



Transforming Northern Freight Flows

**SELLING INTERNATIONAL INTERMODAL
FREIGHT LOGISTICS**

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1. Introduction

At the risk of stating the obvious the transport of goods, as a core part of logistics, exists only to serve a market demand for a product. In intellectual parlance it is purely a derived demand.

The value, volume and weight of the good to be transported at point of ultimate sale and the distance traveled, will ultimately drive the price available to the carrier for the transport service.

This short paper does not concern itself with matters such as the packaging and handling of the goods but rather its actual movement. The paper addresses the challenges of pricing and selling Intermodal freight logistics and particularly the non-road services that are low on emissions, not usually door-to-door and dependent on the economies of scale (focusing on sea, inland waterway and rail). The overall speed of transit and delivery lead time ('Just-in-Time') can also be a factor.

We have drawn on our experiences of engagement with the market, including engagement as part of the LHOFT project, seeking to share lessons learned and make recommendations for consideration by the relevant authorities, the service providers and the users of freight services.

2. Customer Requirements

The fundamental issue when selling freight transport is the price that the customer will pay. There may be many influencing pressures on the price, such as the speed at which the product needs to be delivered (urgent medical supplies, perishable foodstuff), the safety and security of the product (controlled medication, alcoholic beverages), the care with which transit will be achieved (glass, refrigerated product) and the reliability of the carrier. More recently and more prominently factors such as road congestion, emissions and impacts caused by the transport supplier on the environment, together with the need for more resilience in the light of disruptions such as Brexit and Covid-19 have influenced the choice of freight routes.

These factors directly influence the cost of provision of the service (and therefore the price to be offered), but given the multiple choices of services, service providers and mode combinations supporting the source and destination of freight flows, the customer will make a trade-off between price, time, reliability and carbon footprint. Ultimately however it is usually the price for a service that will decide which supplier the customer will choose, to suit its operating strategy - Just-in-Time with frequent deliveries vs. keeping more stock and less deliveries and taking into consideration its tolerance to risk and the Corporate Social Responsibility policies in place.

3. LHOFT: Multi modal experience

Within the LHOFT team we have interviewed various multi modal users and particularly those buying and supplying Anglo European services.

The findings in this paper are based on our evidence.

Our principal areas of study have been ferry and LoLo container services operating between the Low Countries and the east coast of England, associated port activities and Intermodal rail potential from the Humber to the north west of England.



A number of ferry operators and rail operators have been involved as have port service providers on the Humber.

Given that the price offered to the customer should never be less than the direct cost (and a portion of fixed and overhead costs) we have examined the cost drivers that are a significant influence on price. All Freight services are asset intensive which drives the fixed cost base of the operation, but these vary by mode of service. For example, the fixed cost base required to provide road freight services is limited to the cost of a truck, while rail services require a locomotive and suitable wagons and marine services require high value vessel assets. In all cases the financial exposure can be limited by hiring assets, or chartering in the case of ships but the hire costs still reflect the value of the asset cost.

Interviews also indicated a growing demand for rail freight movements due to the reduced availability of truck drivers, leading to higher road haulage costs and increased journey distances/time as manufacturing has moved east to countries like Poland, Romania and Bulgaria

4. Cost drivers

4.1 Rail

The suppliers of Intermodal rail freight have a significant asset base which drives the fixed cost of the operation. For train operators locomotives, either owned (costing around £3m+) or leased, wagons (often leased for a period from 1 year upwards), fuel, train crew and ground staff along with management and overheads form the majority of the cost base

To be competitive, these assets need to be worked intensively but the ability to do this is often outside the control of the rail freight operator. Train paths are under the control of the national rail infrastructure provider (Network Rail) and are subject to a bidding process regulated by another party (the Office of Rail and Road). Terminal access is dependent on the terminal owner (usually a different owner for origin and destination) which in turn will be governed by other trains using the terminal. Indeed lift and terminal costs can be significant factors in influencing the overall cost base. Terminals (like ports) are often a monopoly supplier as there is rarely much geographic choice of terminal and where there is (e.g. Trafford Park) demand is so great that terminal suppliers need take little notice of competition.

There are a number of bespoke infrastructure costs specific to terminal activities. For containers this includes terminal lifting equipment such as gantry cranes and/or reach stackers, tugs (tractor units) etc. adding to the fixed cost base and on occasions bespoke requirements for options such as piggyback rail (eg Viia – hydraulics supporting the rotation of carriage beds).

In comparison to rail, the infrastructure provision for hauliers, the dominant land based logistics supplier, is provided by government and its agencies. This is a significant advantage as it is commonly accepted that road haulage does not fully pay for its use of this Infrastructure by way of road tax, licenses and tolls. Appendix 2 draws comparisons between road and rail costs and illustrates the disadvantages for Intermodal rail.



Because of the significant fixed costs of rail it is necessary to obtain a certain number of containers per train to provide the revenue to fund the train movement. Rail operators will usually ask customers for committed volumes prior to starting a new service. Road, of course, has a far greater flexibility needing only one container per journey. This means that rail will almost always be limited to node to node movements. (It is important at this point to avoid falling into the trap of assuming rail can only be competitive over long distances of 200 miles plus. There are a number of successful Intermodal trains operating at distances between terminals of less than 100 miles e.g. DIRFT to Barking and Teesport to i Port Doncaster).

Costs of track access are regulated; however, terminal and container lift costs are not regulated but priced subject to the commercial policies of the terminal operator. The road haulage operator does not normally have to pay for the cost of loading, or discharging its load.

Immediately we note that the rail freight operator does not have a total control over its cost base.

An additional factor influencing rail is the limited infrastructure and lack of routes that are gauge cleared for the majority of traffic offered by the market ('super cube' containers 9'6" high x 2.5m wide x 13.65m long). This was very evident in the LHOFT work carried out when investigating the trans-Pennine route. Figure 1 shows a map of UK's railway network with different gauges. The central trans-Pennine route (via Huddersfield) has a restrictive rail loading gauge of W8. The minimum practical gauge for large numbers of container carrying wagons is W9 (Although larger gauges are preferable).



Figure 1: UK Railway Network with Different Gauges



Competition for the movement of Intermodal units is often intense with the main competitors being road hauliers (who often compete with each other as well as rail).

From the market research carried out by the LHOFT team, a door to door road rate for container deliveries from Immingham to Manchester and the North West varies from around £400 up to £480/£500 (This was in autumn 2019, more recent information is that these rates have lowered possibly due to lower fuel costs and more vehicle availability). Intermodal rail suffers additional container lift costs and has difficulty getting unit costs (with lifts) down to the £250 mark. When road last mile costs are added, rail can easily become uncompetitive. In addition, it is much easier for a haulier to pick up ad hoc loads from multiple places and combine them to get a return load or a multi-stop route where empty miles are minimised, whereas rail requires established or dedicated freight corridors which is less flexible. This further contributes towards making road a more competitive option when compared with rail.

Appendix 1 details segments of road and rail cost elements along with competitive suppliers.

In the UK, ports are privately owned and tend to be monopoly suppliers. However the port operators often do have to pay the non-operating port owner a high terminal rent and dues as well as having to invest in heavy handling equipment, gantry cranes, terminal handling systems and skilled labour. Hence they need to charge a rate that recovers the cost of its services. Road connectivity and access to UK ports are generally much better than rail connectivity. In many cases, as rail access is more difficult as assets have deteriorated, it requires asset investment to restart rail services. This makes road freight the easiest option for most port users.

Our experience in LHOFT to setup an Immingham to Trafford Park rail freight service has involved the utmost co-operation from our rail partners in efforts to meet market demands. Costs were reduced as much as they could, but were still not able to match the market price set by road haulage suppliers. (Although it should be pointed out that the influence of fuel cost fluctuations is more influential on road than rail costs).

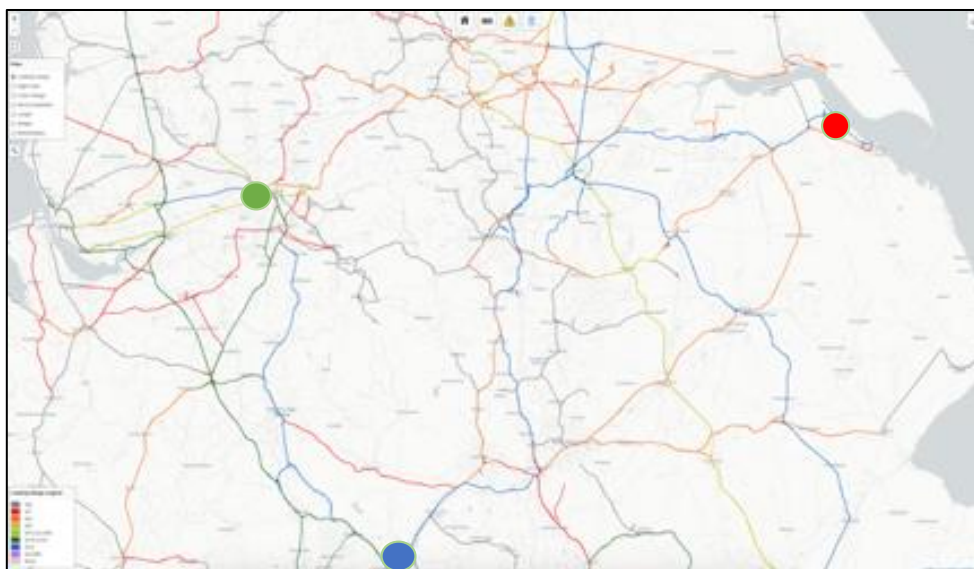


Figure 2: Path from Immingham to Trafford Park
(From red marker via the blue marker to green marker on the blue gauge line)



Rail costs can be reduced if trains get better paths and quicker terminal turn rounds. In the specific case as promoted in the LHOFT project (Immingham to Trafford Park) the operator was obliged to route the proposed train a very long way round (via Lichfield) to get the necessary gauge clearance (see Figure 2). This precluded asset utilisation that would result from two round trips in 24 hours which would have enabled rail costs to be competitive with road.

4.2 Rail recommendations

1) In order to provide a more competitive rail market there need to be regulatory powers influencing rail terminal costs and container lifting costs. This could be sub divided between inland terminals and port terminals.

2) A trans-Pennine gauge cleared route does not exist for anything other than a small fleet of rail wagons. This needs to be urgently addressed.

3) Faster paths for Intermodal trains are necessary in order to achieve better asset utilization and, therefore, more competitive market price.

Point 1 is mainly policy related whereas Points 2 and 3 above require infrastructure investments. In addition point 3 requires prioritisation of Network Rail planning rules for freight paths which may sometimes clash with passenger trains.

4.3 Maritime

The Maritime sector comprises Shipping Lines, employing vessels of differing types and sizes, moving goods between ports with cargo handling terminals within those ports, loading the goods on and off the ships with heavy handling equipment, with those same goods being delivered to, or collected from the terminals generally by road and rail from and to inland origins and destinations.

For the international intermodal movement of goods the mode of transport will generally either be a road trailer (accompanied or unaccompanied on the maritime segment) or a container and the movement will be classed as either 'short sea' or 'deep sea'. Short Sea shipping is considered to be confined to movements between UK and European ports, while Deep Sea shipping covers all other geographical areas, with Europe / Far East and vice versa being a major deep sea trade lane.

In the Short Sea market trailers and containers are both key modes of transport while in the Deep Sea sector containers are by far the dominant mode. Trailers are carried in RoRo ferries, some of which are designed purely for freight (RoRo), while others have capacity to carry passengers as well as freight (RoPax and Pax). Containers can be shipped on RoRo ferries but they have to be loaded onto ship's own trailers in order to be driven on and off the vessel. LoLo container vessels are the normal vessel of choice for containers, with loading only possible by gantry crane, although this allows for a full utilisation of vessel hold space.

In the Deep Sea market the LoLo container vessels are generally of a scale of size much greater than Short Sea container vessels, with the largest deep sea container vessels now able to load up to and exceeding 20,000 twenty foot equivalent container units (TEU). Container vessels serving the Short Sea market, either as the 'sea-bridge' for integrated intra-European carriers or as 'feeder' vessels for deep sea transshipment services are much smaller.



The shipping lines are generally the interface with the goods owner (shipper and receiver), although shipping lines could employ agents to carry out that function, and the goods owners will often employ a forwarding agent, or road and rail transport companies to interface directly with the shipping lines, then offering the customer (shipper / receiver) a full door-to-door service and rate.

The price that the goods owner will pay for the movement will depend on a range of factors including the **volume and density (weight) of the goods**. The goods might amount to a single pallet load, in which case they will be consolidated by a forwarder with other loads into a full trailer or container load. These goods movements are termed as 'groupage' (less than container load / LCL), providing the forwarder with a much better return than a single 'full load' (FCL).

The price that a shipper might pay will depend on whether the business amounts to a full load, several full loads, or multiple loads over a period of time, with higher volumes leading to lower unit prices for the shipper. However, the **sea distance and size of ship** will also play a part in determining the rate, where the deployment of ever larger vessels on both deep sea and short sea trades has served to contain rates for the shippers while maintaining some level of profitability for the shipping lines.

Another factor that determines price is the overall **speed of transit** required that, in turn, determines the **mode of transport used**. In the Short Sea sector 'Just-in-Time' deliveries usually demand use of the accompanied trailer mode and the use of the higher frequency routes such as the Dover Ferries and Channel Tunnel Freight Shuttle services. The 'Just-in-Time' strategy, which is a very common to the automotive industry for instance, has been driven by the customer's financial demands to minimize stock levels and working capital commitments, but the 'accompanied' rate comes at a premium.

However, the UK's trade imbalance in favour of imports has led to the availability of cheap accompanied trailer capacity to carry UK exports back to the Continent, leaving other ferry and container services carrying a disproportionate amount of empty trailers and containers on their eastbound sailings.

In the Deep Sea market and to a lesser extent on the Short Sea market the maritime option may be overlooked in favour of the rail and air modes of transport, in order to reduce lead times, albeit at a much higher cost. Intermodal rail services from China to Europe, for instance, have developed in recent years to provide a more rapid service for high value goods and as capacity and utilisation grow to meet rising demand the average unit rates will come down,

For less time sensitive traffics, such as steel, paper and waste and some high volume constant flows, such as automotive components the unaccompanied trailer (not accompanied by the driver on the ferry) and container mode provide lower cost options and even on these 'lower cost' services there are supply and demand pressures that dictate a lower eastbound rate within the round trip price because of the trade balance in favour of imports (westbound).



The choice of mode, between trailer and container, can also depend on the loading and discharge capabilities at the dispatch and receipt locations, with the container mode being the lower cost option but the mode that is more constrained on its load and discharge options.

Underlying any seafreight pricing is the 'floor' price required to ensure that a shipping line can cover its capital finance, vessel maintenance, management overhead and crew costs and the range of variable operating costs, such as fuel, port dues and stevedoring costs. However, covering these costs from the combined individual seafreight revenues of up to 400 units on a RoRo ferry, to 20,000 TEU on a large LoLo container ship depends on the numbers of units carried on each sailing - the utilisation. Maintenance of seafreight rates and utilisation levels are therefore crucial to the success of any shipping service operator and direct competition can quickly erode both. Fortunately however the entry cost for new shipping services is high and in the UK market this has led, over the years, to major rationalisation in the number of RoRo and LoLo service operators, culminating in a small number of large operators, with ever larger vessels, currently dominating the market.

Another factor that will determine the freight rate is whether specialist trailers or containers are required to move liquids (oils, chemicals, foodstuff), gases or high value dry bulks. Specialist tank containers and road tankers are available to carry such traffic but the higher cost of operation will attract a premium rate, although the seafreight rate might only be inflated if special handling and storage is required for hazardous cargoes, or cargoes that require electrical connections to maintain load temperature.

The 'quay to quay' seafreight rate charged by the shipping line to the shipper, covering discharge and loading to road vehicles in the terminals is the normal composite rate charged to the shipper on the short sea market but this rate is often not transparent for the cargo owner because it is 'wrapped' into a single 'door-to-door' rate. In the deep sea sector matters can be even less transparent because of the many different terms of trade that can be used.

Put simply, in the UK Short Sea market the indicative seafreight rate for an accompanied trailer on a 30-mile sea crossing over the Channel between Dover and Calais is in the region of £150 to £200. A ferry operating on the Dover-Calais service can manage up to 5 round trips per day on this service. The same size vessel operating on a North Sea service between Rotterdam and Immingham can manage only one round trip in every 48 hours (two days). Yet the seafreight rate for an unaccompanied trailer on a North Sea ferry is likely to be in the region of £200 to £300, depending on the trailer operator and the overall level of business that it commits to the ferry operator.

This is one reason why North Sea ferry operators have developed their fleets with ever larger vessels in an attempt to keep increasing the economies of scale. Whereas on the Channel the key is to load and discharge vessels as quickly as possible in order to make as many round trips as possible during the 24-hour day, with service frequency being a major attraction for trailer operators driving from all over Europe to meet a ferry departure.



4.4 Maritime recommendations

The aim of the LHOFT project is to attract RoRo freight traffic away from the Dover Ferries and Freight Shuttle services that lead to long north/south road journeys within the UK to deliver to and collect from premises in the Midlands and north of England, Scotland, Wales and Northern Ireland (via land-bridge). Efforts to attract a proportion of this traffic onto ferry and container services connecting Continental ports with the Humber and Mersey ports have been tried in the past through grants and inducements but these can only be temporary measures.

Real diversion and market transformation can only be achieved through commercial means, market demands and environmental pressures.

The LHOFT project is attempting to encourage the development of capacity on the longer ferry and container service routes by identifying and building appropriate demand from cargo owners and in doing so reduce the major start-up risks for ferry and container service operators seeking to develop route and service capacity.

A shortage of drivers could encourage road transport operators into concentrating on shorter round trip jobs on an east / west axis serving the LHOFT corridor rather than committing drivers to longer journeys on the north / south axis. This can lead to the possibilities for two and three round trip journeys in a day, rather than one, meaning higher productivity and an improved quality of earnings with fewer drivers.

Features of the market that are beyond the control of the maritime sector are, among other things, the UK's import trade imbalance, port hinterland connections, by road and rail to northern ports and the potential for government to introduce road tolls, congestion charging, fuel taxes and vehicle emissions taxes. A re-balancing of trade volumes leading to more UK export loads, improved hinterland connections and the introduction of road tolls, congestion charging, fuel taxes and emissions taxes will all work in favour of a transition from the road to the maritime mode for moving unitised freight into and out of the UK.

The refugee crises around Calais, Brexit uncertainties and now the Covid-19 crisis have all highlighted the need for resilience, continuity and security in the UK importer's and exporter's supply chains and there has been evidence of a shift in traffic from the Dover and Channel Tunnel routings to more secure, less disrupted, if less frequent routings into more northerly UK ports. Some of this has been of a temporary nature but there is a case to be made in the market and a receptive climate for the promotion of the longer routes, at a lower overall cost and with less impact on the environment.

Indeed the external influences mentioned above have highlighted the availability of alternative maritime routings to some cargo owners and the LHOFT project aims to promote those routings connecting with northern ports still further.



5. Conclusions

As can be seen from this paper the challenges facing the transfer of loads to lower emission means of transport are significant. According to DfT's Freight Carbon Review (2017)¹, Heavy goods vehicles (HGVs) in the UK accounted for 17% of all GHG emissions from road transport. The same report states that developing a decarbonisation strategy for HGVs is challenging for two key reasons: i) the technological solutions for electric drivetrains for larger HGVs are not available and ii) There is no single industry-wide decarbonisation measure that will satisfy the complex mix of vehicle configurations, vehicle weights, duty cycles and fleet sizes.

But in the UK, a high volume of freight that originates from or is destined to the Midlands and north of England and Scotland is sent by road to the southern ports and by the channel tunnel contributing to higher emissions. It is only by increasing movements by water and rail that the UK is going to meet its statutory carbon reduction targets.

Both rail and maritime services to the north of England have challenges to be competitive when compared to road. Rail service viability and profitability is highly dependent upon service utilisation, route access and connectivity due to infrastructure issues. The latter includes both gauge enhancement and electrification. The need for electrification has been clearly identified (Railway Industry Association submission to Secretary of State for Transport February 2020). The electrification of missing rail links, along with loading gauge enhancement will increase the capacity of UK rail freight and increase its competitiveness resulting in more paths for freight trains and less emissions.

The utilisation scenario applies even more acutely to ferry and LoLo container service operations to the north of England. Rail and, more prominently, maritime services suffer from the high entry costs and the risks of high losses if utilisation levels are not quickly raised above break-even levels. But when break-even utilisation levels are exceeded, the rewards can be significant.

Investment in rail connectivity will not only get loads off the roads for long distances but will facilitate the deployment of zero emission trucks as these will only be needed for the greatly reduced last miles between the customer and the rail terminal. Enhanced rail connectivity within ports could potentially eliminate trucks completely for LoLo traffic as the loads can be directly moved to/from the port container stack and ships with specialized equipment. (London Gateway is a good example of this type of operation).

On a purely subjective level road haulage management needs an attitude change to take a realistic view of Intermodal rail freight as complimentary rather than competitive to its operations. If road based Logistics providers saw rail as a sub-contractor (such as they see other road hauliers) then they would consider rail options alongside similar road services. The complexity here is in making the rail services easily discoverable by the logistics service providers. The problem is accentuated by the

¹ DfT Freight Carbon Review, Moving Britain Ahead, 2017

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/590922/freight-carbon-review-2017.pdf



fact that there is no single brokerage or point of contact for rail and the logistics service providers must contact each rail Freight Operating Company (FOC) directly.

Government intervention to underwrite the commercial risk to start-up rail and sea operations would be helpful. While being carefully implemented it would also be important to ensure that such interventions were not overly bureaucratic and enabled to respond quickly to new initiatives.

Another stimulus for greater use of rail and maritime transport modes, over road, in UK supply chains would be a greater emphasis on cost savings over the 'Just-in-Time' doctrine. There may be a need for higher stock levels but that stock can be held in the supply chain, on ships and trains and at their respective port and rail terminals.

A tax on CO2 and other harmful gases from HGV emissions would surely provide an initial 'kick-start' to modal shift and ease the pressure of driver shortages from the road haulage sector.



Appendix 1

Road and Rail: Availability of Competitive Suppliers

Cost element	Road	Rail
Fuel	yes	yes
Journey Routing	yes	no
Timing of journey	yes	no
Labour supply	yes	Very limited
Traction supply	yes	Very limited

Appendix 2

Road and Intermodal Rail Cost Comparators

Item	Road	Rail
Container lifts (on/off) and Terminal access charge	Free	Cost
Fuel	Cost	Cost
Staff	Cost	Cost
Loadability	One Container	Twenty Eight +
Staff hours of work	Regulated	Regulated
Infrastructure access	Low annual charge (Road tax)	Mileage/weight based charge
Traction Unit	Cost	Cost
Wagon hire	n/a	Cost

