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Maritime Industries

››› Application of big data systems to monitor shipping operations and to optimise yield and costs of container shipping companies

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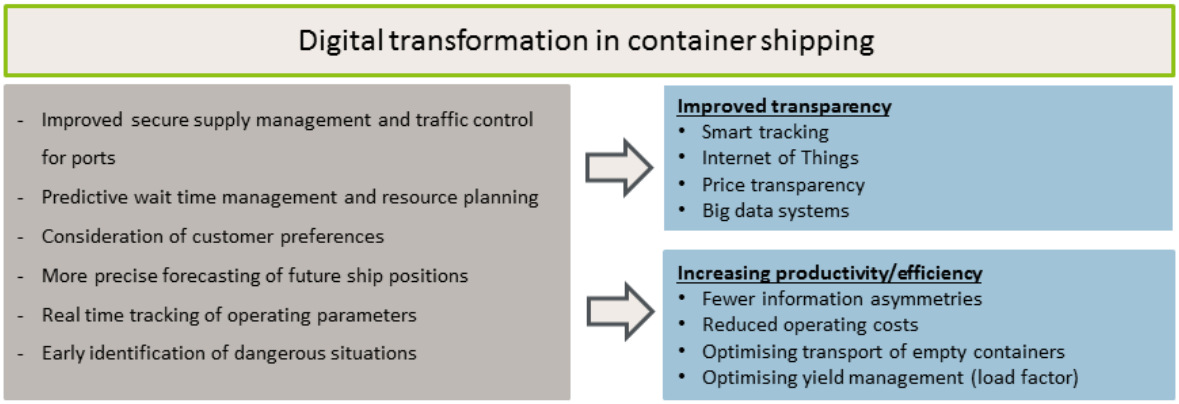
Due to high cost pressures and increasing regulatory requirements that call for greater efficiency and transparency, big data applications are gaining importance for container shipping companies and constitute a key success factor in the long term.

Increasing importance of automation & digitalisation in container shipping

Maritime Industries are finding themselves in the middle of an extensive transformation process as a result of growing digitalisation. According to a 2016 PwC survey among shipping companies, 87% of ship owners assume that automation and digitalisation will increase to an "extreme" degree in the coming years. In this context, the greatest importance is placed on the seamless tracking of shipments transported by sea (94% agreed) and digitalisation of vessel maintenance processes (93% agreed). The following study examines the result-oriented analysis and management of data flows (big data) in container shipping. Big data in this context essentially refers to using information technology for collection, connectivity and analysis of real time data (using intelligent algorithms). The implementation of big data systems represents a key prerequisite for optimising ship operations and operations in ports and logistics chains. According to McKinsey, the productivity of data-driven companies is approximately 5 per cent higher in comparison to ordinary peers.



Cost optimisation with real time transmission of operating parameters

Operationally speaking, big data systems mainly enable optimisation of operational fleet costs and ship utilisation. The basic prerequisite for this is equipping the ship with sensors (advanced sensor module) to enable real time transmission of operating parameters (e.g. current bunker consumption / maintenance status). The Korean shipping company SM-Line for instance has equipped ships and their freight with a satellite system (VSAT) to generate real time data with regard to the ship and freight status. For this purpose, recording devices transmit the data to the satellite system, which in turn forwards the data to the shipping company's central computer. Furthermore, data mining can be transmitted to a shipping company's entire fleet by linking the data from all ships with each other (cloud).

The costs of the network can be reduced overall thanks to combined real time transmission of weather data, condition of vessels (benchmarking) and machines, as well as capacity utilisation in terminals and ports.. Industry experts assume that bunker consumption can be reduced by up to 5% by simply adjusting ship speeds for changing weather conditions and taking operational delays into account (e.g. in the case of port congestion). Further cost savings can be achieved if prompt, situation-related approaches are developed when unforeseeable operational disruptions occur. Additional data regarding land transport, customer behaviour/preferences (e.g. the electronic forecast platform Inttra) are required for an optimal decision-making process. Furthermore, additional costs for feeder services, overland transports and commercial aspects must be taken into account.

Efficient empty container repositioning

Due to imbalances in the flow of trade, managing empty container transports is a major challenge. Big data analysis enables efficient implementation of empty container transports by using modern predictive algorithms. Real time data regarding the location of container boxes must be determined to optimise the container boxes' stream of movement and reduce empty container transport costs. Tracking devices are mounted to the container boxes for this purpose and, if required, data from other operations systems (tracking ships with AIS, equipping trucks with GPS, utilising container depots) or predicted truck wait times for logistics nodes (empty container depot, container packing station, distribution centre) are consulted. For example, Maersk equipped 270,000 reefer containers with GPS technology to transmit the temperature, humidity and mechanical problems in addition to the position on a real-time basis. By additionally utilising empirical and estimated customer needs, big data applications not only ensure that the necessary number of containers is transported to the relevant location, it also ensures that the number of and costs for empty transports can be reduced.

Supporting yield management

An additional important field of application for big data systems at shipping companies is price & capacity management. Because differentiation from the competition is usually done using pricing and, in doing so, using the cost base, the ability to exactly calculate prices based on unit costs is of essential importance to shipping companies' yield maximisation. Calculating the exact unit costs (necessary data includes information about operational aspects such as loading and port congestion applications, and costs and availabilities of trucks and trains) as well as consideration of how the competitors and customers will react to rate adjustments enables the yield-optimised determination of cargo rates for each individual container transport.

Digitalisation as an opportunity for reducing shipping agents' market power

Digital technologies (mainly cloud / blockchain), the Internet of Things (primarily equipping fleets and container boxes with sensors and their networking on an information technology level) as well as big data applications based on these things have the greatest importance for the container segment in the short term. A major success factor will be fully digitalising customer interactions and operational systems. A large number of shipping companies (MOL, NYK, K-Line, PIL, Maersk) are already cooperating with IBM to develop a blockchain platform that includes the majority of supply chain inter/transactions (including underwriters and brokers). The primary objective is to significantly reduce process & documentation costs, which makes up about 20% of the transport costs. According to McKinsey, if it is successful, the shipping companies' business model being transformed to integrated logistics providers (primarily by integrating port infrastructure and introducing digital market places) could significantly reduce the market power of forwarders. The prerequisite is that shipping companies understand digitalisation as a strategic programme, question traditional organisational structures, processes and systems, and examine these for disruptive approaches. Otherwise there is a risk that digital disrupters will exhaust the value-added potential of big data first.