



Green Port Growth and Maritime Shipping Network

-Experience from China and Call for Green Northeast Asian maritime shipping Alliance

Prof. Dr. LIU Zhengjiang

Vice President of Dalian Maritime University (DMU)

China

Busan, November 2018

Outline

1

Background

2

DMU research outcomes

3

Green Northeast Asian maritime Shipping Alliance

1 Background: maritime shipping is the 3rd largest pollutant of all human economic activities

- Maritime shipping emissions with 15%NO_x, 13%SO_x and 3%CO₂ (2007-2012, IMO) , and maritime shipping is the 3rd largest pollutant after industrial production and automobile emission. 70% of shipping emission will expand to 400 km along coastline area.

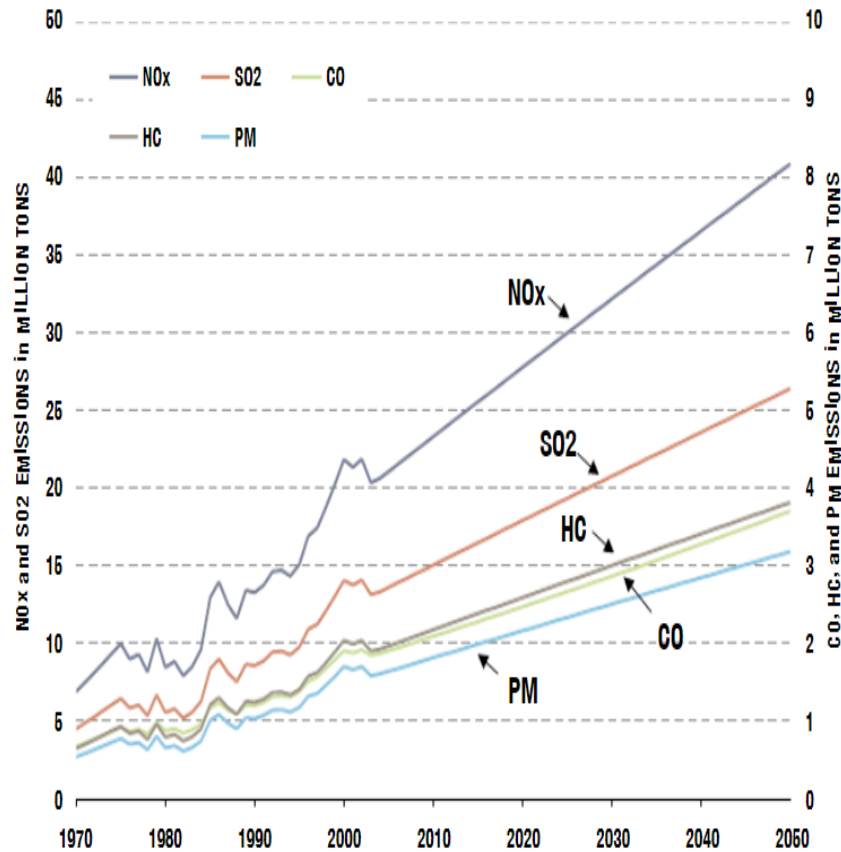


Fig. ship emission and estimation

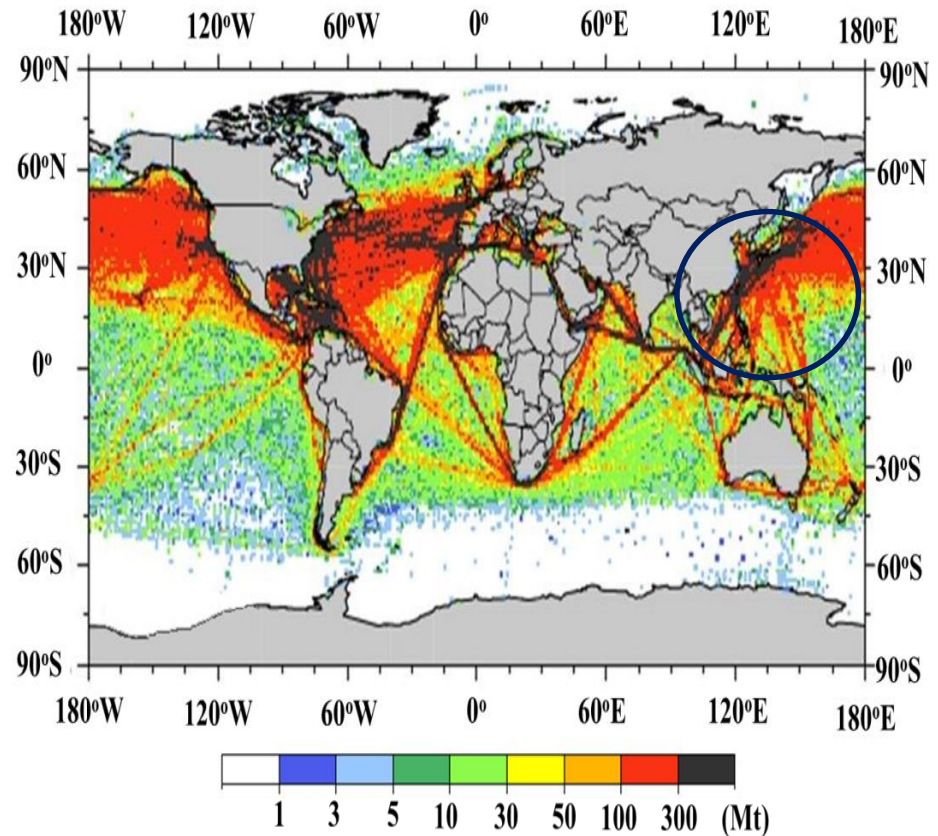


Fig. 2 spatial distribution of ship distribution

Corbett, J., Fischbeck, P., 1997. Emissions from ships. *Science*, 278(5339): 823-824.

Capaldo, K., Corbett, J., Kasibhatla, P., Fischbeck, P., Pandis, S., 1999. Effects of ship emissions on sulphur cycling and radiative climate forcing over the ocean. *Nature*, 400(6746): 743-746.

1

China's effort: enhancing Green Port Growth and emission control in maritime shipping

➤ Green port assessment

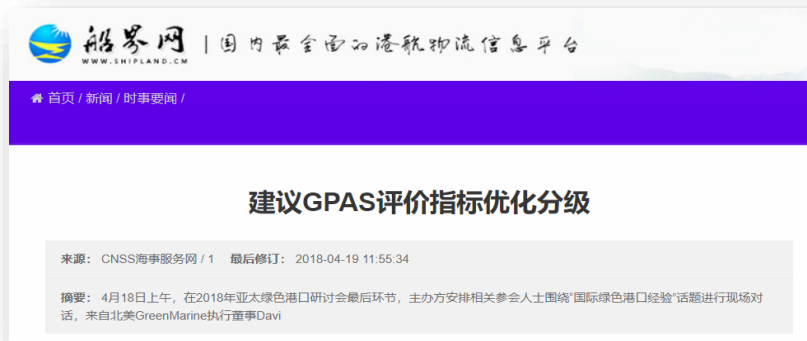
❑ Green Port Act, Initiated by Ministry of Transport of P.R.C



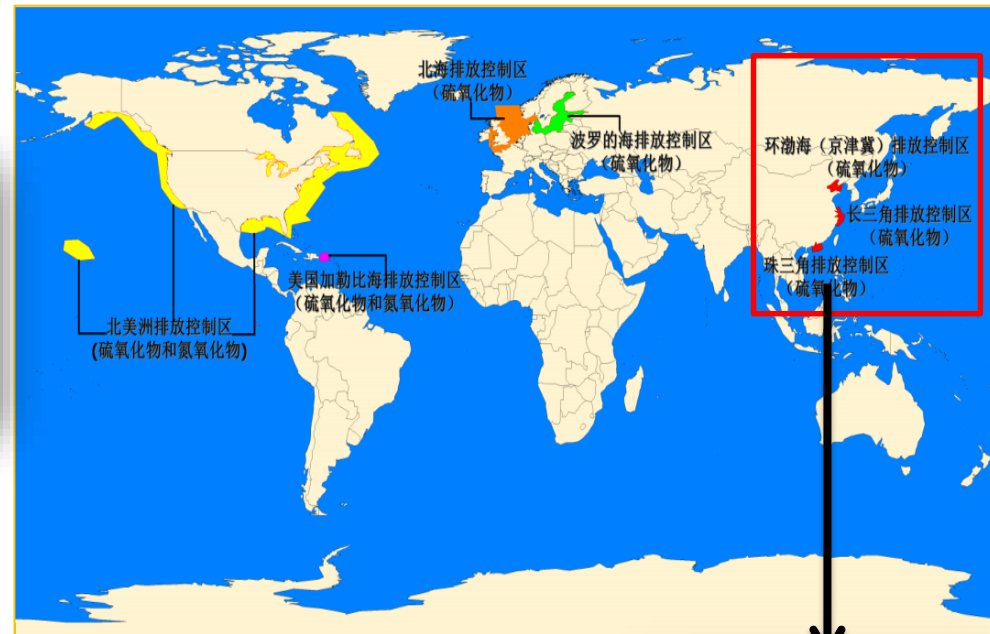
《Green Port Assessment Standard》 (April, 2013)

《Port shore power distribution Act》 (July, 2017)

❑ 《Asian Green Port Plan (GPAS))》 (March, 2016)



➤ shipping emission control areas (IMO)



Ministry of Transport of P.R.C

《Adjustment on ship emission area》

(expand area control)

(July, 2018)



1

How to control shipping emission: a question calling ports, ship carriers and all stakeholders

Administration

Question: how to monitor and set up dynamic assessment: rationalize maritime activity emission policy?

key: trade-off between the emission control cost and economic return in maritime sector

Port authority

Question: how to act to emission control: update port emission control technology and resource reallocation

Key: connection of port infrastructure and operation facility emission and hub-and-spoke distribution

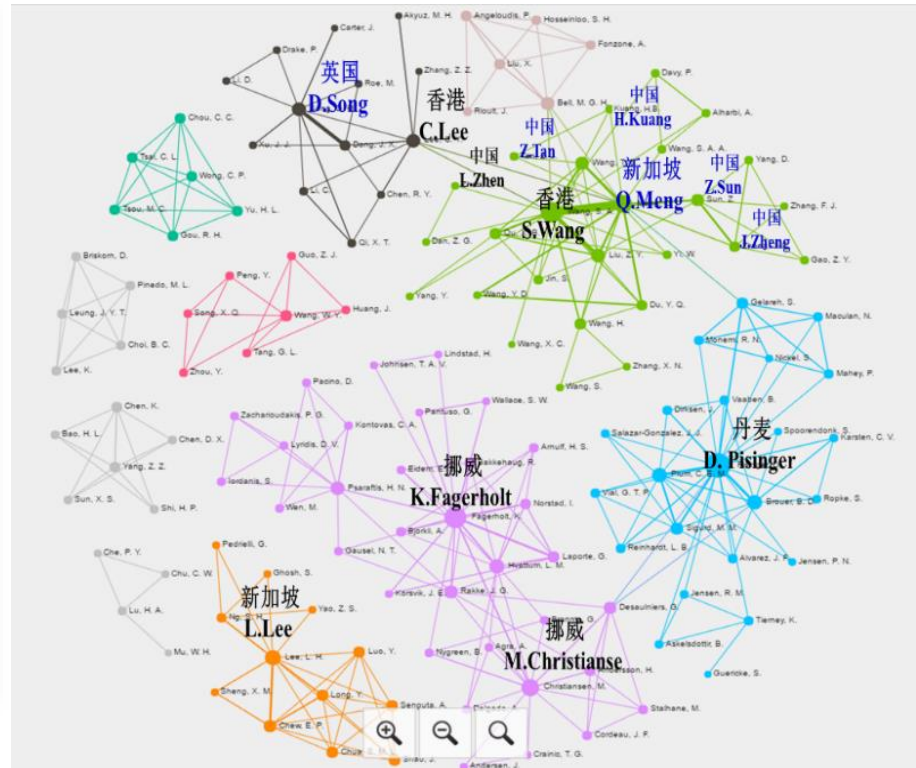
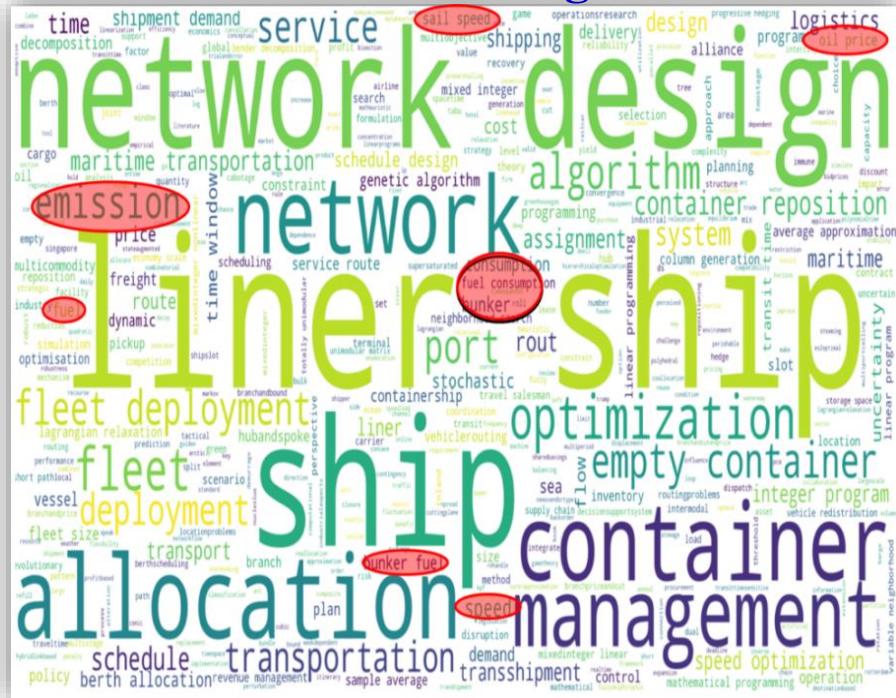
Ship carriers

Question: how to act to emission control: ship crew scheduling and maritime shipping network building

Key: ship emission control technology and cost

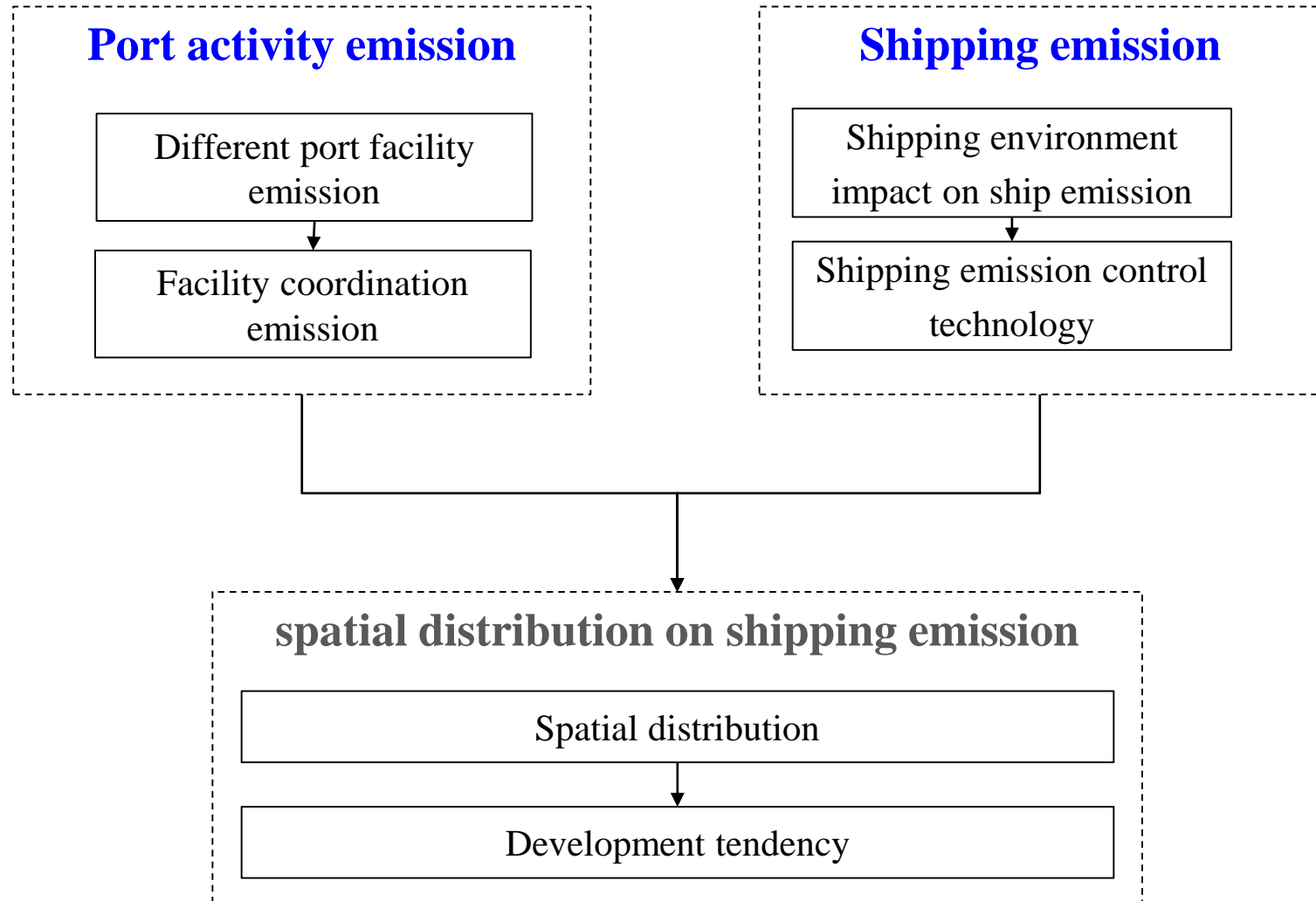
1

“Big-data” search results: 1988-2018



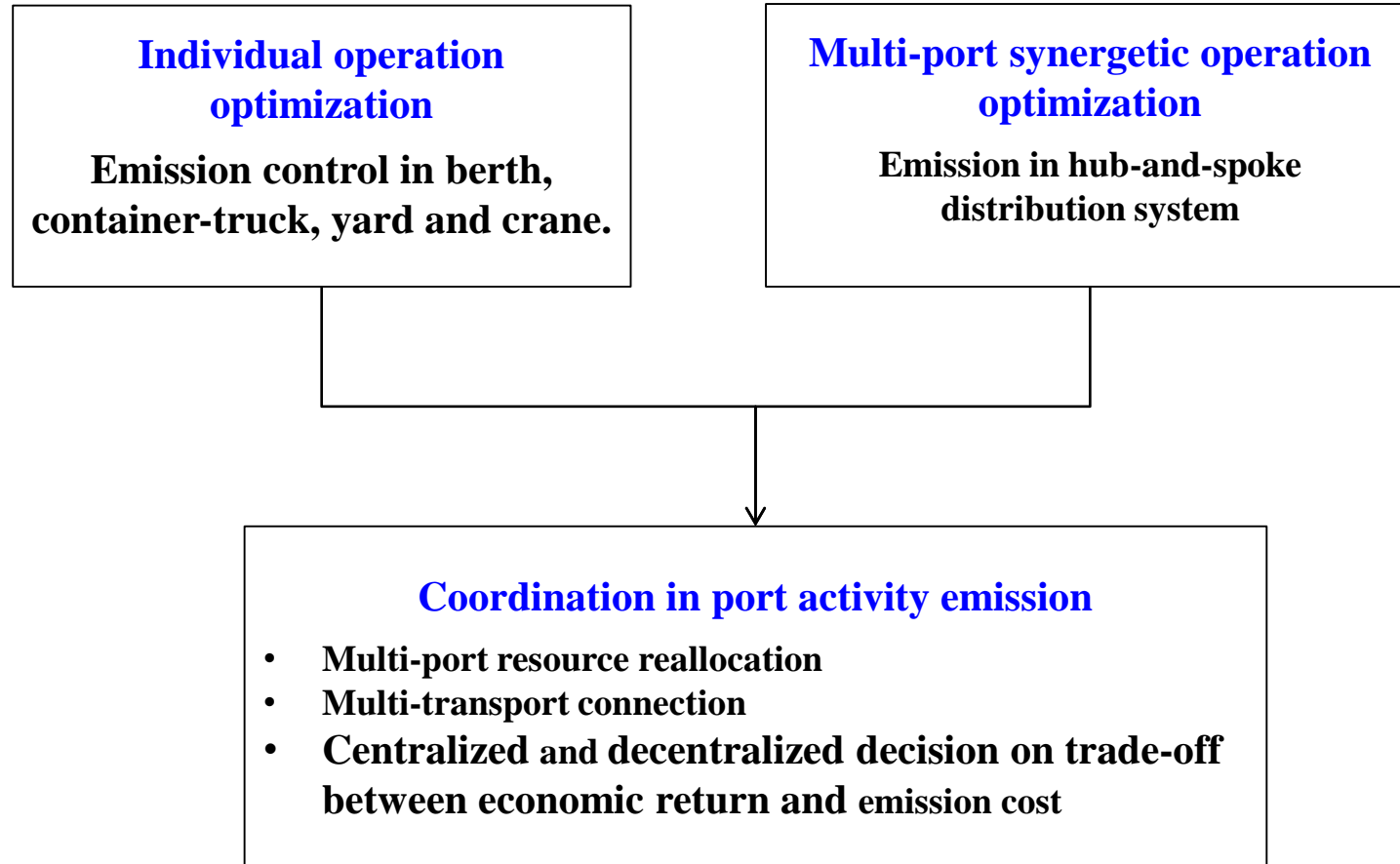
Conclusions:

- (1) lack shipping emission estimation and assessment based on “Big-data” and policy design are more;**
- (2) maritime shipping networking building with few consideration of emission;**
- (3) lack in-depth research into port regional cooperation under emission control background**



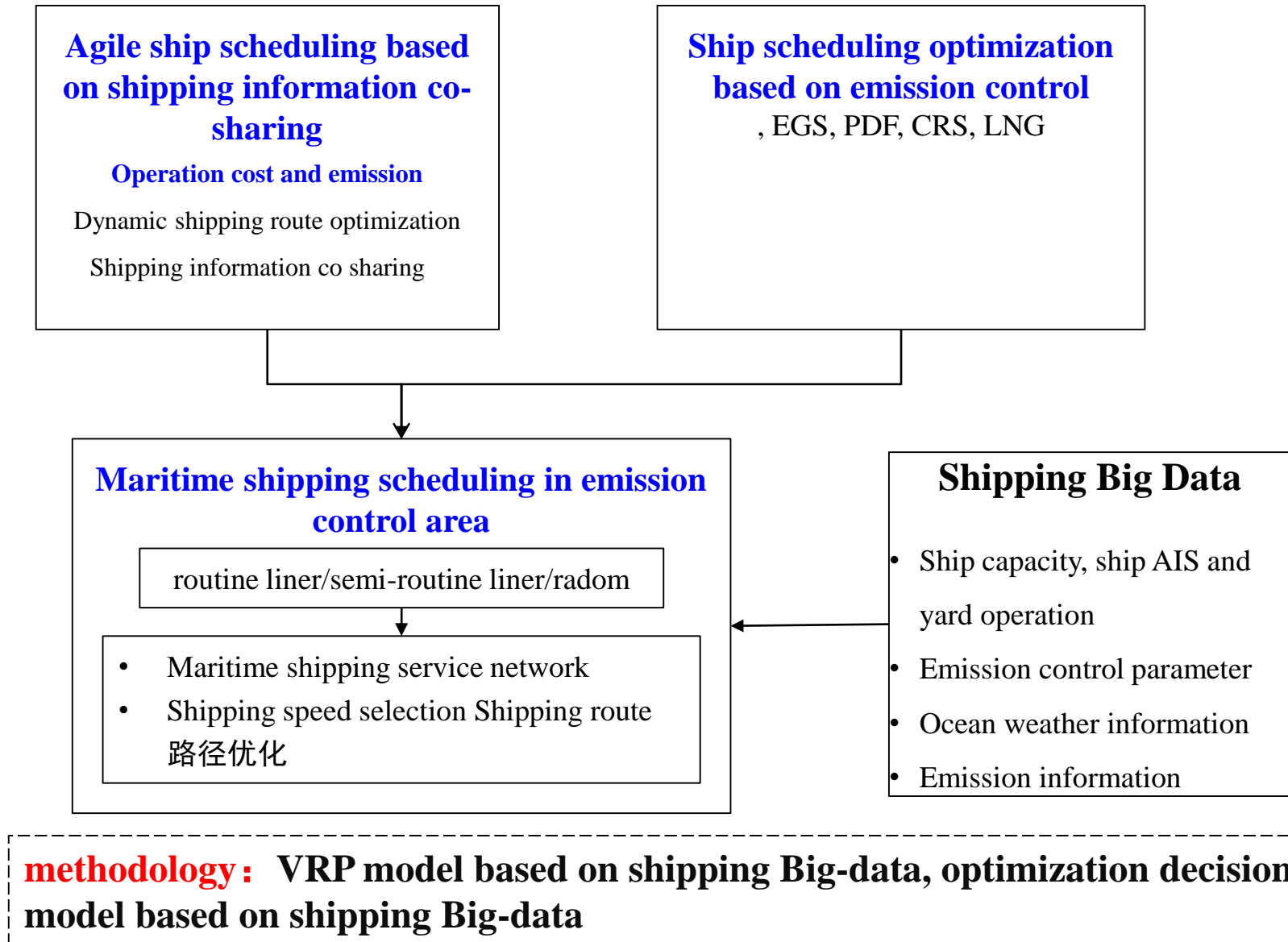
Research methodology: big data analysis. Bottom-Up model、DEA model, etc.

Research outcomes 2—port assessment and dynamic evaluation system based on port activity emission



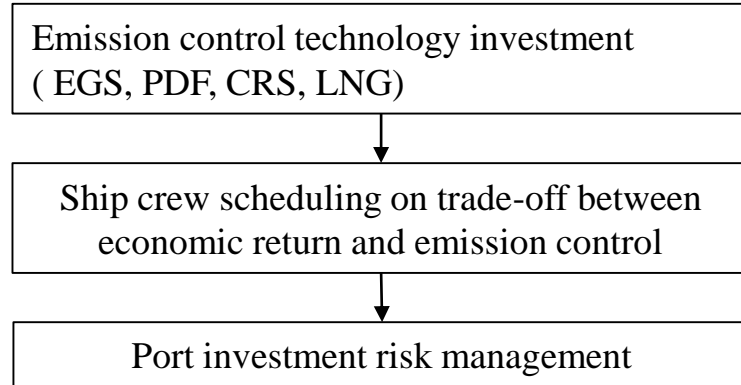
methodology: systematic planning, simulation, game theory and multi-transport networking model

Research outcomes 3——maritime shipping emission control decision optimization

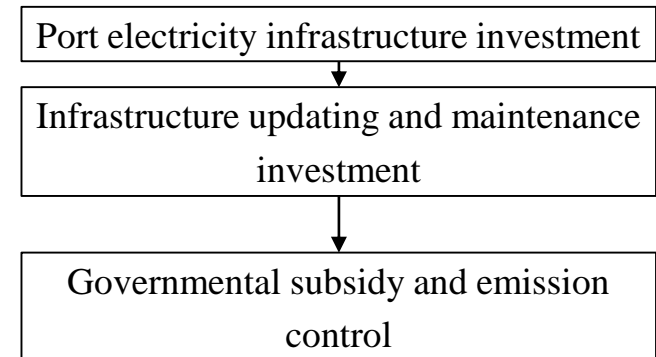


2 Research outcomes 4—maritime shipping strategy and investment based on emission control

Ship crew scheduling based on emission control



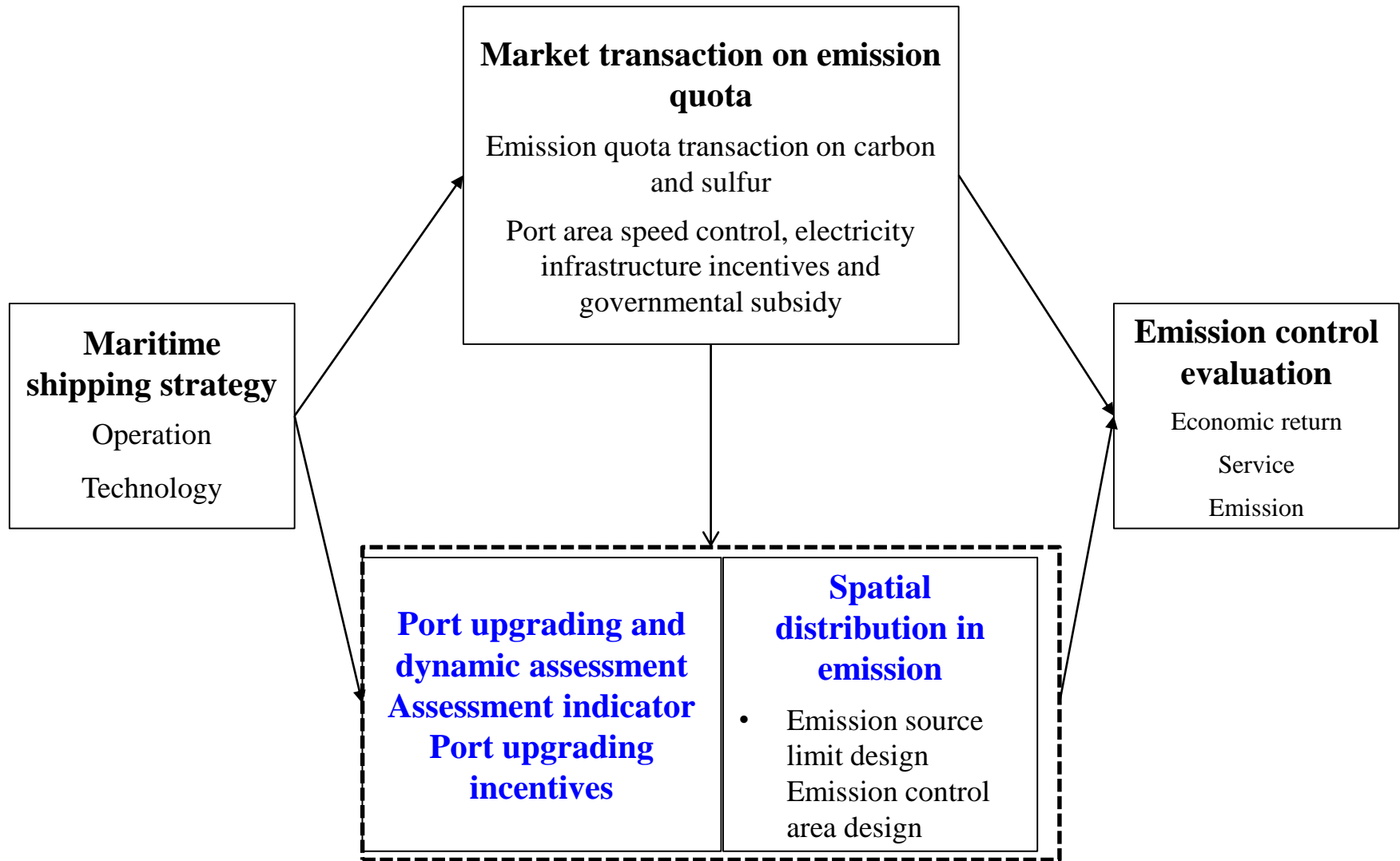
Dynamic investment optimization on port electricity operation



Dynamic maritime shipping emission control technology updating

- Emission control technology application
- Maritime shipping cooperation towards emission control
- Incentives on awarding emission control technology R&D
- Private equity and public investment cooperation (PPP)

methodology: stochastic programming 、 dynamic programming



methodology: bi-level programming

Research outcomes 6—— empirical research on maritime shipping emission control

E-platform on maritime shipping emission control monitoring

- Port activity and ship emission estimation
- Statistical
- Spatial estimation

Empirical research into the ports

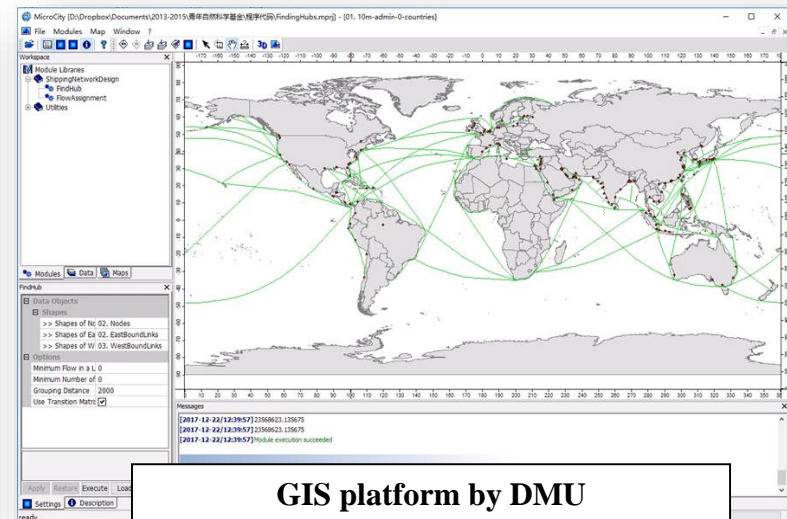
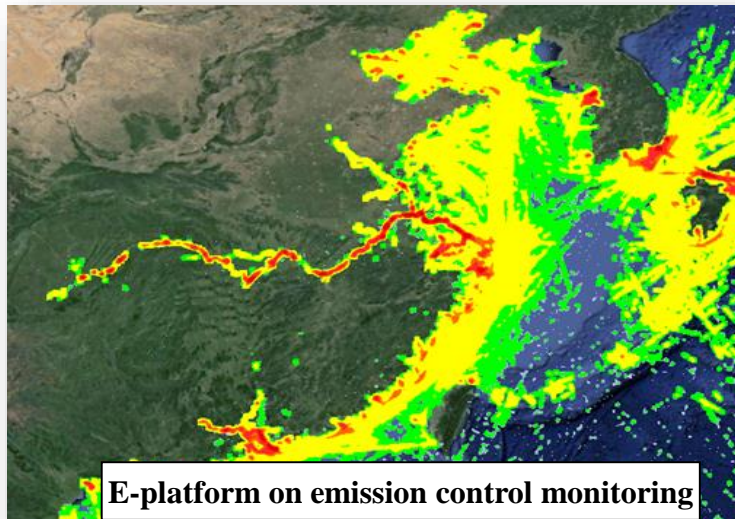
- Port operation
- Optimization Electricity
- Green port upgrading

Empirical research into the shipping carriers

- Ship emission
- Maritime shipping
- Emission control technology and ship crew scheduling

Regional empirical research

- Port-regionalization
- ECAs impact



- I. Cross country coordination towards green port growth in Northeast Asian maritime shipping.**
- II. Initiative in shipping emission control area design**
- III. Dynamic and sustainable research into green port development in this area**
- IV. Research into trade-off in maritime shipping networking optimization based on shipping emission control.**



Dalian Maritime University (DMU)
welcome you to join in us
and call for the green and sustainable
development in Northeast Asian
Maritime Shipping Network Building

Thank you