

Knowledge Assets Management in small and intermediate enterprise (quantitative approach)

ABSTRACT

Knowing that third century is the dynamic business system for knowledge creation and utilization. So that in these paper we are taking human side of enterprise dealing with empirical test of new theory of human sources. From business point of view the meaning of knowledge assets is the professional human recourses in the small and intermediate enterprise. We are undergoing a quality of intellectual capital or people-based knowledge and there is a growing realization that high quality goods and services give an enterprise a considerable competitive edge. Some operations managers believe that in the long run the quality of knowledge based on the single most important factor affecting an operation's performance relative to the competition. Therefore the main aims of paper are:

1. What enterprise must do to get professional knowledge assets?
2. What's enterprise strategy for managing knowledge assets, considering the following constraints:
 1. Keeping of competitive advantage
 2. Doing a good financial result (Max. profit and Min. costs) related with choosing one of the following roles:
 1. Part time, using knowledge professionals (form time to time)
 2. Long term using.

To achieves the above aims we are going adept the transportation models when the decision variables are (Xlmn).

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: **1.1** :

TQM ISO

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		.2
:		:3.1

: Transportation Model

$$Z = \sum_{j=1}^n \sum_{i=1}^m c_{ij} x_{ij} \rightarrow \text{Min} \quad X_{ij} \geq 0 \tag{1}$$

$$\sum_{j=1}^n X_{ij} = a_i \quad (i = 1, 2, \dots, m) \tag{2}$$

$$\sum_{i=1}^m X_{ij} = b_j \quad (j = 1, 2, \dots, n)$$

Min. objective function

$$K = K_1 + K_2 + K_3$$

$$K_1 = \sum_{l=1}^L \sum_{m=1}^M g_{lm} X_{lm}$$

$$K_2 = \sum_{l=1}^L \sum_{m=1}^M \sum_{n=1}^N C_{lmn} X_{lmn}$$

$$K_3 = \sum_{l=1}^L \sum_{m=1}^M S_{lm} X_{lm}$$

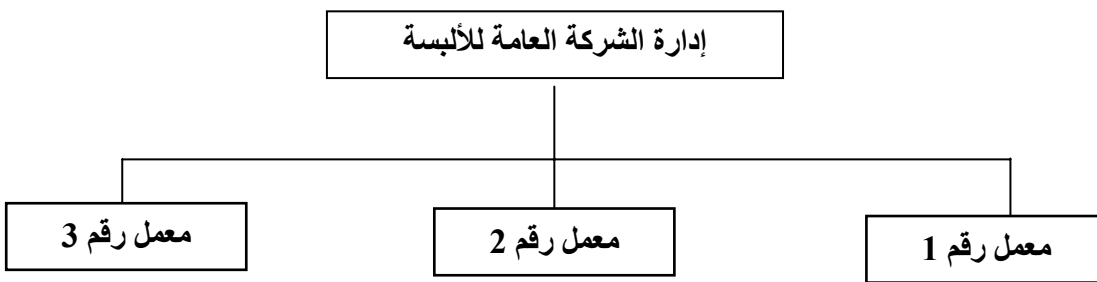
Sut to Constraints :
 = X/m
 = Xm

$$\sum_{m=1}^M X_{lm} = X_m$$

$$\sum_{m=1}^M X_{lmn} = b_{ln}$$

(n) (m) (l) (n) (l) = B/n
 = X/mn
4.1

(1) (3) (2) (1)
 (1)
 (3) (2)



1997/9/1 1996/9/1 (1)

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(1) (3 2 1)

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: 1.2

(1)

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(1)

1

- : No.1 ◀
- : No.2 ◀
- : No.3 ◀
- : No.4 ◀
- : No.5 ◀
- : No.6 ◀
- : No.7 ◀
- : No.8 ◀

(1)

(1)

(1)

.(5.1a) -1

.(5.1b) -2

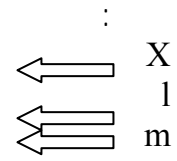
.(5.2a) -3

.(5.2 b) -4

(5.3) -5

.(5.4) -6

.(1)



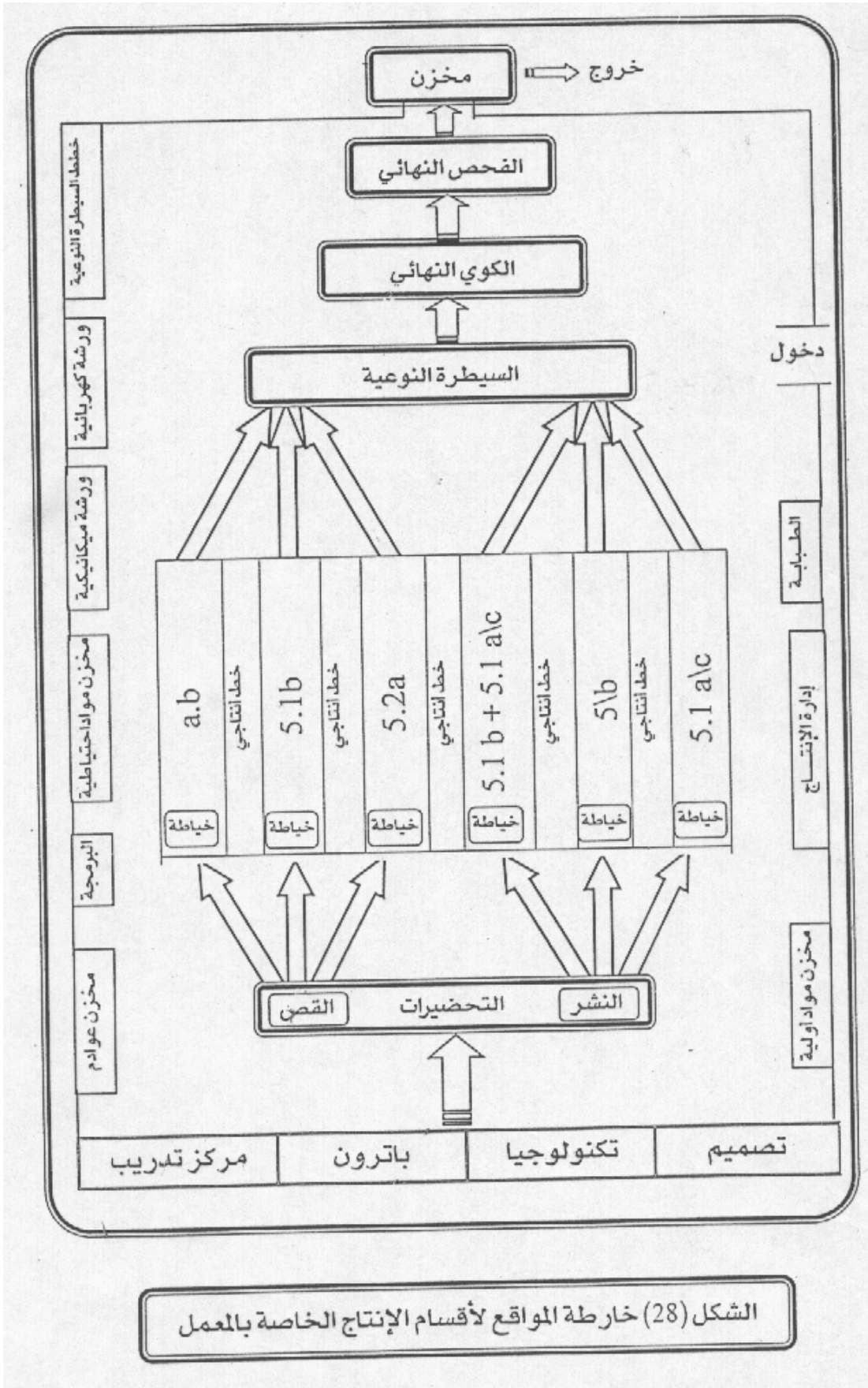
3 = m
6 = n
8 = l

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.(2)

(m)

(1)



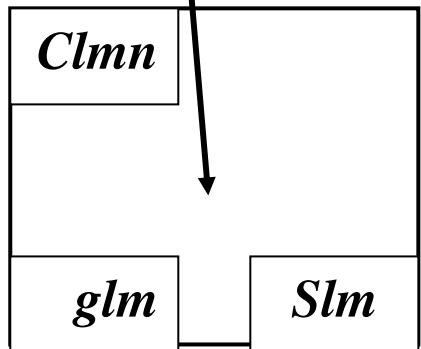
(1)

(1)

()	5.1 a	5.1 b	5.2 a	5.2 b	5.3	5.4
Operation No.1						
Operation No.2						
Operation No.3						
Operation No.4						
Operation No.5						
Operation No.6						
Operation No.7						
Operation No.8						

- = X_{lmn}
- = C_{lmn}
- = g_{lm}
- = S_{lm}

خلية النقل



$$K = C_{lmn} + g_{lm} S_{Lm}$$

(2) (M) (I)

(2)

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Xlmn

X3	X2	X12=10	⊗
(3)	(2)	(1)	
X13=7	X12=10	X11=13	No.1
X32=3	X22=7	X21=20	No.2
X33=3	X32=8	X31=10	No.3
X43=2	X42=5	X41=10	No.4
X53=3	X53=6	X51=10	No.5
X63=3	X62=4	X61=8	No.6
X73=2	X72=3	X71=7	No.7
X83=2	X82=2	X81=7	No.8
25 →	45	85	

$X_1=85, X_2=85, X_3=25$

⁽¹⁾(3)

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(3)

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54	53	5. 2b	5. 2 a	5. 1 b	5. 1 a	
B16=6	B15=0	B14=2	B13=1	B11=1	B11=0	No.1
B26=5	B25=5	B24=3	B23=1	B22=2	B11=0	No.2
B36=4	B35=2	B34=1	B33=1	B32=0	B11=4	No.3
B46=4	B45=1	B44=1	B43=2	B42=0	B11=5	No.4
B56=0	B55=2	B54=0	B53=0	B52=6	B11=1	No.5
B66=6	B65=5	B64=0	B63=3	B62=5	B11=2	No.6
B76=5	B75=4	B74=0	B73=4	B72=0	B11=3	No.7
B86=0	B85=6	B84=3	B83=3	B82=4	B11=5	No.8
BL6=30	BL5=25	BL4=10	BL3=15	BL2=20	BL1=20	

4 (CLmn)

- 1
- 2
- 3

(4)

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CLm	54	53	5. 2b	5. 2 a	5. 1 b	5. 1 a	
C11=15 C21=18 C31=17	C116=50 C126=30 C136=22	C115=40 C125=30 C135=20	C114=35 C124=30 C134=15	C113=40 C123=35 C133=16	C112=40 C122=26 C132=18	C111=45 C121=40 C131=20	No.1
C41=16 C51=17 C61=14	C236=48 C226=24 C236=17	C235=38 C225=25 C235=18	C214=40 C224=30 C234=14	C213=45 C223=40 C233=18	C212=40 C222=25 C232=17	C211=50 C221=15 C231=15	No.2
C17=21 C81=17 C12=18	C316=45 C326=35 C336=22	C315=50 C325=40 C335=20	C314=50 C324=40 C334=18	C313=45 C323=30 C333=15	C312=50 C322=40 C332=20	C311=35 C321=30 C331=20	No.3
C22=17 C32=22 C42=17	C416=45 C426=35 C436=15	C415=45 C425=35 C435=20	C414=50 C424=36 C434=15	C413=48 C423=38 C433=18	C412=50 C422=40 C432=20	C411=45 C421=35 C431=22	No.4
C52=16 C62=17 C72=23	C516=50 C526=40 C536=20	C515=50 C525=44 C535=14	C514=45 C524=30 C533=20	C513=50 C523=40 C533=20	C512=46 C522=36 C532=28	C511=50 C521=40 C531=18	No.5
C82=16 C13=16 C23=17	C616=48 C626=38 C636=15	C516=50 C625=38 C635=20	C614=48 C624=35 C634=16	C613=50 C623=36 C633=16	C612=45 C622=25 C632=15	C611=50 C621=38 C631=18	No.6
C33=18 C43=19 C53=18	C716=50 C726=40 C736=20	C715=50 C725=40 C735=22	C714=48 C724=40 C734=20	C713=5 C723=36 C733=18	C712=38 C722=28 C732=15	C711=45 C721=30 C731=15	No.7
C63=18 C73=19 C83=7	C816=50 C826=35 C836=15	C815=48 C825=38 C853=18	C814=48 C824=40 C834=20	C813=50 C823=35 C833=15	C812=48 C822=35 C832=14	C811=48 C821=36 C831=20	No.8
C121=40	C121=40	C121=40	C121=40	C121=40	C121=40	BL1=20	

(Xlmn)

(n) (3 2 1)

(Clmn)

(SLm) (gLm)

4

() 1

.3 2

: .2.2

(4) (3) (2)

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.(Feasible Solution) .1

.(Beast Solution) .2

.(Optimal Solution) .3

(5) (North west corner)

(129)

.()

: (8)

$$K = K1 + K2 + K3$$

(k) (6)

(5) (52700)

(Best Solution)

(7)

(120)

.() (8)

(496300) (7) (8)

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.(Stepping stone method) .1

.(Multipliers Method) .2

.() (9) . Q.S.B⁺

(6) $X_{123} \rightarrow X_{136} = 5$
(1) (3) () (5)

k=28960

⁽¹⁾ (28960) () (1)

(Xlmn)

(524700) ◀

(North west corner method)

(96300) ◀

(Least cost method)

(28960) ◀

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	.2000)		. 12
			"		. 13
	.2005	14-13	/		

Xlmn

X6	→	X231	=4	
X9	→	X331	=5	
X12	→	X431	=3	
X15	→	X531	=4	
X18	→	X631	=2	
X20	→	X721	=3	
X21	→	X731	=5	
X25	→	X112	=4	
X27	→	X132	=4	
X36	→	X432	=3	
X42	→	X632	=2	
X84	→	X832	=5	
X57	→	X333	=3	
X59	→	X423	=1	
X62	→	X523	=4	
X72	→	X833	=2	
X78	→	X234	=2	
X83	→	X424	=1	
X88	→	X614	=5	
X94	→	X814	=2	
X96	→	X834	=2	
X102	→	X235	=3	
X108	→	X3151	=4	
X8	→	X815	=2	
X128	→	X326	=2	
X133	→	X516	=3	
X135	→	X536	=2	
X140	→	X726	=3	
X143	→	X826	=3	
X84	→	X434	=5	
X53	→	X223	=5	
X66	→	X633	=5	
X75	→	X134	=5	
X62	→	X733	=5	
X111	→	X535	=5	
X123	→	X136	=5	

(K) Z = 28960 دینار

حيث أن :

جدول رقم (5)
حل المشكلة قيد الدرس على أساس طريقة الركن الشمالي الغربي خطة المناقلة الابتدائية (الممكنة)

	5. La	5.Lb	5.2a	5.2b	5.3	5.4	()		
							(1)	(2)	(3)
No.1	4	40	4	3	4	5	g11=10	g12=12	g13=11
	5 1	0	0 1	5 0	0 3	0 0			
	4	36	3	3	3	4	S11 = 5	S12=6	S13=5
	0 0	1	5 0	0 5	0 2	0 0			
No.2	2	18	1	1	2	2	X 11 = 13	X12=8	X13=6
	0 2	3	6 0	5 1	0 5	2 2			
	5	40	4	4	3	4	g 21 = 12	S22=12	g23=11
	0 0	0	5 1	0 0	8 1	8 0			
No.2	3	35	4	3	2	2	S 21= 6	S22=5	S23=6
	0 1	0	0 6	0 0	5 0	8 0			
	1	17	1	1	1	1	X21=13	X22=7	X23=3
	5 1	2	8 4	4 2	8 0	7 0			
No.3	3	50	4	5	5	4	g31=10	g32=15	g33=12
	5 1	0	5 1	0 0	0 0	5 0			
	3	40	3	4	4	3	S11=7	S32=7	S33=6
	0 0	0	0 0	0 0	0 0	5 3			
No.3	2	20	1	1	2	2	X31=8	X32=3	X33=2
	0 0	2	5 0	5 0	0 2	2 2			
	4	50	4	5	4	4	g 41=10	g42=12	g43=14
	5 0	0	8 0	0 0	5 0	5 0			
No.3	3	40	3	3	3	3	S41=6	S42=5	S43=5
	5 0	0	8 0	6 0	5 0	5 2			
	2	20	1	1	2	1	X41=8	X42=2	X43=0
	2 2	1	8 0	5 0	0 2	5 2			
No.6	5	46	5	4	5	5	g51=12	g52=15	g53=12
	0 0	1	0 0	5 1	0 0	0 0			
	4	36	4	3	4	4	S51=5	S52=7	S53=6
	0 0	1	0 0	0 0	4 1	0 1			
No.6	1	18	2	1	1	2	X51=10	X52=3	X53=11
	8 2	1	0 1	5 0	4 2	0 4			
	5	45	5	4	5	4	g61=10	g62=12	g63=12
	0 0	0	0 0	8 0	0 2	8 1			
No.7	3	25	3	3	3	3	S61=4	S62=5	S63=6
	8 2	0	6 0	5 0	8 0	2 0			
	1	15	1	1	2	1	X61=8	X62=2	X63=3
	8 2	3	6 0	6 0	0 2	5 1			
No.7	4	38	5	4	5	5	g71=15	g72=16	g73=12
	5 0	1	0 0	8 0	0 0	0 1			
	3	28	3	4	4	4	S71=7	S72=7	S73=6
	0 1	0	6 0	0 0	0 1	0 1			
No.7	1	15	2	2	2	2	X71=7	X72=3	X73=0
	5 3	1	8 0	0 0	2 0	0 1			
	4	48	5	4	4	5	X31=12	g32=10	g33=14
	8 0	1	0 0	8 0	8 0	0 1			
No.8	3	35	3	4	3	3	G21=5	S22=6	S23=6
	6 1	0	5 1	0 0	8 0	5 0			
	1	14	1	2	1	1	S21=7	X22=2	X23=2
	6 1	1	5 1	0 1	8 2	5 1			
$\sum_{n=1}^N \sum_{L=1}^L b$	$b^{11}=20$	b 12=20	b 13=15	b 14=10	b 15=25	b 16=30	X1=72	X2=30	X3=18

جدول رقم (6)

حسابات الكلف الموقعية (K1) والمناقله (K2) الاستثمارية (K3) التي بمجموعها تمثل دالة الهدف طبقاً لطريقة الركن الشمال الغربي (west North corner)

الخطوط العمليات	5.1 A	5.1 B	5.2 A	B 5.2	5.3	5.4	المعروض	مجموع كلف المناقله	معمل النجف m=1	معمل بغداد m=2	معمل الموصل m=3	مجموع كلف الموقعية	مجموع كلف الاستثمارية
No.1	85	90	40	165	200	124	120 كادر	704	130	96	55	281	138
No.2	45	74	357	28	38	68		610	156	84	33	273	131
No.3	35	40	60	0	40	171		346	80	45	24	149	89
No.4	24	20	0	15	40	100		216	80	24	0	104	58
No.5	36	100	20	0	70	120		484	120	45	12	177	77
No.6	124	45	0	0	140	63		372	80	24	36	140	60
No.7	75	53	0	0	40	110		278	75	48	26	199	68
No.8	52	62	50	20	36	65		285	84	20	28	132	59
المطلوب			120 كادر									K1= 1405	K3= 680
مجموع كلف حسب الخطوط	496	484	228	606	821								

$$K=K1+k2+k3$$

$$K=1405 +3162 +680$$

$$K=5247 \text{ وحدة نقدية الكلية}$$

جدول رقم (7)
حل المشكلة على أساس العنصر الأقل تكلفة (least cost Method)

الخطوط العمليات	موقع معامل المؤسسة m								
	5.1A	5.1B	5.2A	5.2B	5.3	5.4	(1) النجف	(2) بغداد	(3)
العملية No.1	45 1	40 0	40 1	35 0	40 1	50 0	g11=10	g12=12	g13=11
	40 0	36 1	35 0	30 0	30 7	40 2	S11=5	S12=6	S13=5
	20 2	18 3	16 0	15 5	20 5	22 0	X11=13	X12=10	X13=3
العملية No.2	50 0	40 0	45 0	40 0	38 0	48 0	g21=12	g22=12	g23=11
	30 1	35 0	40 1	30 0	25 1	28 0	S21=6	S22=5	S23=3
	15 1	17 1	18 2	14 1	18 5	17 0	X21=20	X22=3	X23=0
العملية No.3	35 1	50 0	45 0	50 0	50 0	45 0	g31=10	g32=15	g33=12
	30 2	40 0	30 0	40 0	40 0	35 0	S31=7	S32=7	S33=6
	20 1	20 1	15 5	18 1	20 1	22 1	X31=10	X32=2	X33=1
العملية No.4	45 0	50 0	48 0	50 0	45 0	45 0	g41=10	g42=12	g43=14
	35 0	40 0	38 0	36 0	35 0	35 0	S41=12	S42=5	S43=5
	22 2	20 1	18 0	15 1	20 2	15 4	X41=10	X42=0	X43=0
العملية No.5	50 0	46 1	50 0	45 0	50 1	50 0	g51=12	g52=15	g53=12
	40 2	36 1	40 0	30 0	44 0	40 0	S51=5	S52=7	S63=6
	18 0	18 2	20 1	15 0	14 2	20 5	X51=10	X52=3	X53=1
العملية No.6	50 0	45 0	50 0	48 0	50 1	48 1	g61=10	g62=16	g63=12
	38 1	25 1	36 0	35 0	38 0	32 0	S61=4	S62=7	S63=6
	18 2	15 2	16 0	16 1	20 0	15 3	X61=8	X62=3	X63=3
العملية No.7	45 0	38 0	50 0	48 0	50 0	50 0	g71=15	g72=16	g73=12
	30 0	28 3	36 0	10 0	40 0	40 0	S71=7	S72=7	S73=6
	15 2	18 3	8 0	20 0	22 0	20 2	X71=7	X72=3	X73=0
العملية No.8	48 0	48 1	50 0	48 0	48 0	50 0	g81=12	g82=10	g83=1
	36 0	25 0	35 7	40 1	38 0	35 0	S81=5	S82=6	S83=6
	16 1	14 1	15 3	20 0	12 0	15 2	X81=7	X82=2	X83=1
$\sum_{L=1}^L b \ln$	b11=20	b12=20	b13=15	b14=10	b15=25	b 16=30	X1=85	X2=26	X3=19
	المطلوب 120			المعروض 155 تم انتخاب 120 حسب الكلف الأقل قيمة					

جدول رقم (8)
حسابات الكلف الموقعية (K1) والاستثمارية (K3) طبقاً لطريقة العنصر الأقل كلفه
(Least cost method)

مجموع الكلف الاستثمارية	مجموع الكلف الموقعية	معمل الموصل m=3 رقم (3)	معمل بغداد m=2 رقم (2)	معمل النجف m=1 رقم (1)	مجموع كلف المناقلة	المعروض	5.4	5.3	5.2b	5.2a	5.1b	5.1a	الخطوط العملية
140	383	30 15	120 60	130 65	684		80	350	75	40	54	85	No.1
135	276	0 0	36 15	240 120	437		170	115	14	76	17	45	No.2
90	142	12 6	30 14	100 70	270		22	20	18	75	20	115	No.3
60	100	0 0	0 0	160 60	179		60	40	15	0	20	44	No.4
77	177	12 6	45 21	120 50	346		100	28	0	20	118	80	No.5
60	140	36 18	24 10	80 32	320		93	50	16	0	55	106	No.6
70	153	0 0	48 21	105 49	199		40	0	0	0	129	30	No.7
59	128	14 6	30 18	84 35	438		30	0	40	290	62	16	No.8
=K3 691	=K1 1399						595	603	178	501	475	521	مجموع الكلف حسب الخطوط

$$K = K1 + K2 + K3$$

$$K = 1399 + 2873 + 691$$

$$K = 4963 \text{ وحدة نقدية } \text{التكاليف الكلية}$$