1	-5	-9

Conclusion:-

HerePlaces are considered as A,B,C------- And Stadium as numbered 1,2,----------.

Place	Abbreviation	Stadium	Abbreviation
New Police Lines	NPL---A	Chhatrasal	CS-----1
Jharoda Kalan	JK------B	Delhi University	DU----2
PitamPura	PP------C	Indraprastha	IP----- 3
Model Town	MT-----D	Yamuna Velodrome	YV----4
Police Training School	PTS-----E	Talkatora Indoor	TKI--- 5
Old Police Lines	OPL----F	Talkatora Swimming	TKS---6
New Kotwali	NK-----G	National	NS-----7
Kamala Market	KMT---H	Hall of Sports	HS-----8
Parliament Street	PST-----I	Harbaksh	HB-----9
Rajpura Lines	RPL----J	Shivaji	SV----10
Shakarpur	SP------K	Jawaharlal Nehru	JLN---11
Moti Nagar	MN---- L	HauzKhas	HK----12
Mehram Nagar	MRN—M	Games Village	GV----13
		Ambedkar	AK----14
		Tughlakabad Range	TR-----15
		Golf Club	GC----16
		Karnail Singh	KS----17

It seems that if shortest route could be used then transportation cost could have been reduced . It could be 248600 Rs.And proper utilisation of resources could save the money .In future if any game /event/elections are being conducted in our india then this technique can help to reduce the cost.

References

1. N.D Vohra (2008) QuantitativeTechnique, FifthEdition, Tata McGraw Hill, Delhi.
2. J.K Sharma (2005) Operations Research, Second Edition, MacMillan, Delhi.
3. U Dinesh Kumar, José E. Ramírez-Márquez, D Nowicki and D Verma, (2007), 'Reliability and Maintainability Allocation to Minimize the Total Cost of Ownership in a Series-Parallel System', Journal of Risk and Reliability, Vol. 221, No. 2, pp. 133-140.
4. T Bhaskar and U Dinesh Kumar (2006), A cost model for N-version programming under imperfect debugging, Journal of Operational Research Society, Vol. 57, 986-994.

5. H Saranga, and U Dinesh Kumar (2006), Optimization of aircraft maintenance and support infrastructure using genetic algorithms - level of repair analysis, Annals of Operations Research, Vol. 143, pp. 91-106.
6. Cats, O., F.Mach .Rufi, H. Koutsopoulos, W. Burghout and T. Toledo, 2012, Optimizing the Number and Location of Time Point Stops, The 12th International Conference on Advanced Systems for Public Transport (CASPT12), Santiago, Chile, CASPT.

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

Academic conference: http://www.iiste.org/conference/upcoming-conferences-call-for-paper/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar