A framework for smart and cleaner urban construction logistics to support sustainable tendering based on the EMAT approach

Ploos van Amstel, Walther 1 a, Balm, Susanne b, Merrienboer, Siem van c

1 Amsterdam University of Applied Sciences, The Netherlands s.h.balm@hva.nl
a Amsterdam University of Applied Sciences, The Netherlands w.ploos.van.amstel@hva.nl
b TNO Mobility, The Netherlands siem.vanmerrienboer@tno.nl

Extended abstract

Objectives and motivation
The transport of materials and personnel to urban construction sites, take a large share of the total number of trucks (20%) and vans (40%) in cities (HVA Research, 2009 and 2014). This has negative consequences for residents, visitors and businesses in the neighborhood where construction works take place. Smarter and cleaner city logistics solutions are needed.

The ‘ground rules’ for smarter and cleaner construction logistics in urban areas are set during the tendering process. This research developed a framework for ‘logistics quality’ to be used as a quality criterion for EMAT (Economically Most Advantageous Tender) procedures to support tendering construction projects by both public and private clients.

On the basis of recent research, patterns of development of alternative logistic systems and relations between the participants of construction projects have been evaluated. Evaluation of recent urban construction projects introducing innovative logistics concepts by construction companies shows that implementing alternative urban logistics concepts can significantly reduce total logistic costs, urban congestion and improve productivity.

General description
The University of Amsterdam and the Amsterdam University of Applied Sciences are building three new campuses in the centre of Amsterdam. The construction and renovation works provide much additional urban freight flows and air pollution at busy traffic junctions in the city. In recent years, there is great pressure on sustainable processes in the construction sector (e.g. BREAAM) due to more construction projects in cities and the need to pay more attention to quality of life, accessibility, safety and communication with stakeholders.

Until recent years the complexity of the construction supply chain and lack of data alignment herein were major obstacles for improving urban freight flows to construction sites. Modern information technology in the construction supply chain, such as the Building Information Model (BIM), now offers possibilities to share logistics information in the supply chain in order to reduce the number of transport movements of equipment and personnel to and from the construction site and using other modes of transportation (e.g. waterways) and at the same time reducing the cost of failure.

The transport of materials and personnel to the construction sites, take a large share of the total number of trucks (20%) and vans (40%) in the cities. This has negative consequences for residents, visitors and businesses in the neighborhood where constructions works take place. This research developed a framework for ‘logistics quality’ to be used as a quality criterion for EMAT (Economically Most Advantageous Tender) procedures to support sustainable tendering by both public and private clients. This framework has been developed based on ‘lean and green’ criteria (Ploos van Amstel e.a., 2013 reference?) used for e.g. outsourcing in the logistics industry (using an ‘integrated logistics concept’), the evaluation of construction logistics for current building projects from the University of Amsterdam and the Amsterdam University of Applied Sciences and expert interviews.

Results and conclusions
Evaluation of ‘best practice’ construction projects (Merrienboer, 2013) shows that construction logistics can be optimized through cooperation in the construction supply chain (between contractors, suppliers and logistics service providers), the use of alternative freight solutions (such as bundling, water transport, urban consolidation centers, combining inbound and outbound flows, traffic control measures and personnel transport) the use of modern information technology for the planning and control of the materiel flows, decision support models, gain sharing and collaborative behavior between parties in the construction supply chain during preparation and execution of the project. Also pro-active communication with stakeholders (residents, local government, businesses) supports realising benefits.

Accordingly, the framework for EMAT evaluation covers: logistics strategy, urban freight network and evaluating alternatives, tactical and operational planning and control, construction logistics information and communication technology, logistics organisation and key performance indicators.

References

- HVA (2009 and 2013). Student research on urban freight in Amsterdam, HvA Amsterdam.
Keywords: urban freight, sustainable tendering, construction logistics, (min = 3; max = 5).