

MULTIMODAL CASE STUDY

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QUESTION 1 – Considering the following case, analyse and argue the carrier offer in terms of transport and risk coverage

QUESTION 2 – Make a comparative analysis of all solutions showed here, taking into consideration buyers' requirements and identify as logistics manager for the company the best solution.

The case study deals with possible container transport between Changsha, a large city in Southern China and Reims (France), Osaka (Japan) and San Francisco (United States), to demonstrate the potential benefits of multimodal IWT and ways to assess the potential.

A. Route description



The possible routes are shown in the hereabove figure .

Changsha is the capital city of Hunan Province in the southern part of China. It sits on the banks of the Xiangjiang River, one of main tributaries of the Yangtze River. It is linked to the hub seaport, Shanghai, by inland waterways through the Xiangjiang/Yangtze Rivers, and by railway and highway. It is also linked by railway and highway to the large seaports in the Pearl River

Delta, Shenzhen, Guangzhou, and Hong Kong, China. In the delta area, river transport can be transferred by barges.

There is not yet a real river container service from Changsha to Shanghai through the Xiangjiang/Yangtze rivers. At present, containers can be transshipped at Wuhan, a central port on the Yangtze River. However, with improvement of the Xiangjiang River, financed by the World Bank and the Government of China, container transport between Changsha and Shanghai (by inland waterways) will be feasible.

Containers reaching seaports will be forwarded to Osaka, San Francisco or Reims via Le Havre, France.

The first leg would be from Changsha to the coast, the choice being mainly between Shanghai and Hong Kong, China.

There are three options to Shanghai, either by waterway, rail or road, and two to Hong Kong, China, by rail or road with a minor option for barge transport between Guangzhou and Hong Kong, China, since there is no rail connection to the container terminals at Hong Kong, China.

The second leg is by sea transport, and finally there is another land leg in the destination countries.

B. Assumptions of the case

The case study is based on the transport of four 20-foot containers with custom-made, heavy jade bottles for sparkling beverages that are to be carried from Changsha. Two of these containers are bound for Reims, one for Osaka and the other for San Francisco.

The goods contained, 30,000 x 450 g bottles per container, are valued at US\$ 200,000 per container. The gross weight of each container is 15.5 tons, including packing and tare weight.

Incoterm is ex-works, assuming the clients will take care of the complete transport chain.

C. Inland portion in Europe

The French buyer, or a representative (freight forwarder, for instance), calculates first the inland portion in Europe, to determine the port of entry in Europe.

The most economical way is to use the multimodal IWT service from Le Havre to Paris. In addition, most sea-carriers have a container depot in Paris, saving the cost of returning by barge to Le Havre, which provides an added bonus (one-way option).

This is summarized in table VII.1.

Table VII.1 Comparison between road transport and river-road transport

To Reims from:	Le Havre return by road	Le Havre return via Logiseine	Le Havre one-way via Logiseine
Return transport port-Reims	650	457	412
THC	117	117	117
Total	767	574	529

Notes : 1. On these short routes, rail is not at present competitive with road and IWT.

2. Prices in US dollars, for a 20-foot container, in a batch of two, with the same destination address.

This shows that land transport is quite expensive, at times higher than river transport, and warrants a complete study of the entire transport chain, because the shorter route

geographically is seldom the cheaper option due to hub effects. Further, due to the higher security in IWT compared with road transport, both in matters of accident and theft, insurance is likely to be cheaper. This will be taken into account in the global comparison, including both land transport legs.

D. Inland portion in Japan

In Japan, a port container depot in Osaka is selected as the destination, for destuffing before sending to bottlers.

E. Inland portion in the United States

The only relevant charge is THC at this port (destination delivery charge), which amounts to US\$ 740.

F. Inland portion in China

An approach similar to the European portion has to be applied in China, but is far more complex. Here, there would be four possible transit ports, and four inland modes. This results in a number of combinations, some of which have not yet been tried, but nevertheless are distinctly possible. These various options show the flexibility of multimodal transport and display the capacity of IWT to fully integrate the most modern supply chains.

The main options involve a choice between the Pearl River estuary ports (Guangzhou, Shenzhen and Hong Kong, China) and Shanghai as transit ports. Both the Pearl River estuary and Shanghai use IWT, although in a different way.

1. Inland river-deep sea

From Changsha, the only modern waterway to the sea is the Yangtze River and its tributary, the Xiangjiang River.

Lightly loaded 72 TEU container barges³⁴ can sail the Xiangjiang River down to the Yangtze River and to Wuhan. There, either the containers would be transhipped onto the main container service from Wuhan to Shanghai, or the barges would continue, tied for instance to a mainstream 30,000 dwt pushed convoy to the seaport.

Shanghai container traffic has been expanding rapidly (nearly 50 per cent in two years), and ESCAP³⁵ is estimating some 11 million TEUs at this port in 2011, to which should be added a probable 8 million TEUs due to its role as a hub. At that stage, it will have overtaken Hong Kong, China. Thus, the future of this IWT solution seems well established, and might evolve in a similar manner as it has in the Rhine Delta.

IWT's position would be even stronger if a one-way possibility was offered from river ICDs, where containers to be stuffed would be taken from these ICDs, or containers emptied were brought back there.

2. Land-river-deep sea

This option is specific to Hong Kong, China.

About one third of South China cargo is transported through Hong Kong, China, by river barge. It is estimated that there are over 160 barge companies providing over 320 daily feeder services, linking 60 river ports and terminals in the Pearl River Delta.³⁶

Thus, another option with rail or road from Changsha to Guangzhou and barge from the port of Guangzhou has been included. For goods originating from the Pearl River Delta,

this IWT option has been a strong advantage of Hong Kong, China, in its competition with

³⁴ 75 x 13.75 m, 1,097 tonnes at 2.2 m.

³⁵ United Nations, 2001, *Regional Shipping and Port Development Strategies Under a Changing Maritime Environment*, p. 61, *ESCAP/UNDP Maritime Policy Planning Model* (New York).

³⁶ Legislative Council Panel on Economic Services, Hong Kong, China, 21 March 2001, *The Freight Container Industry* (Hong Kong, China).

Shenzhen, and it can be easily verified that barging increases the hinterland of Hong Kong, China, versus Shenzhen.

Some 4.8 million TEUs of total throughput are barged into the port from the Pearl River cities, especially those on the western side of the delta. The following costing exercise will show whether this option is still as favorable when considering cargo coming from other provinces.

3. Rail-deep sea

Rail has been the main mode for long-distance transport in China, especially for north-south transport. Changsha is one of the nodal points of the network, located as it is on the Beijing-Guangzhou route, which is one of the main arteries of the Chinese network, although highly congested. It has been working at capacity or overcapacity for at least a decade. Its reliability is thus limited mainly due to priority accorded to passenger trains. As far as Hong Kong, China is concerned, it has practically no railway link to deepsea container terminals. Thus, an extra road leg is incurred between Shenzhen and the port, diminishing the competitiveness of this rail option. As well, since it entails a “border” crossing, it is an expensive leg. Due to this, the competitiveness of the Shenzhen ports is enhanced.

As far as rail transport is concerned, Shanghai is not too badly situated with respect to Changsha, thanks to an east-west line. The availability of wagons on this route is poor, however, which makes the IWT options more attractive.

4. Road-deep sea

Road transport has always been a favorite mode for carrying containers due to its speed and point-to-point delivery.

As far as tariffs are concerned, road transport in China is very expensive, nearly three times more than rail and even more over short distances. However, since IWT and rail quotations usually include also a road leg, often hidden in a global price, the final competitiveness of road transport is not as bad as might have been thought.

However, container truck shortages are common and long-distance transport is not that easy. Thus goods are often brought to the seaport by normal trucks and stuffed into a deep-sea container at the port. In the present case, nevertheless, due to the cost of the bottles and their fragility, there is no other option to direct stuffing in Changsha.

It is to be noted that the road to Guangzhou is nearly 120 km longer than rail, while to Shanghai it is some 20 km shorter.

5. Costing of alternatives

After obtaining data from various sources, figures were gathered and are shown in table VII.2.

Table VII.2. Comparison between different Chinese ports and different inland transport modes (Price in US dollars, for a 20-foot container, in a batch of two, with same origin)

From Changsha to:		Hong Kong, China by rail/road	Shanghai by rail/road	Guangzhou by rail/road	Shanghai return via Wuhan by IWT	Shanghai one-way via Wuhan by IWT	Hong Kong, China via Guangzhou by rail + road/barge	
Distance in km	By rail ^a	854x2+20x2	1,207x2	707x2	-	-	707x2	707x2
	By road	947x2	1,189x2	825x2	-	-	122	105
	By IWT	-	-	-	1,125x2+423x2	423x2+1,125		
Cost for round trip from Changsha to port	By rail	256 (SZ) ^b	354	214	-	-	214 (To Guangzhou)	
	by road	963	1,200	839	-	-		
	by IWT	-	-	-	310	210		
Cost for Guangzhou/Shengzhen-Hong Kong, China		324	-	-	-	-	457	242
IWT/rail handling		184	184	184	100	100	184	184
THC		180	52	180	52	52	180	(180)
Total cost by rail		944	590	578	-	-	-	-
Total cost by IWT		-	-	-	462	362	-	820
Total cost by road		1,143	1,252	1,019	-	-	1,035	-

^a A notation such as 854 x 2 + 20 x 2 indicates 20 km of initial transport by road from the container terminal to the limit of Hong Kong, China, 854 km to go from Shenzhen to Changsha, 854 km to come back and 20 km of approach transport by road from the limit of Hong Kong, China, to the container terminal.

^b The total cost Changsha-Shenzhen is only US\$ 570 by rail due to cheaper THC. If there were no barge option, Shenzhen would beat Hong Kong, China, even in the Pearl River Delta. However, it could well destroy its remote hinterland as well as that of Central China.

It follows that the price of one tonne-km between Guangzhou and Osaka (2,935 km), compared with one between Hong Kong and Le Havre (17,380 km), would show a ratio of 11 to 1. With 11,000 km on a main route costing the same as 1,000 km on a minor route, it can be said that the globe is shrinking along the lines of minimal cost.

G. Maritime portion

All four possible ports of transit must be taken into consideration.

Table VII.3. Freight per 20-foot container

(US dollars)

Freight	From:	Hong Kong, China	Shenzhen	Guangzhou	Shanghai
To:	Osaka	620	855	865	250
	Le Havre	450	500	700	500
	San Francisco	590	375	475	390

The distortions produced by the hub bias for the two leading ports, Shanghai and Hong Kong, China, are clearly seen:

- The distance between Hong Kong, China and Shenzhen is hardly 30 km, while the difference may be more than US\$ 200;
- Shenzhen is nearly 2,000 km closer to Europe than Shanghai, but they share the same freight rate;
- Conversely, in this quotation, Shenzhen is cheaper to San Francisco than Shanghai, even though it is farther away.

H. Global view

At this point, a complete depiction can be drawn, as follows.

1. Changsha-Osaka

Table VII.4 summarizes the total costs from Changsha to Osaka. For simplification, no THC at destination is added.

Table VII.4. Total cost from Changsha to Osaka

From Changsha to Osaka via:	Hong Kong, China by rail	Hong Kong, China via Guangzhou + IWT	Guangzhou by rail	Shanghai by rail	Shanghai return by IWT	Shanghai one-way by IWT
Inland transport	944	820	578	590	462	362
Sea freight	620	620	860	250	250	250
Total	1,564	1,440	1,438	840	712	612

The cheaper option is thus via Shanghai, and the use of IWT saves up to US\$ 228.

2. Changsha-San Francisco

Table VII.5, summarizing the total costs from Changsha to San Francisco (table VII.5) is also rather simple to compute with THC at destination. Again, Shanghai comes out as the cheapest option, with an added bonus when using IWT. From the table, two interesting facts can be derived:

- Transoceanic sea freight is cheaper than inland transport, except when IWT is used;
- Guangzhou is practically equivalent to Shanghai, if rail is the only mode available.

Table VII.5. Total cost from Changsha to San Francisco

From Changsha to San Francisco via	Hong Kong, China by rail	HongKong, China via Guangzhou +IWT	Guangzhou by rail	Shanghai by rail	Shanghai return via Wuhan	Shanghai one-way via Wuhan
Inland transport	944	820	578	590	462	362
Sea freight	590	590	475	390	390	390
THC at destination	740	740	740	740	740	740
Total	2,274	2,150	1,793	1,720	1,592	1,492

3. Changsha-Reims

Table VII.6. shows transport to Europe. For simplification, only one European transit port and one inland mode have been selected, as was explained earlier.

Table VII.6. Total cost from Changsha to Reims

From Changsha to Reims via	Hong Kong, China by rail	Hong Kong, China via Guangzhou +IWT	Guangzhou by rail	Shanghai by rail	Shanghai return via Wuhan	Shanghai one-way via Wuhan
Chinese inland transport	944	820	578	590	462	362
Sea freight to Le Havre	450	450	700	500	500	500
European inland transport	529	529	529	529	529	529
Total	1,923	1,799	1,807	1,619	1,491	1,391

Once again, Shanghai is the cheapest option, but this is due only to IWT, because, as seen earlier, Shenzhen would be marginally cheaper than Shanghai if only rail was considered, while it does not suffer the same sea freight penalty as Guangzhou.³⁷

³⁷ With a land transport cost of only US\$ 570 and a sea freight cost of US\$ 500, the total cost is US\$ 1,599, slightly cheaper than via Shanghai by rail.

4. Other considerations

These results are linked to a specific quotation for international freight, and may vary according to the shipping line selected. However, they do display interesting variations, showing the various factors to be taken into consideration.

The main conclusion is that IWT increases the hinterland for all inland origin/destinations (O/D) served directly by river transport, especially concerning Shanghai. Similarly, IWT increases the hinterland of Hong Kong, China, for most O/D in the Pearl River Delta region. The same was found true for Europe, to the benefit of Le Havre, faced with competition from Antwerp. It can thus be said that IWT is the best friend of seaports, when they can be served by it.