Case Study Transport Calculation

The following exercise is a shortened version of a Case Study, which was designed as part of a Master thesis in cooperation with the Logistikum Steyr (The complete Case Study is available under www.rewway.at).

Background

Maria Schubert works for an Austrian forwarding company. She has to advise and support customers to choose the appropriate mode of transport for their specific goods. The customer Unger has the following request:

The company Unger wants to transport 3.400 tons of scrap metal (bulk cargo) from Duisburg (Germany) to Vienna (Austria). The company is asking for the best possible offer but has no special demands for the transport.

Task

Calculate the total cost as well as the cost per tonne for the above-mentioned transport using the inland vessel. Use the calculation scheme below and compare the price with the cost for truck and train (see graph below).

Give a recommendation to the company Unger based on the calculation below.

Attention: In this case, the inland waterway transport is carried out by a <u>2-unit pushed convoy</u> consisting of a MCV (max. 1.850 t) and a pushed lighter (PL max. 1.720 t) from a <u>shipping company</u> (24 hour operating form).

SOLUTION:

Customer Unger	Inland vessel	Truck	Train
Total cost	€	158.619,52 €	54.822,8 €
Cost per tonne	€/t	46,7 €/t	16,1 €/t

Calculation Inland Vessel:

Calculation scheme inland waterway transport:

A	Quantity		t
B	Operating form	☐ private ship owner ☐ shipping company	☐ A (14 h/d) ☐ B (18 h/d) ☐ C (24 h/d)
C	Distance		km
D	Calculated travel time		h*
E	Surcharge for empty voyages		h*
F	Calculative transport time	D + E / 24	d (days)*
G	Calculated port time (transhipment and waiting)		d (days)*
H	Cost effective time required	F + G	d (days)*
I	Daily rate		€**
J	**Standby costs**	H x I	**€****
K	Transport performance	A x C	tkm
L	Specific fuel consumption		kg/1.000 tkm
M	Effective fuel consumption	K x L / 1.000	kg
N	Current fuel price (Ø)		0,65 €/kg
O	**Fuel costs**	M x N	**€****
P	Port fees per tonne	port of loading and unloading	€/t
Q	**Total port fees**	A x P	**€****
R	**TOTAL COST**	**J + O + Q**	**€**
S	**COST PER TONNE**	**R / A**	**€/t***

* rounded down to one decimal place
** rounded up to next whole Euro amount

Surcharge for empty voyages:

It is often not possible to fully utilize vessels in both directions/at the return voyage. It is possible that the vessel has to drive back empty. Thus, average surcharge for empty voyages are included in the cost calculation:

Average surcharge for empty voyages (% of travel times)	
Shipping company	10 %
Private ship owner	15 %

Times rounded down to one decimal place

Reference values for loading and unloading:

Loading and unloading periods vary greatly from situation to situation. They depend on the transhipment facilities present in the port in question, as well as their current availability. In this example in both ports transhipment is possible 24 hours/7 days a week. A waiting period of **one notification day** per transport has to be calculated.

Type of cargo	Transhipment method	Procedure	Reference value
Bulk cargo	grabber, suction equipment, chute	loading	150 t/h
		unloading	100 t/h
General cargo	hook	(un-)loading	60 t/h
Container	bridge	(un-)loading	16 cont./h

Round down to one decimal place

Daily rate (standby costs):

The total cost of the vessel operator are covered through daily rates. Total cost per year include for example costs for the crew, insurance, repairs and amortisation.

Vessel category	MCV	PL
Total cost in €/year	490.000	62.700
Days in use/year	330	330

Round up daily rate to next whole Euro amount

Specific fuel consumption:

Vessel category	Ø consumption in kg/1.000 tkm
MCV	10,0
MCV + PL (pushed lighter)	8,5

Port fees:

Port fees are defined in the harbour regulations of each port and have to be paid in the port of loading **and** unloading. **Ø port fees per port:** 0,36 €/t.

Travel times (incl. distances):

4-unit pushed convoy	2-unit pushed convoy	MCV 2.000 t	MCV 1.350 t	distance in km	port	MCV 1.350 t	MCV 2.000 t	2-unit pushed convoy	4-unit pushed convoy
travel time in hours						travel time in hours			
	174	161	172	1.440	**Ghent**	159	149	165	
	170	157	168	1.419	**Antwerp**	155	145	161	
	163	151	160	1.325	**Amsterdam**	149	140	154	
	163	151	161	1.336	**Rotterdam**	147	138	152	
	145	135	142	1.119	**Duisburg**	135	127	141	
	119	113	113	835	**Mainz**	119	111	125	
	115	109	109	808	**Frankfurt**	116	108	122	
	43	41	41	380	**Nuremberg**	55	47	55	
	26	25	25	280	**Kelheim**	39	31	39	
	23	22	22	242	**Regensburg**	33	26	34	
	14	13	13	153	**Deggendorf**	21	17	21	
				0	**LINZ**				
2	2	2	2	19	**Enns**	3	2	3	3
7	6	6	6	73	**Ybbs**	10	8	10	11
13	10	10	10	133	**Krems**	17	14	17	19
20	17	17	17	211	**Vienna**	27	22	27	30
26	22	22	22	263	**Bratislava**	36	30	37	41
42	37	37	37	491	**Budapest**	60	51	61	70
51	45	45	45	652	**Baja**	75	63	76	88
61	54	54	54	798	**Vukovar**	90	76	91	106
67	60	60	60	878	**Novi Sad**	99	85	100	117
73	65	65	65	961	**Belgrade**	109	93	110	128
98	88	88	88	1.340	**Vidin**	142	120	140	164
115	103	103	103	1.639	**Giurgiu**	167	140	163	191
135	121	121	121	2.007	**Réni**	197	164	192	224
142	128	128	128	2.131	**Sulina**	208	173	201	236
133	120	119	129	1.891	**Constanta**	190	159	185	216
139	125	125	125	2.074	**Ismail**	203	169	197	231
141	127	127	127	2.120	**Kilia**	207	172	200	235

TRAVEL DIRECTION (left) — TRAVEL DIRECTION (right)
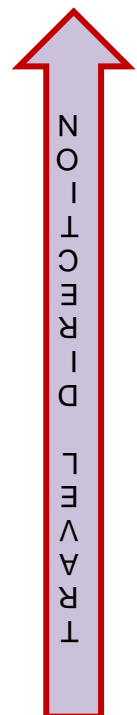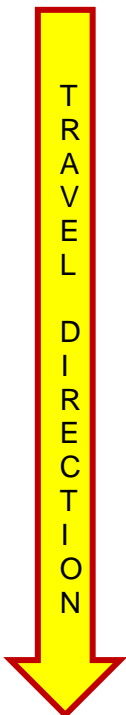
*Table of travel times from/to Linz: In the table above Linz is used as basic port. If you have a different point of departure use the hours and kilometres from and to Linz and count them together. For example: when you transport goods from Bratislava to Rotterdam you count 263 km + 1336 km = **1599 km distance.**