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Port call optimization: Two sides of the same coin

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In recent years strong emphasis has been put upon port call optimization to facilitate just-in-time shipping. Diverse initiatives to standardize processes and communications conducted within the port, with visiting ships, and with previous and next ports. Not surprisingly, ports and terminals have led this development to enhance their value proposition. One core value coming out of port call optimization is enhanced predictability which is an important foundation for shipping lines' scheduling and planning processes. Predictability in a ship's arrival to the port is at the same time an important foundation for expanding the planning horizon for ports moving towards a commitment-driven planning process rather than continuing to follow the first-come first-served principle. However, port call optimization needs to be regarded from different business logics, a port-centric approach raises the concern of the port with its operators to optimize the utilization of their resources, while a ship-centric approach raises the concern of ensuring high utilization of the ship paying visits to multiple ports. Container shipping tends to operate a port rotation schema, where the rotation through successive ports needs to be taken into consideration - for the shipping line it is not enough to just explore the direct relationship between a single ship and a single port.

Introduction: Why is port call optimization on the agenda

Increasing demands are being made to overcome the fact that many of the world's ports continue to serve ships on a first-come first-served basis, causing inefficiencies and an adverse carbon footprint. This port business logic has caused a lot of concern associated with just-in-time shipping and, as a result, increasing the synchronization between the ship's plan for arriving to the port and the port's capabilities of serving the ship is now high on the IMO agenda[1] and is now a component in how digitalization is recommended to be adopted for the world's ports.[2] Just-in-time shipping is conceived as one of the toughest initiatives to realize, but also one of the initiatives that would have most impact on improving both the sustainability and the image of shipping transport. This is also one of the parts where capital productivity from the involved actors has a direct relationship to energy efficiency.[3] Port call optimization is now being actively promoted by organizations such as the Digital Container Shipping Association (DCSA) as a standardized approach to port visit interaction and the foundation for optimal turn-around times.[4]

In this article particular emphasis is put upon container shipping and on the need to take the container line rotation schedule into consideration, because disruptions occurring at one port causes accumulated delays to succeeding ports. Delays in previous ports may cause

- a ship needing to steam faster and burn more fuel to meet an original time slot thereby reducing returns on capital productivity and energy efficiency, or

[1] https://smartmaritimenetwork.com/2020/08/13/imo-calls-for-port-call-data-exchange-standards-in-just-in-time-arrival-guide/

[2] https://sustainableworldports.org/wp-content/uploads/World-Bank-IAPH-joint-paper-accelerating-digitalization.pdf

[3] Lind M., Watson R., Chua C. P., Levy D., Theodossiou S., Primor O., Picco A. (2020) A Primer for a Profitable and Sustainable Maritime Business, Smart Maritime Network, 2020-09-09 (https://smartmaritimenetwork.com/2020/09/09/prime-considerations-for- shipping-success/)

[4] https://dcsa.org/initiatives/just-in-time-port-call/

- to cut and run or even skip a visit to a port part in the rotation schedule, thereby presenting a lesser quality of transport service to clients, or
- risk waiting in the next port and thereby reduce the optimization of the ship asset when it becomes idle.

It is also important to take a wide perspective on a global effort so as to avoid simply "paving over the cow paths"; we need to question what really matters.[5]

A port-centric perspective on port call optimization

A port is concerned with optimizing its utilization of resources and infrastructure serving multiple visits made by different shipping companies simultaneously. The average port serves different types of trade, such as container traffic, wet and dry bulk, regular and cruise-based passenger transport, etc., all driven by different business logics. Container calls are part of a larger schedule with multiple visits to the same port, a single cruise call is planned maybe two years ahead of time, regular passenger traffic is often repetitive, and bulk ships are highly dependent on supply and demand driven by market prices for the cargo. For the port to overcome the challenges of meeting the needs for different types of trade, two complementary approaches are taken: to seek as much flexibility on re-planning at the last minute and to expand the planning horizons as much as possible. The latest developments at the top of the data analytics agenda of maritime informatics[6] - access to data streams and enhanced digital connectivity across the ecosystem of maritime transport, are all expected to support such ambitions. Unfortunately, it seems that many ports are slow to digitalize.[7] This, in turn, affects the opportunities to harvest data now coming out of smart containers - something that could only help ports to shorten container dwell time in terminals and support vessel planners in adjusting their stowage plans.

Initiatives to standardize the core definitions used as coordination mechanisms (such as the meaning of an estimated time of arrival (ETA) to a particular location) in the port call process as well as standardizing processes of interaction between the involved actors have already been taken.[8]

One may however raise some concerns whether all the ports in the world, in the short run, will act in the same way. It will, for sure, take some time before a consensus is reached on a predefined pattern or patterns of operations. This is especially challenging when many of the world's ports lack suitably responsive governance structures. One solution might not fit all, since ports are not all managed the same way. Nevertheless, port call optimization, from a port's point of view aims to provide enhanced predictability on when visiting ships can be served and when they will be ready to depart from the port. This includes the coordination with the various government and service actors, who all have roles in relation to the vessel's arrival, e.g. customs and immigration, ships chandlers, husbandry agents (crew change, doctor appointments etc) as well as acknowledging the service level agreements (SLA) between carriers and terminals. To do this, a fundamental level of standardization is essential.

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[5] Lind M., Becha H., Simha A., Larsen S. E., Ben-Amram E., Marchand D. (2020) The maritime ecosystem needs ecosystem innovation to avoid "paving the cow paths", The Maritime Executive, 9/12-2020 (https://www.maritime-executive.com/editorials/maritime-ecosystem-needs-innovation-to-avoid-paving-the-cow)

[6] Lind M., Michaelides M., Ward R., Watson R. T. (2021, Ed.) Maritime informatics. Heidelberg: Springer; Lind M., Michaelides M., Ward R., Watson R. T. (2021, Ed.) Maritime informatics – additional perspectives and applications, *forthcoming*, Heidelberg: Springer;

[7] https://splash247.com/80-of-ports-missing-out-on-the-benefits-of-digitalisation-creating-last-mile-risks/

[8] IHMA and UKHO port information project: Functional definitions for nautical port information (https://www.harbourmaster.org/sites/default/files/2019-05/Functional%20definitions%205.5.pdf) and IMO (2020) Just In Time Arrival Guide Barriers and Potential Solutions (http://www.imo.org/en/OurWork/PartnershipsProjects/ Documents/GIA-just-in-time-hires.pdf)

A complementary approach, not taking a particular port governance model into consideration, is to adopt a principle where actors continually align their plans based on common situational awareness constituted by each of the actors, belonging to the same community, sharing of their knowledge.[9] This principle is followed within port collaborative decision making (PortCDM).[10]

A ship-centric perspective on port call optimization

Ports, being a collaborative effort among the actors belonging to the port, are concerned with optimizing the utilization of resources and infrastructure in providing value for their clients. While shipping lines are ultimately concerned with efficiently providing their resources and infrastructure to their clients, an underlying concern is to optimize the use of the ship for operations. Consequently, shipping lines want to steam at an optimal speed between ports, experience as fast a turn-around time as possible, arrive just-in-time for realizing the purpose of call, and experience as little waiting time as possible. Importantly, a high degree of predictability for starting and finishing port call operations is of high concern to a shipping line. To do this requires digitalization and collaborative data sharing processes to be established.

It is therefore unavoidable to not take the scheduling reality into consideration in the interaction between the shipping line and the port prior and during port visits. Shipping lines are concerned with optimizing their routing on visits to multiple ports and do not necessarily want to interfere with the processes upon which the port operates to provide its services for inbound and outbound passages, and the visit to the terminal operator. However, and most importantly, shipping lines, as for other shipping companies, do need to establish a channel for collaborative interaction to both the port authorities and terminal operators.[11] It is also highly advisable that ports establish a channel of communication with ship operations (with fleet operating centers) avoiding the port to interact with every single ship for medium and short-range planning.

Possible combinations

Many of the initiatives with digital implications currently being taken by the “community” of port call optimizers are both promising and re-usable from a ship centric perspective, including:

- a shared understanding of the definitions of core events, time stamps, and nomenclature associated to the port call process;
- a shared understanding of a standardized messaging format, such as S-211[12];
- standardized interfaces for messaging;
- a digital infrastructure that allows episodic visitors to connect to the port authorities and terminal operators; and
- a joint agreement on the tolerance for deviation from 100% predictability for some key events in the port call process.

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[9] Lind M., Becha H., Simha A., Bottin F., Larsen S. E. (2020) Smart Decision-Making and Collaborative Alignment, Smart Maritime Network, 2020-08-20 (https://smartmaritimenetwork.com/2020/08/20/smart-decision-making-and-collaborative-alignment/)

[10] Lind M., Watson R.T., Ward R., Bergmann M., Bjørn-Andersen N., Rosemann M., Haraldson, S., Andersen T., (2018) Digital Data Sharing: The Ignored Opportunity for Making Global Maritime Transport Chains More Efficient , Article No. 22 [UNCTAD Transport and Trade Facilitation Newsletter N°79 - Third Quarter 2018] (https://unctad.org/en/pages/newsdetails.aspx?OriginalVersionID=1850)

[11] Lind M., Ward R., Watson R. T., Haraldson S., Zerem A., Paulsen S. (2021), Decision support for port visits, in M. Lind, M. Michaelides, R. Ward, R. T. Watson (Ed.), Maritime informatics. Heidelberg: Springer.

[12] Bergmann M., Schröder M., Ward R., Andersen T. (2020) Maritime Digitalisation: Sharing timestamps on Port Calls is paramount, Smart Maritime Network, 2020-05-04 (https://smartmaritimenetwork.com/2020/05/04/maritime-digitalisation-the-foundation-for-tomorrows-port-calls/)

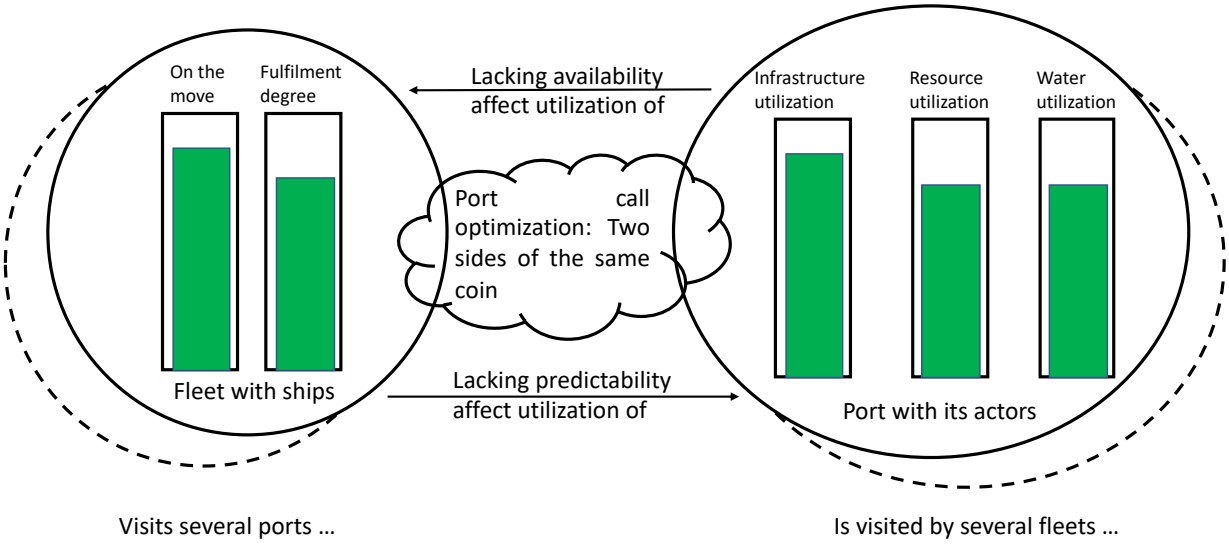

Figure 1: A fleet and port centric view on port call optimization

Final reflections

Most likely, existing port-centric approaches to port call optimization will not provide all the desired effects for shipping as a whole. In this article we have described the reality for container shipping. What does this mean for other types of trade, since container shipping only represents about a third of all sea transport and all port calls being made?

To avoid any misunderstanding of whether we are talking about a ship or a port centric approach to port call optimization, maybe we should include the ship-centric perspective on port call optimization under the revised title of port visit optimization.

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