Technical audit of the transhipment study - terms of reference

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Technical audit of the transhipment study

29 May 2008

Dear colleague

I am writing to inform you that following a competitive tender the Department has appointed Imperial College to undertake a technical audit of the MDS Transmodal transhipment study. The purpose of this work is to assess the suitability of the transhipment modelling approach and to recommend any development of the model to assist the future formation of the Department's ports and international networks policies. The full terms of reference are attached and appear on the DfT website.

This will be a "desk top" study without formal industry involvement. However, Imperial College are open to approaches from key stakeholders. If you wish to speak to the Imperial team about the MDS Transmodal transhipment study please contact Professor Michael Bell at the address below.

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Please feel free to pass on this letter to any other organisation you feel may have an interest in this project. Copies of this letter have been sent to maritime industry trade bodies and some individual port companies.

Yours sincerely,

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Project brief

Aim

To undertake a technical audit of the MDS Transmodal transhipment study considering the structure, input data, processing and the quality of output results. The purpose of this work is to assess the suitability of the transhipment modelling approach and to recommend any development of the model to assist the future formation of ports and international networks policy.

Background

In May 2006 the Department for Transport published a study into container port transhipment commissioned from MDS Transmodal to inform the evidence base for the Ports Policy Review. The research also informed the Eddington Transport Study. The objective of the transhipment study was to identify and quantify the economic costs and benefits of providing additional container port capacity to

service the deep sea container transshipment market. Using exogenous forecasts of demand for container port services the study investigated the impact of changes in port capacity and shipping line behaviour.

The study concluded, based on transport costs modelling, that South East container ports would remain dominant in the direct call deep sea market and that, given capacity constraints in south-east container ports, shipping lines would generally choose to use feeder ships to Northern and West Coast ports rather than divert deep sea ships to make direct calls at these ports. However, if shipping lines were to divert a direct call to a GB West Coast port en route between Asia and North America this appeared to be cost-competitive and may therefore provide some modest potential for diverting cargo from the Greater South East.

An updated version of the study was published in July 2007. The update report considered further capacity scenarios, updated maritime charter rates, and new information on the inland origins and destinations of container traffic. The new report confirmed the main conclusions of the original study, namely the dominance of the southeast ports and the primacy of the Mersey among GB west coast ports.

A number of respondents to the Ports Policy Review discussion document disagreed with the original transhipment report's conclusions on the dominance of south-east ports for direct-call traffic. The Department believes publication of the updated MDS study addressed concerns of respondents with input assumptions in the original study. However, the Department is seeking an independent audit of the MDS container shipping transhipment modelling that will document the model, leading to an improved understanding of how it operates. The audit should highlight current relative strengths and weaknesses, and provide recommendations to address the latter.

Requirements

In co-operation with MDS Transmodal, the contractor will carry out an audit of the MDS Transmodal transhipment study (see annex for details) with the following requirements:

- review existing MDS documentation of the modelling processes, primarily LINCOST and port allocation model, commissioning any extra documentation from MDS as necessary;
- assess the relative strengths and weaknesses of the transhipment modelling;
- post modelling: consider whether the July 2007 update report addresses fully questions of the robustness of cost values used and the sensitivity to different future maritime operating cost scenarios and inland origins/destinations. For example, greater action to address local and global transport emissions, highway congestion charging, or Panama Canal expansion could affect transport costs. The inception report should consider the case for commissioning from MDS one or two additional sensitivity tests on costs and inland origins/destinations to help with this assessment;
- non-cost factors: assess the treatment of qualitative factors. For example, the allocation of shipping lines to ports and the preference of lines for more capacity in existing South East ports. The consultants should draw on relevant evidence from transport modelling literature; and,
- comments on priority and cost effectiveness of recommendations.

Note that the MDS forecasts of UK port container traffic and the MDS Great Britain freight model are not part of this technical audit.

Deliverables

Under the terms of the contract the contractor will be required to deliver the following:

- an inception report detailing the work programme, including a proposed set of any sensitivity tests, and a timetable;
- a draft report on the independent assessment of the relative strengths and weaknesses of the MDS transhipment study. The report will need to look into the structure, the input data sources/processing and the quality of output results and to make recommendations on any potential areas of future development of a model;
- after sending the draft report to the MDS and allowing the opportunity to respond to draft recommendations, to make amendments to the draft report;
- a final report.

Timing

It is envisaged that given the limited scope of the terms of reference this project could be completed within three months, if resource within the consultancy team and MDS is available (see annex) [1]. Target completion date is summer 2008.

The preliminary timetable is as follows:

invitations to tender to be issued:	early March;
deadline for tenders to be received:	4 April;
approval of appointment:	end April/early May;
completion and publication of study	within three months of appointment.

The format and content of the final report shall be subject to the project officer's prior agreement. The Department will publish the results of this research on the Department's web site.

[1] In order to protect MDS Transmodal's intellectual property rights competitor maritime modelling consultants are not being invited to bid for this project and may not be team members.

Management

Two meetings will be required between DFT and the contractor during the study.

The project officer is Mr Brian Turner.

Exact details of invoice procedures will be issued on appointment.

Tender requirements

The tender shall include daily staff rates and a fixed cost estimate.

Tenderers are required to provide details of the proposed number of days to be spent by each member of the consultancy team on the project, along with the daily rates which they are charged. The basis of any charges for travel and subsistence and other ancillary expenses disbursements should be outlined.

Note that MDS Transmodal will invoice DFT directly on a time and material basis using the Department's existing call off contract number PPAD 4/003/007 for up to 10 days of MDS time. Additional MDS input would require preapproval of DfT.

In order to protect MDS Transmodal's intellectual property rights competitor maritime modelling consultants are not being invited to bid for this project and may not be team members.

Evaluation criteria

The contractor should show a clear insightful understanding of the issues involved. Tenders will be evaluated on the basis of the following factors.

- understanding of the requirements of the audit;
- calibre and suitability of staff assigned to the project;
- expertise in the relevant areas of freight modelling; and,
- value for money.

References

Container port transhipment study

http://www.dft.gov.uk/consultations/archive/2006/ppr/containerporttranshipment.pdf

Update of UK port demand forecasts to 2030 and economic value of transhipment study

http://www.dft.gov.uk/pgr/shippingports/ports/portspolicyreview/207015_Final_Report_2.pdf

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DFT/INAS/BT

7 March 2008 .

Annex: Illustrative work schedule

The following illustrates the timeframe in which the project might take place: contractors may adjust this timeframe for their tender.

The Department recognizes that availability of staff at the contractor and at MDS Transmodal and the scope of any additional work commissioned from MDS Transmodal could affect project timings

Week	Activity
1	Review existing documentation
2	Meet with MDS
3	If necessary: commission further documentation and sensitivity tests from MDS. Prepare inception report for DFT
4	Inception meeting with DFT
5	Receive MDS documentation and test results
6	Review MDS information
7	Prepare draft report and circulated to MDS
8	
9	Receive MDS comments on draft report
10	Prepare draft final report and circulated to MDS and DFT
11	Meet with DFT to discuss draft report
12	Receive final comments from DFT and MDS
13	
14	Final report

Annex: MDS Transmodal transhipment modelling processes

The following describes the MDS Transmodal container shipping databases and modelling process. It is extracted from the MDS proposal for the original container port transshipment study. It includes reference to the GB Freight Model, although the GB Freight Model is not part of this audit.

In house models and databases

MDS Transmodal holds the following databases which describe the growth of demand. Selected outputs from the databases are illustrated in Appendix A (to be supplied to the audit contractor in hard copy).

i) UK Customs data for all non EU countries showing commodity, import/export country, port, mode of appearance (e.g. containers) from 1988 to date (Illustration1)

ii) UK Customs data (1988 to date) and Intrastat (1993 to date) showing UK trade with EU member countries by commodity (convertible to âunitisationâ classification). (Illustration 2).

iii) A world wide matrix, compiled from up to date data from the major economies and supplemented by UN data for smaller economies from 1996 to date organised in tonnages by country-country-commodity classification. This data has been used to develop estimated flows of containerised tonnage and containers by country, calibrated to explain world wide container port throughputs, including the volume of empty container traffic. Uniquely, this allows changes in the commodity mix of each trade route to be monitored so that container flows can be forecast as a derived demand of detailed trade flows instead of as a crude multiple of GDP. (Illustration 3).

iv) Volume of container traffic through each significant container port worldwide, mid â90s to date.

v) Maritime Statistics Directive data from 2000 supplied by the DfT to facilitate MDS Transmodal producing âUK Waterborne freightâ.

vi) The database which underpins the GB Freight Model, updated annually, which uses data from the Continuing Survey of Roads Goods Transport, Network Rail HM Customs and the ports and ferry industry. This data describes movement of containers between the ports and GB regions by mode. (Illustration 4).

vii) GBFM road and rail assignment modules, which will allow different port strategies to be tested against the impact on inland infrastructure. (Illustration 5).

viii) The Containership Databank (maintained by MDST since 1982) which describes the role which every containership worldwide plays in terms of operator, route, ports served and utilisation. Vessels are described by their individual speed and capacity. This databank is used by many leading lines, is updated continuously and can describe and forecast route capacity. Forecasts of the short-run (to 2008) supply of container ship capacity are made through the analysis of each shipping lines planning, and particularly new building programmes which are committed 2-3 years ahead. (Illustration 6).

ix) FORK forecasting model. Forecasts for the future demand for container volumes to and from Great Britain by country would be made using MDSTâs model FORK. This model estimates future trade by country and commodity by developing coefficients through multiple regression, adopting GDP and exchange rates as explanatory variables. OECD forecasts of GDP and exchange rates are used to create the forecasts (incorporated within GBFM).

x) LINCOST (see below) which models the cost of shipping services taking account of charter, bunker, port and container hire costs, ports of call and cargo distribution (illustration 7).

These databases, all of which have already been developed by MDS Transmodal, would be employed to generate forecasts which N.W. European ports can expect to face in the future.

Forecasts would be âexpressedâ in both geographic terms through origin and destination matrices (for example, describing the volume of containers expected to move between the Far East and each N.W. European country), and in terms of the number and size of vessels that would be expected to carry them. This is crucial because the port capacity must be seen in terms of both handling and storage capacity AND each portâs ability to accommodate vessels of a given capacity.

Developing a reference case

Any evaluation of the impact that the amount of GB port capacity may have on transhipment of containers to or via Britain requires a reference case to be established. That reference case may not reflect current behaviour because of the rapid increase in the mean size of vessel which will be serving the Far East â Europe routes within 2-3 years, the dredging of major US east coast ports to also accommodate post-panamax vessels and the possibility that wider locks may be installed on the Panama Canal itself. These factors could change the way in which lines serve North West Europe. We shall discuss and explain the possible implications, which may include the resurrection of âround the worldâ, or âpendulumâ services which will serve the Americas, N.W. Europe, the Mediterranean and the Far East on the same voyage. This possibility is beginning to emerge in studies examining the potential for different port projects in the area.

Port costs and charges

Port costs form a substantial element of overall shipping costs. In order to develop a reference case, we shall assume as a base case typical charges for deep sea, short sea and transhipment handling levied in GB ports to both model shipping line behaviour and to compute port revenue. In order to assess port operating margins, we shall deduct our estimate of port operating costs. This will inform discussion about the âaffordabilityâ of deep-sea container port capacity.

Service levels

Different transhipment strategies will lead to different delivery delays for some shippers. Those shippers not âbooking throughâ a container to a final destination but holding it at a port until the final delivery destination is determined are more easily served by direct GB calls. We shall estimate the proportion of containers whose owners require an âimmediateâ service and assess the implications for the overall market.

Inland transport impact

Inland transport costs of containers between ports and domestic origins and destinations within Britain will be calculated from the GB Freight Model, which also synthesises the modal share of road and rail from each port. GBFM will also output non user costs based on Sensitive Lorry Mile values.

Container service cost modelling

The cost of actually operating container shipping services, and thereby determining the likely behaviour of shipping lines in routeing vessels and containers, would be modelled using LINCOST. This model was originally developed by MDST 25 years ago and has been used continuously since then to evaluate port projects and shipping routes in general and transhipment projects in particular. The model takes as inputs origin-destination matrices of container flows, the geographical relationship between ports, and the cost structure and operational characteristics of container shipping (including port charges). The model outputs an optimum ship strategy (number, capacity and speed of vessels) for each route tested and the resultant cost per container shipped. By combining different model runs, a wide range of different strategies combining direct calls and transhipment can be tested in an internally consistent manner (i.e. different strategies to transport a finite number and geographical distribution of containers).

In order to be able to relate model output to the experience of shipping line operators (see consultation below), all actual deep sea services (liner shipping âstringsâ of port calls by a given service fleet) to North West Europe would be listed and categorised by geographical range (e.g. ex Far East or North America) and scale. A handful would be selected as generic examples. LINCOST would then be run so that the transhipment scenarios can be tested, based on these case studies.

This could include, for example, a string such as the CHKY (Cosco, Hanjin, K Line and Yang Ming) Alliance PDS service which currently serves the West Coast of North America, the Far East and N.W. Europe (and return) and until very recently called at Le Havre, Rotterdam, Hamburg and Felixstowe. It has now dropped the call at Felixstowe. Deep-sea liner costs could be tested based upon:

i) The rotation that includes the GB call.

ii) Dropping the GB port call.

iii) substituting a call at a northern GB port for the previous GB call.

This approach would deal with marginal changes to existing service patterns (dropping or changing a port call). However, more radical changes in service patterns could also be tested, such as the substitution of one or more existing North Sea strings for one serving Irish Sea/W. European seaboard ports. (This is illustrated by LINCOST in Appendix A).

Taking the example above for the CHKY Alliance, the inland transport costs AND feeder costs would be tested against existing service structures.

i.e.

i) previous rotation, serving GB entirely by road and rail (including Scotland)

ii) dropping the GB port call and serving all GB by transhipment from Rotterdam

iii) serving part of GB by transhipment (UK south east) while serving the remainder of Britain by road or rail through a northern port.

In each case, total Sensitive Lorry Miles values AND commercial transport costs would be computed, using GBFM to allocate traffic between road and rail.

The scenarios to be tested would be based on detailed discussion with the client and would reflect dialogue with the industry. The output of LINCOST and GB Freight Model will be combined to determine the transport cost (user costs, inland, port and shipping costs) and non user costs of each broad scenario, for each year tested (2004, 2015 and 2020).

The matrix of container flows, which drive the above cost model, will include full details of the commodity mix of goods carried within the containers, at 5 digit SITC level if necessary. These commodities would be mapped through input-output analysis into Standard Industrial Classification, so that the tonnage and value of goods related to each industry can be determined.