CIPS KNOWLEDGE

Multimodal Transportation

Multimodal transport is the method used for the carriage of goods by at least two modes of transport

This knowledge paper is supportive of Procurement professionals operating at operational level of the CIPS Global Standard

01 CPD HOURS

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Multimodal Transport

Definitions

"For the purposes of the convention, international multimodal transport means the carriage of goods by at least two different modes of transport on the basis of a multimodal transport contract from a place in one country at which the goods are taken in charge by the multimodal operator to a place designated for delivery situated in a different country."
United Nations Convention on International Multimodal Transport of Goods.

"The combination of two or more modes of movement of goods such as air, road, rail, or sea, managed under a single contract. Also called combined transport."
The Business Dictionary.

In contrast, intermodal transportation is defined as the movement of cargo from origin to destination by several modes of transport where each type has its own separate contract.

Background

Since the 1950's, the growth in international co-operation, the opportunities from international business links and the rapid improvement in technology has supported the vast expansion of international trade and the movement of goods.

As investment in rail infrastructures grew, as sea freight became safer and the opportunities for air transport developed, so did the market for combining these means of transport into a single supply chain to allow the movement of goods from place of origin to place of consumption across the globe in one coordinated logistics exercise.

At the outset, these separate elements were contracted separately (intermodal transport) and the hand-off across national boundaries from rail to boat, for example, was complicated and time consuming. Some carriers developed expertise in these areas of interface and undertook the responsibility for managing all the handoff aspects for the entire journey and multimodal transport became an industry in its own right.

The industry received a boost in the 1960's and 70's with the growth of 'containerisation', which was a standardised and secure means of carrying many types of goods. Containerised transport is now by far the most important, although not the only, multimodal means of consignment.

The accelerated delivery times, reduced misunderstandings and the introduction of regulations and enabling technology has led to the massive growth in international multimodal transport.

Scope of multimodal operations

Types of transportation

Multi modal transportation can include pretty much any type of commercial transport including;

Road – truck, container lorry, motorbike

Ocean – containerised shipping, cargo vessels

Rail – rail freight

Inland waterways – barges, steamers, ferries

Air – airfreight

Ocean transportation tends to be slow. Air transportation tends to be expensive. Rail transportation tends to be lower carbon usage. A calculation which weighs up quickest route versus the most economical route versus the least polluting route depending, on the client's wishes, will result in the best transport selection. It is a balance of the 3 C's – convenience, cost, carbon.

Types of transporter or carrier

The carrier responsible for the entire end to end shipment is referred to as a 'multimodal transport operator' or MTO. In practice, a carrier does not usually possess all the means of transport to complete an end to end journey, but will sub-contract to those who do. These sub-carriers are referred to legally as 'actual carriers'. Freight forwarders have become one of the most important MTO's.

Freight forwarders – Freight forwarders undertake land, water and air transportation. The freight forwarder may or may not own any of the vessels that transport the goods. They are experts in managing the

complexities of cross border documentation and the logistics of moving goods via different types of transport from door to door.

They can manage customs clearance, cargo inspection, dangerous cargo management, logistics, finance, overseas warehousing, bonded stocks, taxes, duty costs, tariffs, insurance etc. on behalf of the client. They can arrange storage of cargo and forwarding or distribution later on. Kuehne & Nagel, DHL Supply Chain and Panalpina World Transport are examples of the many freight management companies.

Large shipping lines have also developed into MTO's.

Sea Carriers – Shipping lines or sea carriers undertake land or water transportation either via their own infrastructure or using that of a third party. Maersk Line, Transpacific Shipping Solutions are examples of major sea carriers.

NVOC (Non-Vessel Operating Carriers) are MTO's who don't operate a sea vessel (even though the route may require a sea leg).

Types of product transported

Given legal compliance and the correct supporting paperwork, pretty much any type of goods imaginable are transportable via a multimodal approach: IT, construction materials, waste, precision instrumentation, textiles, pharmaceuticals, consumer goods, agricultural products, raw material, capital plant, military equipment.

Types of documentation

Freight forwarders, shipping lines and NVOC's have become experts in managing the complex documentation that must accompany all international goods transportation and without which the transport will be delayed or possibly even stop completely, resulting in spoiled goods or delivery deadlines missed.

The most important document is the Bill of Lading (BOL) which is a detailed list of the cargo, issued by the carrier to confirm receipt of said cargo for shipment.

Other documentation can include certificates of origin (CO), packing lists, customs and port documentation, air waybills (AWB's) issued by the airline to the freight forwarder, shipping negotiation documentation (Eur1, certificate of origin etc.), pro-forma invoice, specialist legal documentation required by certain countries such as food certificates.

The documentation is supported by the use of International Commercial Terms. Incoterms, as they are known, are three letter acronyms that are intended to clearly communicate the tasks, costs and risks associated with global transportation and delivery of goods.

Types of transportation containers

There are many different types of shipping containers depending on the cargo:

- Large steel shipping containers are available in 20 feet, 40 feet or high cube size. A twenty foot equivalent unit (TEU) is used as a standard to measure a ship's cargo carrying capacity. The dimensions of a TEU is 20 feet long by 8 feet high, usually 9-11 pallets are able to fit into one TEU.
- Corrugated metal boxes are used for 90% of all shipping containers as they are more lightweight than the solid steel containers.

- Wooden boxes are often used to ship military shipments.
- Bespoke crates can be used for large, awkward shaped, heavy items, such as capital plant.
- A Unit Load Device (ULD) is used to bulk pack and transport cargo on a commercial airline.

In terms of sizing, the following are the most regularly used designations:

- A 'single pallet' is normally the minimum recognised shipment size that is handled
- 'Less than container' (LCL) is often used by carriers that consolidate and transport many smaller shiploads of freight. This is used increasingly in the e-fulfilment market.
- Full container load (FCL) is a shipment that occupies at least one complete container.

The use of technology

As businesses compete to deliver products, they must avoid inefficient routes, running less than optimal capacity loads or taking too many shipments at reduced margins.

Transport Management Software (TMS) can improve the efficiency and visibility of the multimodal transportation process. It provides end to end visibility, door to door tracking and the ability to perform routing scenarios to determine the best overall routing transit time. TMS has the capability to co-ordinate transport carriers and suppliers along with up to date freight rates, contract and documentation management. It provides tools to manage carrier rates, carrier dispatch, traceability, event horizon management, customs clearance, invoicing, booking documentation, transport alerts for delay or accident and KPI management. It extends visibility and collaboration from suppliers through carriers to customers and can be used to consolidate orders and accurately forecast demand and shipment volumes to enhance the solution without human intervention, thereby maximizing the return on the carrier's transportation budget.

The future of multimodal transportation

The challenges and opportunities that face multimodal transportation in the future are broadly the challenges from its impact on the environment and the opportunities from technology and business innovation.

Challenges from environmental impacts

If we are looking to de-carbonise the supply chain then consolidating on rail will be beneficial.

However, ships carry 80% of global trade and this is predicted to double by 2030. Around 95% of the goods imported and exported by the UK are transported by sea (data from Chartered Institute of Logistics and Transport) so rail is not a comprehensive solution.

Slow steaming (operating ocean going ships at significantly less than their maximum speed) has been taken up across the whole of the international industry. In 2010, the National Ports and Waterways Institute stated that nearly all global shipping lines were using slow steaming to save money on fuel and lessen emissions. This however increases journey times.

'Smart Steaming' is a strategy by which the vessel speed is dynamically optimised based on weather, destination port, client's requirements, cost and carbon impact. An International Maritime Organisation project studying Smart Steaming, refers to it as 'Just In Time ship operations'. However, to effect maximum benefit from this optimisation strategy, in the future, ship control systems will have to be more sophisticated, communications with destination ports will have to be improved and new style commercial and legal agreements with port and terminal operators and freight forwarders will have to be developed.

The EU Horizon 2020 work programme has the objective of providing smart, green and integrated transport solutions through co-operation with EU partners.

Integrated, multimodal, low emission freight transport systems and logistics is one of the five main themes under the programme. This includes development of hybrid/electric aircraft, sustainable electrification in urban areas and reduction of transportation impact on air quality. An example development under this initiative is the plan to build and launch over 500 electric barges that can transport containers. However, with a total of over 7300 inland vessels, there is still some way to go for this to have a measurable impact on emissions.

Opportunities from technology and business innovation

Telematics and geolocation is playing an ever increasing role in multimodal transportation. Vehicle tracking devices can be installed to monitor fleet movement and location by Global Positioning Systems (GPS) in real time. Container tracking is used to show real time locations and can improve security and assist in efficient re-scheduling if required.

Galileo is the global navigation satellite system created by the EU. The high precision and authentication positioning services of Galileo can greatly improve optimisation or port operations and global cargo routes. The use of geolocation data alongside other telematics is bringing about a more efficient use of physical assets and a reduction in carbon usage.

Multimodal transportation will always respond to innovations in the marketplace.

A very recent development is FBA – or Fulfilment by Amazon. Here, Logistics companies specifically set themselves up to store, pick, pack, ship and service client products in Amazon warehouses. The flexibility required to ship, often smaller products, across the world is a new challenge for multimodal logistics operators. The gradual increase in large scale containerisation may be reversed as it becomes too bulky and slow to respond to the need for quick delivery and quick returns. Multimodal transportation will have to rise to the needs of individual consumers rather than just large corporations.

This brings pressure to bear to develop new routes and new transport means which are faster than ocean and more affordable than air. The use of drones to complete final stage delivery of these smaller packages may yet revolutionise international deliveries.

Working relationships

The paragraphs above give some idea of how complex and how vital the freight movement industry is.
The value of procurement working closely with an expert freight forwarder or shipping agent in this dynamic environment cannot be overestimated. The political landscape, international legal developments, weather conditions, environmental considerations and commercial imperatives are changing daily. Unless the procurement team has an import/export expertise within the business, then contracting with a reliable freight forwarder or shipping agent is central to managing the complexities of supply chain movement, reliably fulfilling your customer's requirements and making your business secure and profitable.

The failure of the Hanjin Shipping Company (2016) which was one the world's largest container carriers caused worldwide disruption to the supply and shipping industries. It has raised the question of whether single source contracts for freight management now poses a major supply chain risk. The continuing downturn in the container shipping industry due to the Chinese economic slowdown and weak global GDP has

prompted some businesses to weigh up the cost benefit of having a single source freight contract against the risk in the market of having just one provider.

Undoubtedly, whatever changes continue in the international freight industry, close working relationships with one or more freight experts will be fundamental to maximising the benefits for your business and avoiding the very real pitfalls associated with long and unpredictable supply chains.

Case Studies

Maersk Line Shipping

Maersk Line is a Danish international container shipping company, set up in 1928 and which, as of 2018, was the world's largest container shipping company by fleet size and cargo capacity.

It operates over 786 vessels, has over 31,000 staff – 7000 shipping crew and 24,500 processing personnel. It has 374 offices in 116 countries. Its headquarters is in Copenhagen. As of 2011, its container fleet consisting of owned and leased vessels had 700 vessels with a capacity of 3.8 million TEU's (Twenty foot Equivalent Units).

In 2006, the largest container ship in the world at that time was delivered to Maersk Line. Since then, Maersk has ordered a further 20 container ships each with a capacity of 18,000 containers.

Maersk set a goal in 2018 to be carbon neutral by 2050. In 2017, the company's ships emitted 35.5 million tonnes of CO2e. By employing 'slow steaming' it reduced its CO2 emissions in 2007-14 by 40% or 11 million tonnes. It is co-operating with the US navy on testing algae bio fuels as a source of power.

P&O Ferrymasters European warehousing and distribution facility

P&O Ferrymasters has announced the opening of a 17,000 square metre state-of-the-art warehousing facility in Europoort to support its trans-continental operations. The ten year contract for the additional facilities will significantly expand the warehousing storage capacity of P&O Ferrymasters at Rotterdam, allowing its customers new storage opportunities and flexibility at one of the business transport hubs of Europe.

The warehouse, which consists of two 7,500 square metre levels, will become operational next month and has close proximity to both the Maasvlakte 2 area in Rotterdam and the Europoort ferry terminal, making it ideally positioned to accommodate the import and export of goods requiring storage for routes on the deep sea, short sea and North Sea. P&O Ferrymasters is equipping the new facility with 16 loading docks and proven warehouse management systems to ensure its customers immediately receive the benefit of extra storage capacity in their end-to-end supply chain solutions.

P&O Ferrymasters' Contract Logistics Director, said:

"This new warehouse capacity at Rotterdam marks an important step in our plans to enable trade flows across Europe."

"This new facility will provide the operational flexibility and capacity our customers need to ensure their supply chains are becoming even more efficient and effective with direct access to a central hub linking rail, road, inland barging, deep sea and short sea."

Antwerp Inland Port

Antwerp is the best inland shipping port in Europe, operating mainly through inland barges and connecting rail networks. Thanks to its inland location, in the middle of the Scheldt-Maaz-Rhine-delta, the port is directly connected with the pan-European barge network.

There are 240 weekly barge services between Antwerp and 90 key destinations across Europe. 240 container shuttles a week operate to 90 European destinations in seven countries. The barges make an average of 1000 calls per day and move 99.3 million tonnes of freight via Antwerp annually.

The Antwerp Port Authority is seeking to influence a modal shift of transport flows in favour of barge and rail transport by implementing an inland container shipping action plan.

Its' ambition is to increase container barge transport from 36% to 42% by 2030, by improving planning, collaboration and use of technology. The introduction of The Barge Traffic System and the Automatic Identification System which operate by web application to reduce the complexity and improved speed of communication for barge operators off-loading freight at inland ports and rail terminals.

Author

Susan has worked in corporate industry within procurement for many years, undertaking everything from expediting, contract negotiation, to strategy development and large scale change management initiatives.

Susan is now focusing on project procurement, commercial training, coaching and technical authoring through her own business.

Susan is a great contributor to CIPS and has been involved with CIPS through her chairmanship of the Birmingham branch and participation in the annual Negotiation Challenge events.

Susan Randall (BA FCIPS Chartered)

LinkedIn

Further Reading

The United Nations Convention on International Multi Modal Transport of Goods (Geneva May 1980)

Transport Intelligence Insight www.ti-insight.com

Multimodal 2020 www.multimodal.org.uk

Chartered Institute of Logistics and Supply www.cilt.org.uk

EU2020 Work programme
https://ec.europa.eu › programmes › horizon2020 › area › transport

"Move by South Korea's Hanjin Shipping Roils Global Trade." Wall Street Journal August 31 2016