Ontwerp van het logistiek kostenwegingsmodel DISTOM, Distribution Trade Off Model

Bosman, B.B.M.

Award date:
1992

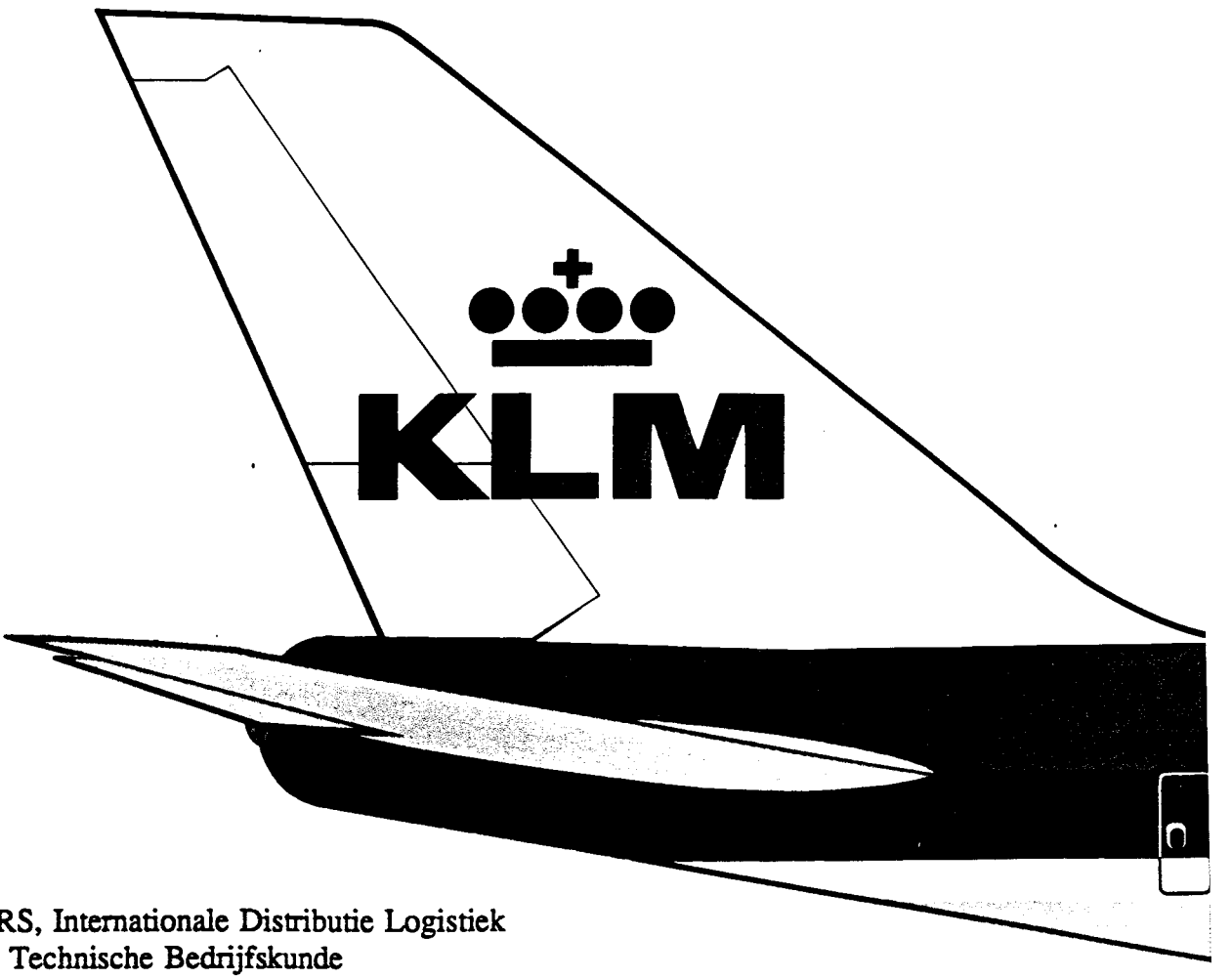
Eindverslag van afstudeeronderzoek bij KLM Vracht

Ontwerp van het logistiek kostenwegingsmodel

DISTOM

Distribution Trade Off Model

BIJLAGEN



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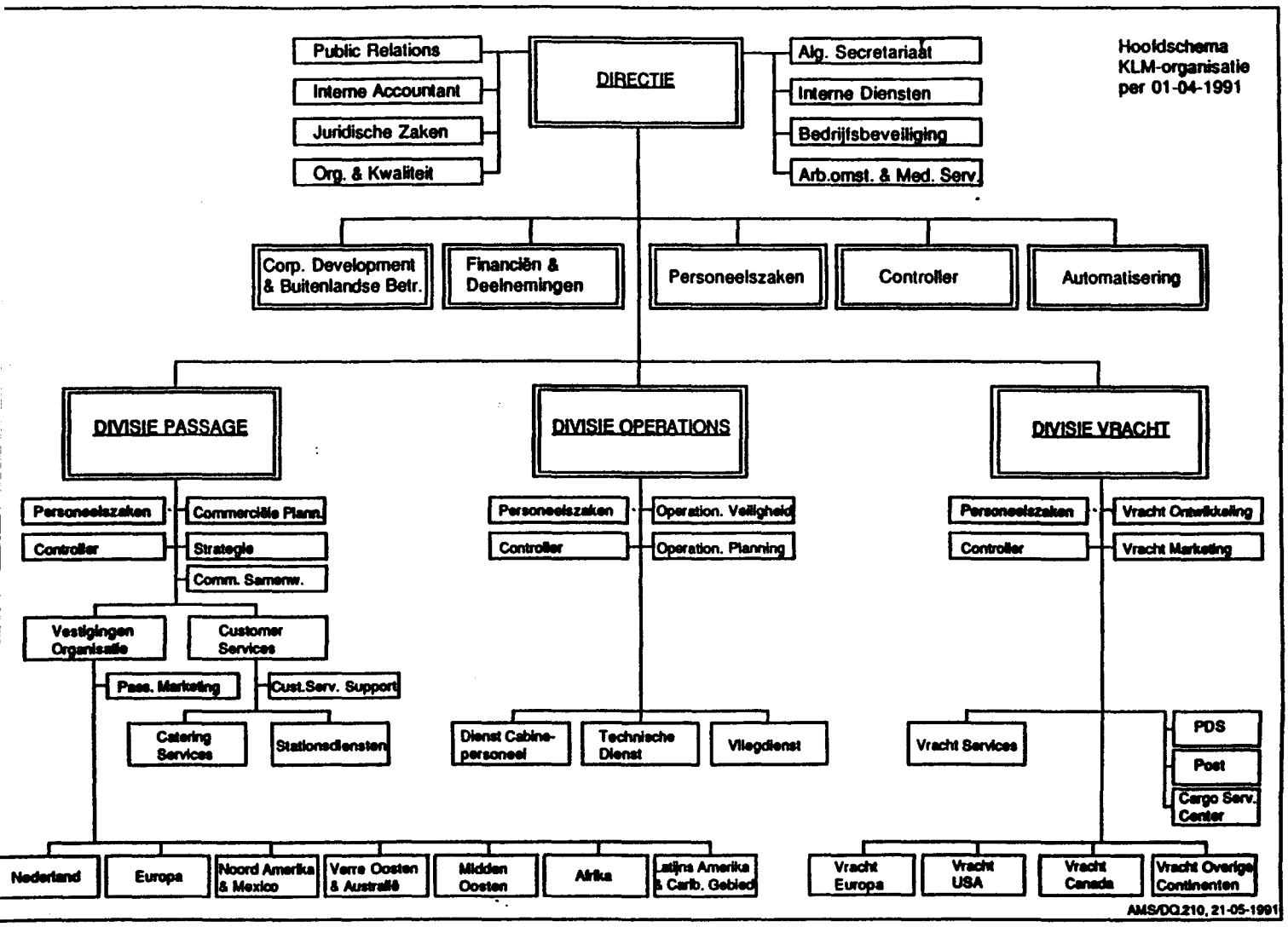
BIJLAGEN bij
Eindverslag van afstudeeronderzoek bij KLM Vracht

Ontwerp van het logistiek kostenwegingsmodel
DISTOM
Distribution Trade Off Model

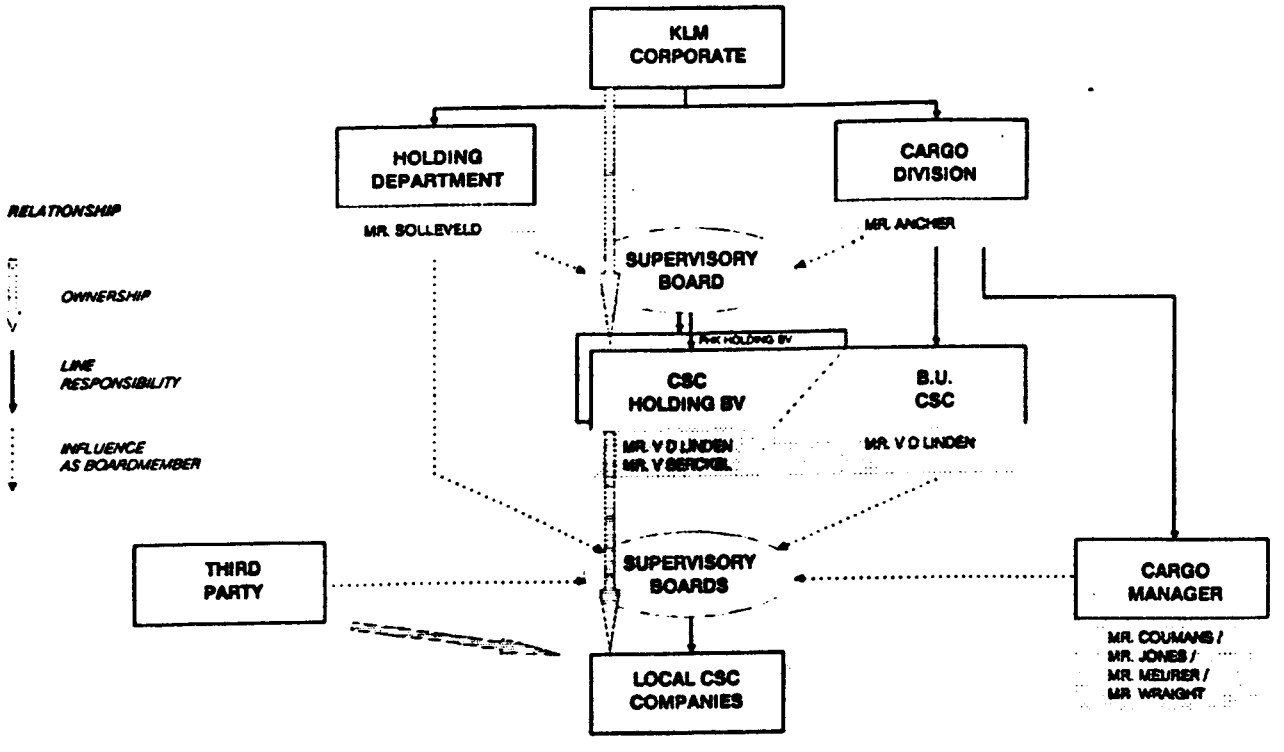
KLM CARGO SERVICE CENTER
BIJLAGEN.
Schiphol, Amsterdam,
10 januari 1992,
B.B.M. Bosman.

INHOUD

BIJLAGE 1: DE KONINKLIJKE LUCHTVAARTSCHAPPIJ N.V.



BIJLAGE 2: CARGO SERVICE CENTER



BIJLAGE 3: CSC LOGISTIC SERVICE ELEMENTS

Deze bijlage geeft een overzicht (in het engels) van de service-elementen die CSC wil gaan ontwikkelen en wil gaan aanbieden. Bij het ontwerp van DISTOM zijn deze 48 service-elements samengevoegd tot 8 service elementen.

Physical:

1. Receive cargo - create dock receipt
2. Inspect cargo - weighing/inspection/inventory receipt
3. Load & off-load cargo - CSC or customer premises
4. Build & break down pallets/containers - all modes
5. Break-bulk services
6. Storage - bonded/non bonded - cooled and heated
7. Packing/crating - all modes
8. Parts-bank operation
9. Inter company/point-of-sale distribution
10. Installation service
11. Assembly/modification of product
12. Security/guarding service
13. Hazardous goods handling
14. Labeling/re-labeling/marking
15. Round the clock 'emergency' capabilities

Transport:

16. Multi-modal carrier selection (Air/sea/truck/rail)
18. Multi-modal chartering
19. FTL/LCL/NVOCC
20. Sea-air/air-sea
21. Sea-land/land-sea
22. FTL trans-shipment
23. Express/standard/deferred Multimodal services
24. Door-to-door/shelf-to-shelf
25. Cooled/heated multimodal transport
26. Valuable/sensitive/hazardous transport

Administration and information technology

27. Documentation - air/sea/land waybills - all types
28. Banking documents - L/C's/drafts
29. Commercial documentation - invoices, packing, carnets
30. Governmental documentation - licences, carnets, etc.

31. Project management
32. Purchase order coördination
33. Traffic/management reporting/discrepancy reports
34. Inventory control/management - JIT/MRP I/MRP II/DRP
35. Warranty/repair/maintenance services
36. Order entry
37. Customs clearance - normal/expedited/automated
38. Automation - EDI/computer linking/document creation
39. Quality circles - improvement feed back
40. Performance reporting
41. Billing/invoicing on behalf of customer
42. Logistical consultancy
43. Proof of delivery by phone/fax/telex/written
44. Pre-payment of duty
45. Duty-drawback filing
46. Pre-advice service
47. Document translation
48. Insurance - multi-modal

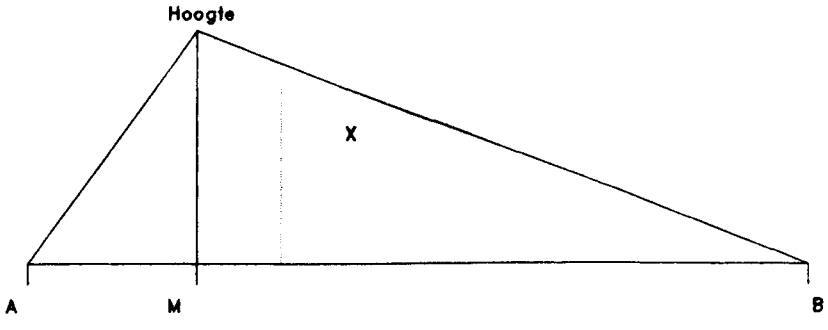
BIJLAGE 4: BEREKENING PIJPLIJNTIJD EN SPREIDING

Deze bijlage beschrijft de berekening van de gemiddelde pijplijntijd en de spreiding.

Uitgangsvariabelen:
Som van minimale doorlooptijden: summin (dagen)
Som van modus doorlooptijden : summmod (dagen)
Som van Maximale doorlooptijden: summmax (dagen)
Jaarlijkse stroom door pijp : yearflow (kilo's)
Leverbetrouwbaarheidsgraad : serv (percentage)

Berekening van de gemiddelde pijplijntijd:

1. A = summod - ((summod - summin)/(√aantal service elements))
   B = summod + ((summax - summod)/(√aantal service elements))
   M = summod



2. Hoogte driehoek = 2/(B - A)

3. ALS 0,5 * (B - M) * Hoogte > 0,5
   DAN (1) 0,5 * ((B - pijp) * X) = 0,5
   (2) X/(B - pijp) = Hoogte/(B - M)

   DUS X = (B - pijp) * Hoogte/(B - M)

   SUBSTITUTIE VAN (2) IN (1) GEEFT
   0,5 * (B - pijp) * ((B - pijp) * Hoogte/(B - M)) = 0,5
   (B - pijp) = √(B - M)/Hoogte

4. Pijplijntijd = pijp = B - √((B - M)/Hoogte)

5. ANDERS
   Pijplijntijd = A + √((M - A)/Hoogte)

De berekening van de spreiding:

De spreiding wordt opgesplitst in 2 delen: Spreiding om afwijkingen in de gemiddelde pijplijntijd op te vangen en Spreiding om afwijkingen in het vraagpatroon gedurende de pijplijntijd op te vangen.

Spreiding in de pijplijntijd

1. ALS 0,5 * (M - A) * Hoogte < Serv
   pijpspreid = B - pijp - (√(2 * (1 - serv) * (B -M)/Hoogte))

   ANDERS
   pijpspreid = A - pijp + (√(2 * serv * (M - A)/Hoogte))

Spreiding in de vraag gedurende de pijplijntijd

2. (1) Veiligheidsvoorraad = (√(year/365)) * (pijp + pijpspreid)
   (2) Veiligheidsvoorraad/jaaromzet = Tijd van voorraad/365

   SUBSTITUTIE VAN (1) IN (2) GEEFT

   Tijd van voorraad = tijdspreid =
   (pijp + pijpspreid) * (√(365/year))

3. Spreiding = pijpspreid + tijdspreid

BIJLAGE 5: BEREKENING WEGENDE EN METENDE TARIEVEN

De transporttarieven zijn 'wegend' of 'metend'. Dat wil zeggen dat de volume/gewicht-verhoudig van het te verzenden product bepalend is voor de hoogte van het tarief.
De berekening van dat tarief is als volgt.

Uitgangsvariabelen:
Volume/gewicht-verhouding: v/w (dm3/kg)
Kilotarief : act (FL/kg)
Breekpunt van tarief : Bv/w (dm3/kg)

Het berekende tarief = MAX [act , (v/w)/(Bv/w) * act]

Dus een product met een volume/gewicht-verhouding < breekpunt heeft gewoon het Kilotarief.
Een product met een volume/gewicht-verhouding > breekpunt heeft een factor (groter dan 1) maal het Kilotarief

BIJLAGE 6: BEREKENING KOSTENPLAATSEN

De kostenplaatsen worden door DISTOM per service-element berekend. De berekeningen worden per kostenplaats opgesplitst in 2 functies: een waardeafhankelijke: (V(x) * EX-works waarde) plus een waarde-onafhankelijke kostenfunctie: NV(x).
Deze opsplitsing is noodzakelijk om, naast het kostentotaal, de break-evenwaardedichtheid te kunnen berekenen. Vervolgens worden deze twee functies weer opgesplitst in 2 delen, Vvoor(x), Vna(x) en NVvoor(x) en NVna(x) om de kostenplaatsen Insurance en Customs Duties te kunnen berekenen op basis van de CIF waarde van de goederen.
Hieronder zulllen eerst de berekening van de verschillende functies worden weer gegeven. Vervolgens wordt de break-even berekening gepresenteerd.

BEREKENING KOSTENTOTAAL:

EXW := Ex-works waardedichtheid

Vtot(som) := De som van alle waardeafhankelijke parameters
Vvoor(som) := De som van de waardeafhandelijke parameters Vvoor(x)
Vna(som) := De som van de waardeafhankelijke parameters Vna(x)
NVtot(som) := De som van alle waarde-onafhankelijke kostenfuncties
NVvoor(som):= De som van de kostenfuncties NVvoor(x)
NVna(som) := De som van de kostenfuncties NVna(x)

ALS

Preparation		
Packing	: Vvoor(packing) * EXW	NVvoor(packing)
Adm. Handl.	:	NVvoor(Adm.Handl.)
Handling Out/In		
Phys.Handl.	:	NVvoor(Phys.Handl.)
		NVna(Phys.Handl.)
Transport Road		
Road	:	NVvoor(Road)
		NVna(Road)
Transport Sea		
Sea	:	NVvoor(Sea)
		NVna(Sea)
Transport Air		
Air	:	NVvoor(Air)
		NVna(Air)

```
Warehousing
      Warehousing :                                NVvoor(Warehouse)
                                                   NVna(Warehouse)
Black Box
      Black Box   : Vvoor(Black B.) * EXW          NVvoor(Black B.)
                    Vna(Black B.) * EXW            NVna(Black B.)
Customs
      Insurance   : V(Insure) * EXW :=
                        premie * [1,1 * ((1 + Vvoor(som))] * EXW
                    NV(Insure):=
                        premie * 1,1 * NVvoor(som))
      Duties      : V(Duties) * EXW :=
                        heffing * [1 + Vvoor(som) + V(Insure)] * EXW
                    NV(Duties):=
                        heffing * NVvoor * [1 + NV(Insure)]
      Clearance   :                                NVna(Clear)
Finishing
      Safety Stock: V(Safe St.) * EXW :=
                        percentage * [(1 + Vvoor(som) + V(Insure) +
                        V(Duties) + Vna(som)] * EXW * (spreiding/365)
                    NV(Safe St.) :=
                        percentage * [(NVvoor(som) + NV(Insure) +
                   NV(Duties) + NVna(som)] * (Spreiding/365)
      Interest    : V(Interest) * EXW :=
                        rentepercentage * (pijplijntijd/365) * EXW
      Opportunity :V(opport.) * EXW                NV(opport.)
```

DAN wordt het Kostentotaal =
Vtot(som) * EXW + NVtot(som)

De berekening van de Break-even waardedichtheid (BEW) is met de opsplitsing betrekkelijk eenvoudig geworden.

BREAK-EVEN WAARDEDICHTHEID:

STEL Kostentotaal van service-package A en B.

Kostentotaal van A = Vtot(som)A * EXWA + NVtot(som)A
Kostentotaal van B = Vtot(som)B * EXWB + NVtot(som)B

DAN Vtot(som)A * BEW + NVtot(som)A = Vtot(som)B * BEW + NVtot(som)B

DUS BEW = [NVtot(som)B - NVtot(som)A]/[Vtot(som)A - Vtot(som)B]

BIJLAGE 7: OUTPUT DISTOM VALIDATIE BIJ IFF TILBURG

D I S T O M : Results IFFLCL date: 10jan92

Initiate alternative	TIME-CHECK
Origin	TILBURG
Destination	HONG KONG
PRODUCT CHARACTERISTICS	
Volume/weight ratio	1.8000 dm3/kg
SHIPMENT CHARACTERISTICS	
Yearly flow	246025 kg

Alternative activities	TRADE-OFF		
Alternative	Time (days) min.	mod.	max.
PREPARATION	0.5	1.0	2.0
TRANSPORT TRUCK	1.0	1.0	1.0
HANDLING OUT/IN	2.0	3.0	4.0
TRANSPORT SEA	21.0	21.0	24.0
HANDLING OUT/IN	1.0	1.0	2.0
TRANSPORT TRUCK	2.0	2.0	3.0
FINISHING	0.0	0.0	0.0

Final results	TIME-CHECK
Sub-total time minimum	28.43
Sub-total time modus	29.00
Sub-total time maximum	31.65
Client customer service	98.00
Average throughput time	29.58
Average safety stock time	2.85

Initiate alternative		TRADE-OFF
Origin		TILBURG
Destination		HONG KONG
UNITS OF CALCULATION		
Currency		fl
Weight		kg
Volume		m3
PRODUCT CHARACTERISTICS		
Volume/weight ratio		1.8000 dm3/kg
Ex-works	fl	44.08 /kg
SHIPMENT CHARACTERISTICS		
Shipment size		3785 kg
Number of colli		41 /shipment
Number of shipments		65 /yr
Yearly flow		246025 kg

Alternative activities	Time (days) min.	mod.	max.
PREPARATION	0.5	1.0	2.0
TRANSPORT TRUCK	1.0	1.0	1.0
HANDLING OUT/IN	2.0	3.0	4.0
TRANSPORT SEA	21.0	21.0	24.0
HANDLING OUT/IN	1.0	1.0	2.0
TRANSPORT TRUCK	2.0	2.0	3.0
FINISHING	0.0	0.0	0.0

PREPARATION			
Packing	fl	0.00	/shpt
Administrative handling	fl	18.00	/shpt
TRANSPORT TRUCK			
Actual weight price	fl	0.0431	/kg
Break point		3.0	dm3/kg
HANDLING OUT/IN			
Physical handling	fl	0.0700	/kg
TRANSPORT SEA			
Actual weight price	usd	76.59	/m3
Break point		1.0	dm3/kg
HANDLING OUT/IN			
Physical handling	fl	0.0000	/kg
TRANSPORT TRUCK			
Actual weight price	usd	65.00	/m3
Break point		3.0	dm3/kg
FINISHING			
Insurance		0.0189	%
Capital in transit ; Interest rate		16.00	%
Safety stock ; Costs		21.00	%
Client customer service		98.00	%

D I S T O M : Results IFFLCL date: 10jan92

Final results TRADE-OFF

Costs	Calculation of costs	Result	Ctrl
Packing	0.0000/(SHPT)	0.0000	CSC
Adm. handling	18.0000/(SHPT)	0.0048	CSC
TRUCK	0.0431	0.0431	CSC
Phys. handling	0.0700	0.0700	CSC
SEA	((76.5900*EX_R/1000)*VW/(1.0))*VW	0.4482	CSC
Phys. handling	0.0000	0.0000	CSC
TRUCK	(65.0000*EX_R/1000)*VW	0.2113	CSC
Insurance	1.1*(C+F) * 0.0189/100	0.0093	CSC
Interest 29.58	(time/365) * (16.00/100)*EXW	0.5716	CSC
Safety stock 2.85	(variation/365) * (21.00/100) * DDP	0.0736	CSC
TOTAL COSTS		1.4320	

D I S T O M : Results IFFAIR date: 10jan92

Initiate alternative TIME-CHECK

Origin	TILBURG
Destination	HONG KONG
PRODUCT CHARACTERISTICS	
Volume/weight ratio	1.8000 dm3/kg
SHIPMENT CHARACTERISTICS	
Yearly flow	22425 kg

Alternative activities TRADE-OFF

Alternative	Time (days) min.	mod.	max.
PREPARATION	0.5	1.0	2.0
TRANSPORT TRUCK	0.5	1.0	1.0
TRANSPORT AIR	2.5	3.0	3.0
HANDLING OUT/IN	1.0	1.0	2.0
TRANSPORT TRUCK	1.0	2.0	2.0
FINISHING	0.0	0.0	0.0

Final results	TIME-CHECK
Sub-total time minimum	6.98
Sub-total time modus	8.00
Sub-total time maximum	8.82
Client customer service	98.00
Average throughput time	7.95
Average safety stock time	1.80

D I S T O M : Results IFFAIR date: 10jan92

Initiate alternative			TRADE-OFF
Origin			TILBURG
Destination			HONG KONG
UNITS OF CALCULATION			
Currency			fl
Weight			kg
Volume			m3
PRODUCT CHARACTERISTICS			
Volume/weight ratio		1.8000	dm3/kg
Ex-works	fl	106.39	/kg
SHIPMENT CHARACTERISTICS			
Shipment size		300	kg
Number of colli		7	/shipment
Number of shipments		75	/yr
Yearly flow		22425	kg

Alternative activities	TRADE-OFF		
Alternative	Time (days) min.	mod.	max.
PREPARATION	0.5	1.0	2.0
TRANSPORT TRUCK	0.5	1.0	1.0
TRANSPORT AIR	2.5	3.0	3.0
HANDLING OUT/IN	1.0	1.0	2.0
TRANSPORT TRUCK	1.0	2.0	2.0
FINISHING	0.0	0.0	0.0

PREPARATION			
Packing	fl	0.00	/shpt
Administrative handling	fl	0.00	/shpt
TRANSPORT TRUCK			
Actual weight price	fl	0.2718	/kg
Break point		3.0	dm3/kg
TRANSPORT AIR			
Actual weight price	fl	3.9500	/kg
Break point		6.0	dm3/kg
HANDLING OUT/IN			
Physical handling	fl	0.0000	/kg
TRANSPORT TRUCK			
Actual weight price	usd	0.9000	/kg
Break point		3.0	dm3/kg
FINISHING			
Insurance		0.0189	%
Capital in transit ; Interest rate		16.00	%
Safety stock ; Costs		21.00	%
Client customer service		98.00	%

D I S T O M : Results IFFAIR date: 10jan92

Final results TRADE-OFF

Costs		Calculation of costs	Result	Ctrl
Packing		0.0000/(SHPT)	0.0000	CSC
Adm. handling		0.0000/(SHPT)	0.0000	CSC
TRUCK		0.2718	0.2718	CSC
AIR		3.9500	3.9500	CSC
Phys. handling		0.0000	0.0000	CSC
TRUCK		0.9000*EX_R	1.6256	CSC
Insurance		1.1*(C+F) * 0.0189/100	0.0233	CSC
Interest	7.95	(time/365) * (16.00/100)*EXW	0.3707	CSC
Safety stock	1.80	(variation/365) * (21.00/100) * DDP	0.1162	CSC
TOTAL COSTS			6.3575	

D I S T O M : Compare results alternatives date: 10jan92

Final results TRADE-OFF

Filename : IFFAIR			Filename : IFFLCL		
Origin : TILBURG			Origin : TILBURG		
Destination : HONG KONG			Destination : HONG KONG		
Costs	fl	Cntrl	Costs	fl	Cntrl
Packing	0.0000	CSC	Packing	0.0000	CSC
Adm. handling	0.0000	CSC	Adm. handling	0.0048	CSC
TRUCK	0.2718	CSC	TRUCK	0.0431	CSC
AIR	3.9500	CSC	Phys. handling	0.0700	CSC
Phys. handling	0.0000	CSC	SEA	0.4482	CSC
TRUCK	1.6256	CSC	Phys. handling	0.0000	CSC
Insurance	0.0233	CSC	TRUCK	0.2113	CSC
Interest 7.95	0.3707	CSC	Insurance	0.0093	CSC
Safety stock 1.80	0.1162	CSC	Interest 29.58	0.5716	CSC
			Safety stock 2.85	0.0736	CSC
TOTAL COSTS	6.3575		TOTAL COSTS	1.4320	
Cost difference :	4.9255		Break-even value :	503.00	

D I S T O M : Sensitivity analyses date: 10jan92

Cost difference : 4.9255 Break-even value : 503.00

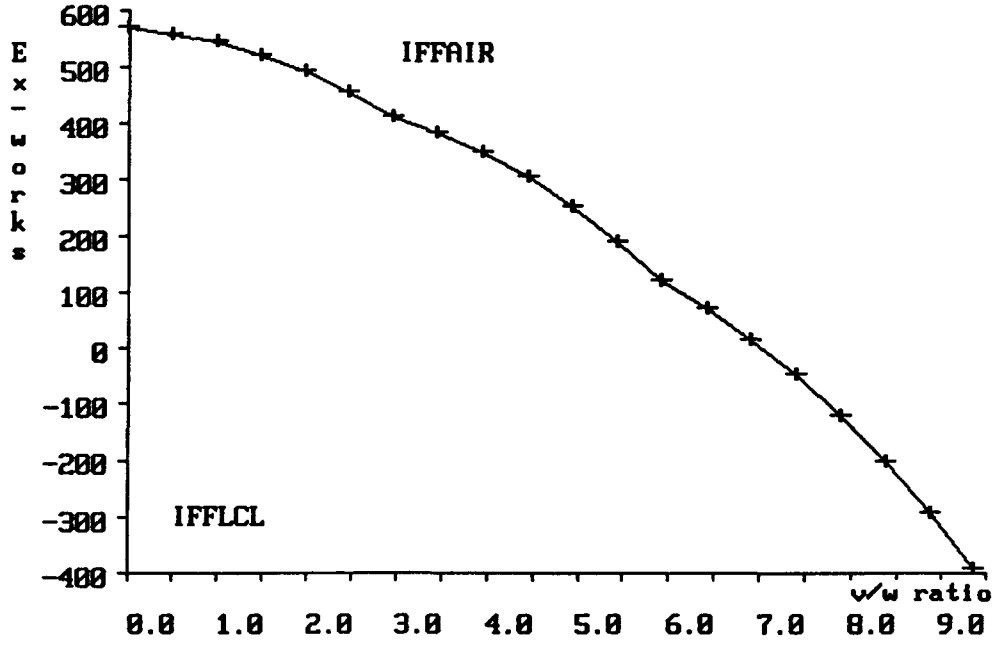
Variation of :			Difference cur	Break-even cur
10	Volume/weight ratio	for BOTH	-0.12	-11.44
10	usd Exchange-rate	for BOTH	0.10	9.58
10	Interest	for BOTH	-0.02	-43.22
10	Ex-works value	for BOTH	-0.02	0.00
10	Volume/weight ratio	for IFFLCL	-0.12	-11.44
10	usd Exchange-rate	for IFFLCL	-0.07	-6.55
10	Ex-works value	for IFFLCL	-0.07	0.00
10	Interest	for IFFLCL	-0.06	-57.28
10	SEA	for IFFLCL	-0.04	-4.45
10	Time modus	for IFFLCL	-0.04	-37.89
10	Time maximum	for IFFLCL	-0.03	-30.19
10	TRUCK	for IFFLCL	-0.02	-2.10
10	Client customer service	for IFFLCL	-0.01	-12.01
10	Safety stock	for IFFLCL	-0.01	-8.06

D I S T O M : Sensitivity analyses date: 10jan92

Cost difference : 4.9255 Break-even value : 503.00

Variation of :			Difference cur	Break-even cur
0		for	0.00	0.00
0		for	0.00	0.00
0		for	0.00	0.00
0		for	0.00	0.00
10	AIR	for IFFAIR	0.40	39.19
10	TRUCK	for IFFAIR	0.16	16.13
10	usd Exchange-rate	for IFFAIR	0.16	16.13
10	Ex-works value	for IFFAIR	0.05	0.00
10	Interest	for IFFAIR	0.04	17.99
10	TRUCK	for IFFAIR	0.03	2.70
10	Time modus	for IFFAIR	0.03	12.65
10	Time maximum	for IFFAIR	0.02	10.83
10	Client customer service	for IFFAIR	0.01	5.73
10	Safety stock	for IFFAIR	0.01	5.27

D I S T O M : Break-even analyses TRADE-OFF date: 10jan92



D I S T O M : Results CSCLCL date: 10jan92

Initiate alternative TIME-CHECK

Origin	TILBURG
Destination	HONG KONG
PRODUCT CHARACTERISTICS	
Volume/weight ratio	1.8000 dm3/kg
SHIPMENT CHARACTERISTICS	
Yearly flow	246025 kg

Alternative activities TRADE-OFF

Alternative	Time (days) min.	mod.	max.
PREPARATION	0.5	1.0	2.0
TRANSPORT TRUCK	1.0	1.0	1.0
HANDLING OUT/IN	2.0	3.0	4.0
TRANSPORT SEA	21.0	21.0	24.0
HANDLING OUT/IN	1.0	1.0	2.0
TRANSPORT TRUCK	2.0	2.0	3.0
FINISHING	0.0	0.0	0.0

Final results	TIME-CHECK
Sub-total time minimum	28.43
Sub-total time modus	29.00
Sub-total time maximum	31.65
Client customer service	98.00
Average throughput time	29.58
Average safety stock time	2.85

D I S T O M : Results CSCLCL date: 10jan92

Initiate alternative		TRADE-OFF
Origin		TILBURG
Destination		HONG KONG
UNITS OF CALCULATION		
Currency		fl
Weight		kg
Volume		m3
PRODUCT CHARACTERISTICS		
Volume/weight ratio		1.8000 dm3/kg
Ex-works	fl	44.08 /kg
SHIPMENT CHARACTERISTICS		
Shipment size		3785 kg
Number of colli		41 /shipment
Number of shipments		65 /yr
Yearly flow		246025 kg

Alternative activities	TRADE-OFF		
Alternative	Time (days) min.	mod.	max.
PREPARATION	0.5	1.0	2.0
TRANSPORT TRUCK	1.0	1.0	1.0
HANDLING OUT/IN	2.0	3.0	4.0
TRANSPORT SEA	21.0	21.0	24.0
HANDLING OUT/IN	1.0	1.0	2.0
TRANSPORT TRUCK	2.0	2.0	3.0
FINISHING	0.0	0.0	0.0

PREPARATION			
Packing	fl	0.00	/shpt
Administrative handling	fl	75.00	/shpt
TRANSPORT TRUCK			
Actual weight price	fl	0.0462	/kg
Break point		3.0	dm3/kg
HANDLING OUT/IN			
Physical handling	fl	0.0550	/kg
TRANSPORT SEA			
Actual weight price	usd	58.11	/m3
Break point		1.0	dm3/kg
HANDLING OUT/IN			
Physical handling	fl	0.0000	/kg
TRANSPORT TRUCK			
Actual weight price	usd	65.00	/m3
Break point		3.0	dm3/kg
FINISHING			
Insurance		0.0189	%
Capital in transit ; Interest rate		16.00	%
Safety stock ; Costs		21.00	%
Client customer service		98.00	%

D I S T O M : Results CSCLCL date: 10jan92

Final results		TRADE-OFF	
Costs	Calculation of costs	Result	Ctrl
Packing	0.0000/(SHPT)	0.0000	CSC
Adm. handling	75.0000/(SHPT)	0.0198	CSC
TRUCK	0.0462	0.0462	CSC
Phys. handling	0.0550	0.0550	CSC
SEA	((58.1100*EX_R/1000)*VW/(1.0))*VW	0.3401	CSC
Phys. handling	0.0000	0.0000	CSC
TRUCK	(65.0000*EX_R/1000)*VW	0.2113	CSC
Insurance	1.1*(C+F) * 0.0189/100	0.0093	CSC
Interest 29.58	(time/365) * (16.00/100)*EXW	0.5716	CSC
Safety stock 2.85	(variation/365) * (21.00/100) * DDP	0.0735	CSC
TOTAL COSTS		1.3268	

D I S T O M : Results CSCAIR date: 10jan92

Initiate alternative TIME-CHECK

Origin	TILBURG
Destination	HONG KONG
PRODUCT CHARACTERISTICS	
Volume/weight ratio	1.8000 dm3/kg
SHIPMENT CHARACTERISTICS	
Yearly flow	22500 kg

Alternative activities TRADE-OFF

Alternative	Time (days) min.	mod.	max.
PREPARATION	0.5	1.0	2.0
TRANSPORT TRUCK	0.5	0.5	0.5
HANDLING OUT/IN	0.5	0.5	1.0
TRANSPORT AIR	1.0	1.0	1.0
HANDLING OUT/IN	0.5	0.5	0.5
TRANSPORT TRUCK	1.0	1.0	2.0
FINISHING	0.0	0.0	0.0

Final results	TIME-CHECK
Sub-total time minimum	4.31
Sub-total time modus	4.50
Sub-total time maximum	5.44
Client customer service	98.00
Average throughput time	4.71
Average safety stock time	1.26

Initiate alternative		TRADE-OFF
Origin		TILBURG
Destination		HONG KONG
UNITS OF CALCULATION		
Currency		fl
Weight		kg
Volume		m3
PRODUCT CHARACTERISTICS		
Volume/weight ratio		1.8000 dm3/kg
Ex-works	fl	106.39 /kg
SHIPMENT CHARACTERISTICS		
Shipment size		300 kg
Number of colli		7 /shipment
Number of shipments		75 /yr
Yearly flow		22500 kg

Alternative activities	TRADE-OFF		
Alternative	Time (days) min.	mod.	max.
PREPARATION	0.5	1.0	2.0
TRANSPORT TRUCK	0.5	0.5	0.5
HANDLING OUT/IN	0.5	0.5	1.0
TRANSPORT AIR	1.0	1.0	1.0
HANDLING OUT/IN	0.5	0.5	0.5
TRANSPORT TRUCK	1.0	1.0	2.0
FINISHING	0.0	0.0	0.0

PREPARATION			
Packing	fl	0.00	/shpt
Administrative handling	fl	50.40	/shpt
TRANSPORT TRUCK			
Actual weight price	fl	0.3000	/kg
Break point		3.0	dm3/kg
HANDLING OUT/IN			
Physical handling	fl	50.00	/shpt
TRANSPORT AIR			
Actual weight price	fl	2.9600	/kg
Break point		6.0	dm3/kg
HANDLING OUT/IN			
Physical handling	fl	0.5000	/kg
TRANSPORT TRUCK			
Actual weight price	usd	0.9000	/kg
Break point		3.0	dm3/kg
FINISHING			
Insurance		0.0189	%
Capital in transit ; Interest rate		16.00	%
Safety stock ; Costs		21.00	%
Client customer service		98.00	%

D I S T O M : Results CSCAIR date: 10jan92

Final results TRADE-OFF

Costs	Calculation of costs	Result	Ctrl
Packing	0.0000/(SHPT)	0.0000	C
Adm. handling	50.4000/(SHPT)	0.1680	C
TRUCK	0.3000	0.3000	C
Phys. handling	50.0000/(SHPT)	0.1667	C
AIR	2.9600	2.9600	C
Phys. handling	0.5000	0.5000	C
TRUCK	0.9000*EX_R	1.6256	C
Insurance	1.1*(C+F) * 0.0189/100	0.0233	C
Interest 4.71	(time/365) * (16.00/100)*EXW	0.2198	C
Safety stock 1.26	(variation/365) * (21.00/100) * DDP	0.0813	C
TOTAL COSTS		6.0447	

D I S T O M : Compare results alternatives date: 10jan92

Final results			TRADE-OFF		
Filename : CSCAIR			Filename : CSCLCL		
Origin : TILBURG			Origin : TILBURG		
Destination : HONG KONG			Destination : HONG KONG		
Costs	fl	Cntrl	Costs	fl	Cntrl
Packing	0.0000	C	Packing	0.0000	CSC
Adm. handling	0.1680	C	Adm. handling	0.0198	CSC
TRUCK	0.3000	C	TRUCK	0.0462	CSC
Phys. handling	0.1667	C	Phys. handling	0.0550	CSC
AIR	2.9600	C	SEA	0.3401	CSC
Phys. handling	0.5000	C	Phys. handling	0.0000	CSC
TRUCK	1.6256	C	TRUCK	0.2113	CSC
Insurance	0.0233	C	Insurance	0.0093	CSC
Interest 4.71	0.2198	C	Interest 29.58	0.5716	CSC
Safety stock 1.26	0.0813	C	Safety stock 2.85	0.0735	CSC
TOTAL COSTS	6.0447		TOTAL COSTS	1.3268	
Cost difference :	4.7179		Break-even value :	427.46	

D I S T O M : Sensitivity analyses date: 10jan92

Cost difference : 4.7179 Break-even value : 427.46

Variation of :			Difference cur	Break-even cur
10	Volume/weight ratio	for BOTH	-0.09	-7.85
10	Interest	for BOTH	-0.04	-36.10
10	Ex-works value	for BOTH	-0.03	0.00
10	Shipment size	for BOTH	-0.03	-2.42
10	Volume/weight ratio	for CSCLCL	-0.09	-7.85
10	Ex-works value	for CSCLCL	-0.07	0.00
10	Interest	for CSCLCL	-0.06	-42.27
10	usd Exchange-rate	for CSCLCL	-0.06	-4.67
10	Time modus	for CSCLCL	-0.04	-27.80
10	SEA	for CSCLCL	-0.03	-2.88
10	Time maximum	for CSCLCL	-0.03	-22.10
10	TRUCK	for CSCLCL	-0.02	-1.79
10	Client customer service	for CSCLCL	-0.01	-8.74
10	Safety stock	for CSCLCL	-0.01	-5.86

D I S T O M : Sensitivity analyses date: 10jan92

Cost difference : 4.7179 Break-even value : 427.46

Variation of :			Difference cur	Break-even cur
10	AIR	for CSCAIR	0.30	25.07
10	TRUCK	for CSCAIR	0.16	13.77
10	usd Exchange-rate	for CSCAIR	0.16	13.77
10	Phys. handling	for CSCAIR	0.07	5.65
10	Phys. handling	for CSCAIR	0.07	5.65
10	Ex-works value	for CSCAIR	0.03	0.00
10	Shipment size	for CSCAIR	-0.03	-2.58
10	TRUCK	for CSCAIR	0.03	2.54
10	Interest	for CSCAIR	0.02	7.61
10	Adm. handling	for CSCAIR	0.02	1.42
10	usd Exchange-rate	for BOTH	0.11	9.09
10	Volume/weight ratio	for BOTH	-0.09	-7.85
10	Interest	for BOTH	-0.04	-36.10
10	Ex-works value	for BOTH	-0.03	0.00

D I S T O M : Break-even analyses TRADE-OFF date: 10jan92