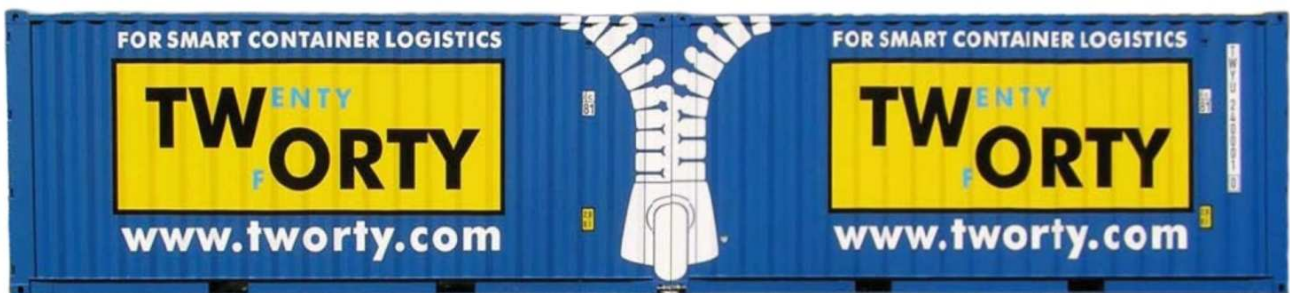




TWORTY BOX

Detailed economics



Two coupled "Tworties"

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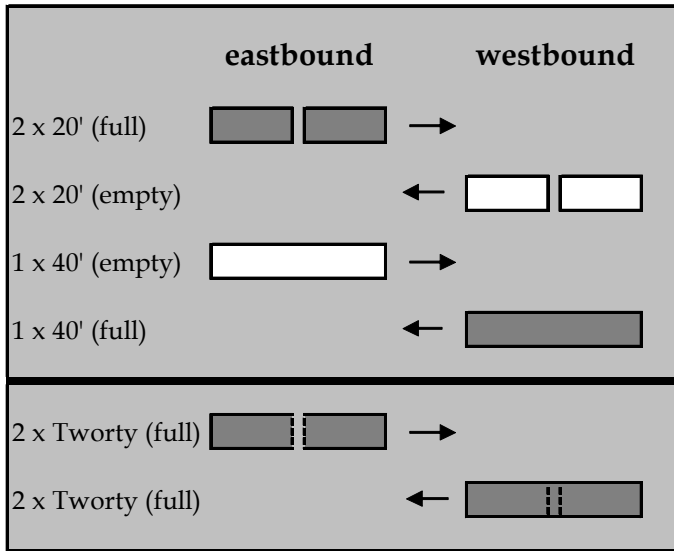
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1. Focus on individual container voyage

Maximum savings can be achieved when 2 x *TWORTIES* are substituting 2 x 20ft and 1 x 40ft standard boxes which are due to be empty positioned in opposite trade directions. The table below is illustrating the economics of operating *TWORTY BOXES* compared to standard 20ft / 40ft containers.



Duration RV [days]	Unitcosts [US\$]		Trans-shipment
	Move	Coupling	
100	100,-	100,-	0

Capital Costs [US\$]	Moves [US\$]	Coupling [US\$]	Voyage Total [US\$]
85	400	0	485
85	400	0	485
68	200	0	268
68	200	0	268
Total			1.506
200	400	100	700
200	200	100	500
Total			1.200

Difference	306
Percentage of conv. costs	20%

For the comparison three relevant cost items have been considered whereby the costs of crane moves and the costs for coupling/de-coupling have been varied within a realistic bandwidth. Considering the slightly higher investment for the *TWORTY BOX*, its daily capital costs have been set more than two times (!) the value of a standard 20ft box, which is by all means much more than the additional door will realistically cause:

- daily capital costs:
 - standard 20ft container: _____ 0.85 US\$/box/day
 - standard 40ft container:¹ _____ 1.36 US\$/box/day
 - ***TWORTY BOX (worst case assumption):*** _____ **2.00 US\$/box/day**
- avg. costs per crane move: _____ 100 ... 200 US\$/move
- avg. cost for coupling/de-coupling: _____ 20 ... 100 US\$/(de-)coupling

¹ According to the industry standard the capital costs of a standard 40ft box are defined to be 1.6 times higher compared to a 20ft box.



In addition the duration of the container voyage and the number of transhipments have also been varied in order to analyse all relevant impacts on the profitability of *TWORTY BOX* operation:

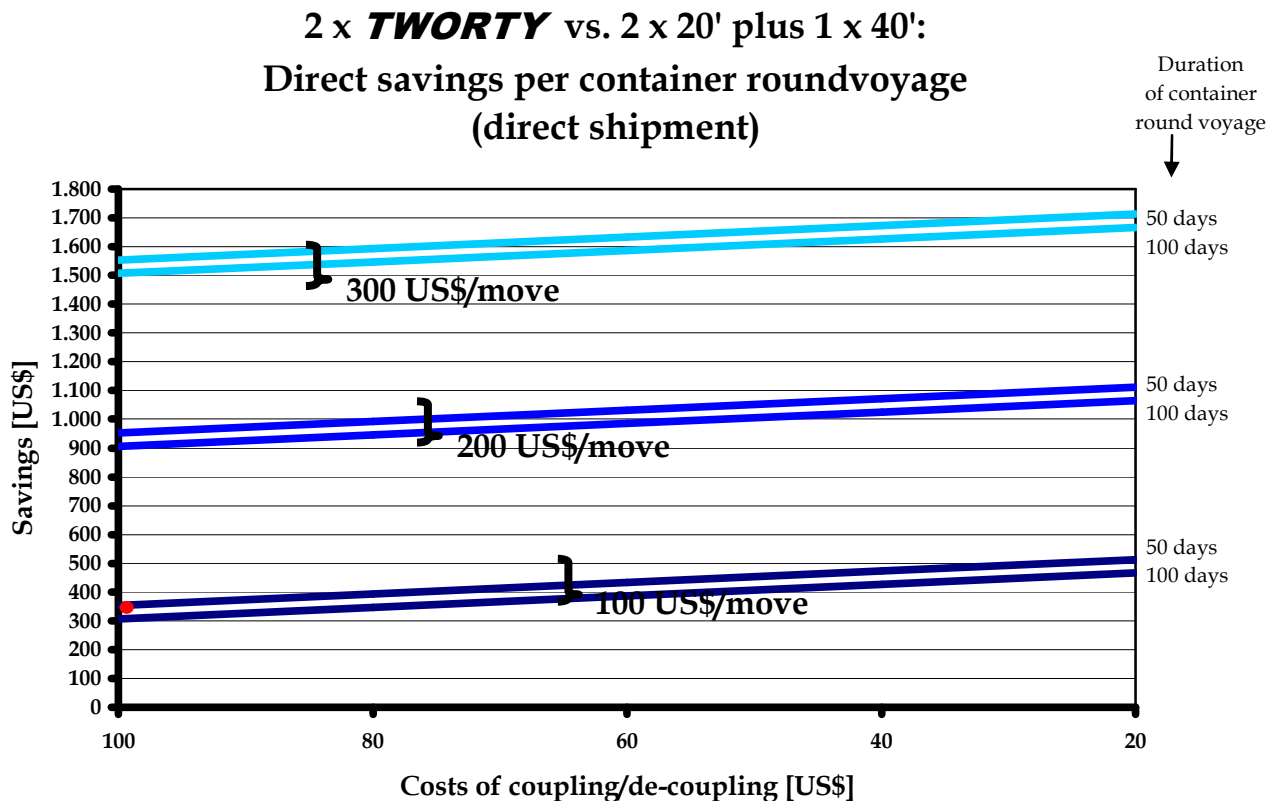
- duration of container round voyage: _____ 50 ... 100 days
- number of transhipments (during one voyage): _____ 0 ... 2

Result

The table above represents the most unfavourable case for the operation of *TWORTY BOXES* within the given range of parameters (red dots in the diagrams below), i.e.:

- minimum lift on/lift off rate
- maximum coupling/de-coupling rate
- longest duration of container voyage
- no transhipment

Nevertheless savings of 306 US\$ are shown for a round trip of the boxes, i.e. two shipments, compared to conventional box operations. This amount represents 20% of the costs normally involved with the operation of conventional containers. This magnitude exceeds by far the industries average profit per shipment. Saved costs for slots on board which do not need to be used for empty positioning have not even been considered.

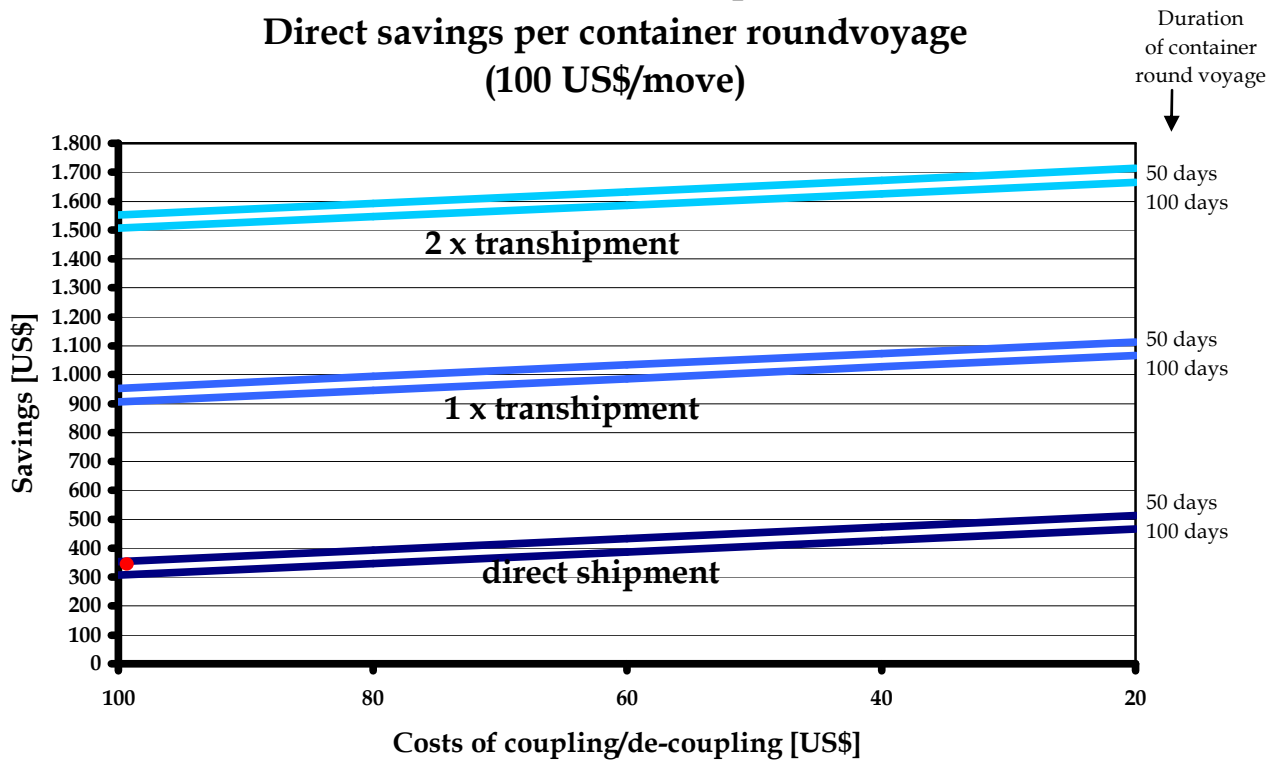




Savings would logically increase if costs for coupling/de-coupling were decreased. However considering the wide range of this parameter the impact on the *TWORTY BOX* profitability is not dramatic. It can also be revealed from the above diagram that the impact of the duration of the single container voyage is rather negligible. It is much more the applicable average lift on/lift off rate which is of significant influence on the savings. For general guidance the following rough amounts can be applied (according to the specific trade a respective average from both ends has to be considered):

- Europe _____ approx. 100 US\$/move
- N.America _____ approx. 200 US\$/move
- Asia _____ approx. 300 US\$/move

**2 x *TWORTY* vs. 2 x 20' plus 1 x 40':
Direct savings per container roundvoyage
(100 US\$/move)**



As more and more container lines are following the "hub-and-spoke" strategy the influence of transshipment has to be considered as well. In the meantime the share of transhipped boxes in port's global container throughput has risen from 10% in 1980 to almost 30% in 2004!² It can be revealed from the above diagram, that the savings the *TWORTY BOX* can provide, become higher the more often the containers are transhipped.

Furthermore savings are even much higher if average lift on/lift off charges in excess of 100 US\$/move meets with the necessity to tranship empty containers at least once.

² Drewry 2006

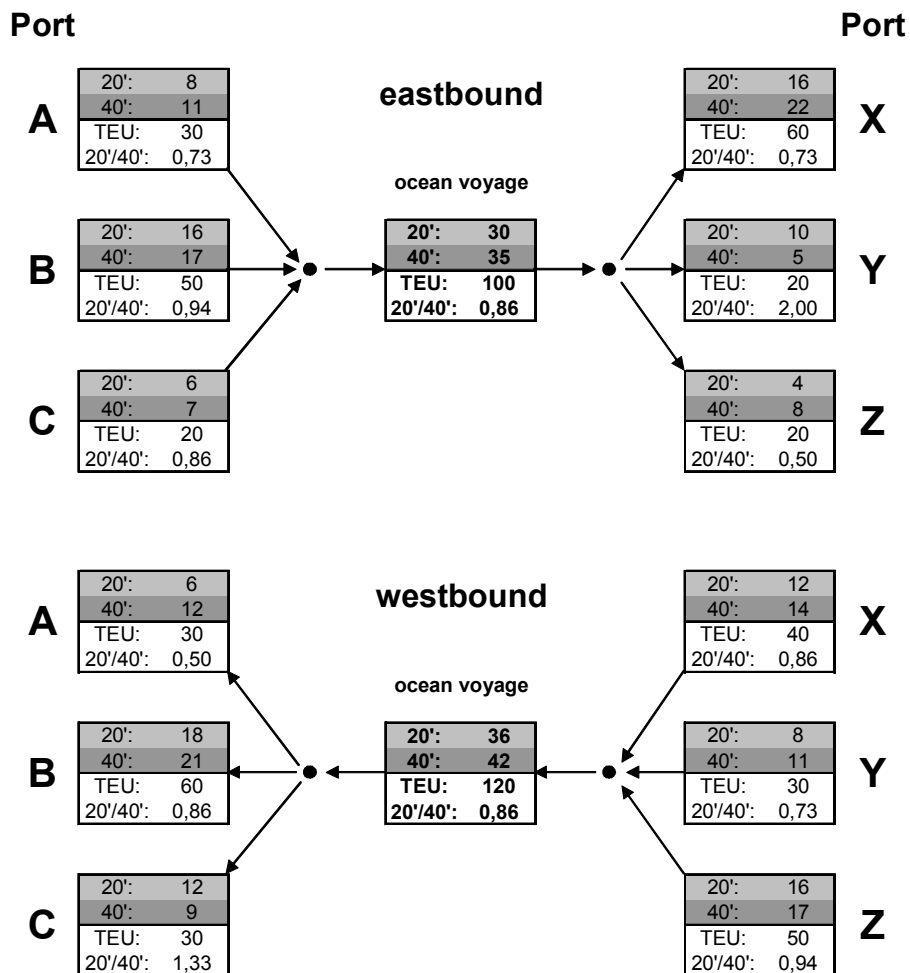


From the above it can be concluded that the introduction of *TWORTY BOXES* can provide dramatic savings if they are operated and kept in certain imbalanced trades where their advantages can be fully utilised. Thus contrary to standard containers they have to be individually tracked and treated as special equipment like e.g. flats, reefers etc.

2. Focus on entire container fleet

Almost all container trades are characterised by imbalances with regard to the volume of cargo flow and the related 20ft:40ft ratio. Imbalances are not static but are changing continuously over time and location. The ideal case of a balanced trade with an identical cargo flow in both directions resulting into the same 20ft:40ft ratio over all ports and in both directions does not exist. Furthermore local and temporary imbalances mostly exceed the summarised average extend.

The simple example below shall demonstrate that even trades with an almost balanced cargo flow and an identical over all 20ft:40ft ratio both ways shall very much benefit from the *TWORTY BOX*:



Within a hypothetical trade 100 TEU have to be shipped eastbound whereas 120 TEU are due to be carried westbound. Contrary to reality and not beneficial for *TWORTY* operation both volumes shall exactly have an identical 20ft:40ft ratio (= 0.86) on their ocean leg. In reality this ratio is however varying more or less around an average figure among the loading and discharging ports involved.



Hence deadheading is not only required to compensate the general volume imbalance in required equipment flow between both trade directions but also to balance the various requirements for different container sizes among the ports. The required box fleet is determined by the dominant trade direction. For both sizes the westbound leg is stronger. Hence in this hypothetical case at least 240 TEU of equipment would be required to ship both volumes simultaneously.

	eb	wb	balance (= presumed deadheading)
20':	30	36	6
40':	35	42	7
TEU:	100	120	20
20'/40':	0,86	0,86	
positioning:			13

western region

required equipment	
20':	72
40':	84
TEU:	240

eastern region

A

	out	in	balance
20':	8	6	-2
40':	11	12	1
TEU:	30	30	0
20'/40':	0,73	0,50	

balance	in	out	
4	16	12	20':
8	22	14	40':
20	60	40	TEU:
	0,73	0,86	20'/40':

X

B

20':	16	18	2
40':	17	21	4
TEU:	50	60	10
20'/40':	0,94	0,86	

2	10	8	20':
-6	5	11	40':
-10	20	30	TEU:
	2,00	0,73	20'/40':

Y

C

20':	6	12	6
40':	7	9	2
TEU:	20	30	10
20'/40':	0,86	1,33	

-12	4	16	20':
-9	8	17	40':
-30	20	50	TEU:
	0,50	0,94	20'/40':

Z

actual empty positioning	
20':	14
40':	15
TEU:	44 +120% !
positioning:	29 +123% !

Due to the apparent general imbalance in trade volume only additional 20 TEU (6 x 20ft + 7 x 40ft = 13 boxes) would have to be empty positioned eastbound (see above). Considering the various local imbalances per port 44 TEU (14 x 20ft + 15 x 40ft = 29 boxes) have actually to be shipped empty (also within the regions) in order to compensate the imbalanced supply and demand of container sizes. This is 120% more deadheading volume (in terms of TEU) than one would expect from the pure general trade imbalance, resulting in 123% more empty box movements! Also the box fleet has to be slightly larger than originally anticipated as boxes which are due for an additional intra-regional deadheading can not be immediately stuffed after having been stripped.

Result

At all ports which suffer from a sudden or permanent lack of one size and a surplus of the other size (e.g. port "A" and "Y") the operation of *TWORTIES* would be very advantageous (see below). If in the above example only 4 x *TWORTIES* were introduced (replacing 2 x 40ft standard boxes) and were kept plying only between port "A" and "Y" just only 40 TEU (including the *TWORTIES*) would have to be empty positioned. Hence a *TWORTY* share of only 2% (TEUwise) within the box fleet could theoretically lead to a reduction of deadheading costs by 10%! Furthermore the entire fleet could be reduced by 4 TEU (-2%)!



Thus a homogeneous fleet existing completely out of *TWORTIES* is not even necessary. The huge majority of the fleet can still consist of standard 20ft and 40ft boxes. As it can be derived from the example even a small number of *TWORTY BOXES* which are kept plying between ports where a chronic surplus of one size meets with the lack of the other size can significantly contribute to the improved economics of a carrier's container fleet.

	eb	wb	balance (= presumed deadheading)
20':	30	36	6
40':	35	42	7
TEU:	100	120	20
20'/40':	0,86	0,86	
positioning:			13

western region

required equipment incl. Tworties	
Tworties:	4
20':	68
40':	82
TEU:	236

eastern region

Tworty-Potential

	out	in	balance	Tworty
Tworties				2
20':	8	6	-2	0
40':	11	12	1	0
TEU:	30	30	0	
20'/40':	0,73	0,50		

	Tworty	balance	in	out
Tworties	0			
20':	4	4	16	12
40':	8	8	22	14
TEU:	20	60	40	
20'/40':		0,73	0,86	

A

	out	in	balance	Tworty
Tworties				0
20':	16	18	2	2
40':	17	21	4	4
TEU:	50	60	10	
20'/40':	0,94	0,86		

B

	out	in	balance	Tworty
Tworties				0
20':	6	12	6	6
40':	7	9	2	2
TEU:	20	30	10	
20'/40':	0,86	1,33		

C

	out	in	balance	Tworty
Tworties				0
20':	-12	-12	4	16
40':	-9	-9	8	17
TEU:	-30	20	50	
20'/40':		0,50	0,94	

X

	Tworty	balance	in	out
Tworties	0			
20':	4	4	16	12
40':	8	8	22	14
TEU:	20	60	40	
20'/40':		0,73	0,86	

Y

	Tworty	balance	in	out
Tworties	2			
20':	0	2	10	8
40':	-5	-6	5	11
TEU:	-10	20	30	
20'/40':		2,00	0,73	

Z

	Tworty	balance	in	out
Tworties	0			
20':	-12	-12	4	16
40':	-9	-9	8	17
TEU:	-30	20	50	
20'/40':		0,50	0,94	

reduced actual empty positioning by "Tworty"

20':	12
40':	14
TEU:	40
positioning:	26

-9,1% !
-10,3% !

Tworty share	2%
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		just by trade imbalance (theory)	realistic due to locally imbalanced split of container sizes	including 2 % TWORTY share	savings
necessary deadheading	Boxes	13	29	26	-10 %
	TEU	20	44	40	-9 %
required fleet	TEU	240	240 plus	236 plus	-2 %

Although the *TWORTY Box* can not supersede all repositioning necessities, there are many trades where the 40ft:20ft ratio of equipment is varying among the ports and where the system can help substantially.

Because 2 x *TWORTY* are destined to replace approx. 2 x 20ft standard boxes and 1 x 40ft standard box the capital costs of the entire box fleet do not increase as the additional expenses for one *TWORTY Box* do not exceed half the costs of a 40ft standard box.