



Current strategic planning for sustainability in international shipping

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Abstract

Sustainability is a necessity for the future earth. As international shipping, the lifeblood of the global economy, moves toward door-to-door, strategic planning for sustainability of such movements becomes extremely important and challenging. Extant research on strategic planning for sustainability in shipping is rare. This study adopts a structured literature review in conjunction with content analysis to identify whether the existing strategic planning encourages sustainability in international shipping. A broad review of maritime logistics is also conducted to understand whether its strategic planning contributes to sustainability. Key findings include (1) the most strategic planning in shipping is limited to “port-to-port”; (2) the efforts of strategic planning toward sustainability in shipping are fragmented; (3) maritime logistics represents an active research area but lags behind in strategic planning; (4) proactive efforts to encourage green or sustainable maritime logistics have emerged; and (5) the research gaps include the distinction between the terms of sustainability, “green,” and “sustainable,” and the lack of an appropriate approach, methods, and a collaborative research-practice network of strategic planning for sustainability in international shipping. The findings suggest directions for future research to make international shipping fit for the sustainability challenge.

Keywords Strategic planning · Shipping · Maritime logistics · Sustainability

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1 Introduction

Sustainability, a prerequisite for the well-being of humankind, depends heavily on the practice of global industries (Future Earth 2013). International shipping, for example, is facing the challenge to reduce the carbon emission by at least half by 2050¹ (Dessens et al. 2014). Actually, this industry can play a major role in global sustainability not only for the Greenhouse Gases (Smith et al. 2015; Fayiga et al. 2018), but also the air quality problem of the global port cities, which are mostly populated coastal areas (Pike et al. 2011; Wan et al. 2016). Concurrently, as the world economy globalizes, logistic services integrate, and information technology advances, international shipping, the enabler of international trade, is expanding its service from its core maritime transportation to “door-to-door,” namely the supplier to consumer, embracing combined transport (Mukherjee and Brownrigg 2013; Branch 2014). This enhances logistic efficiency, reduces overall transport costs, and improves service continuity (Rodriguez and Youssef 2017). Door-to-door shipping in international trade usually involves different jurisdictions, uses both land and sea transportation, as well as ports; each may have their own way to improve sustainability, but these are fragmented for the integrated international shipping network (USDOT 2007; ATAP Guidelines Steering Committee 2016).

Sustainability is the ability to provide the service with minimal impacts on natural resources and the environment (Oxford Dictionaries 2017). Strategic planning, a systematic approach to produce strategies with long-term thinking (Grünig and Kühn 2010; Ioppolo et al. 2016), has proven to be an indispensable tool to generate effective decisions (Bryson 2011), particularly in the horizontally and vertically fragmented freight transport industry (Youssef et al. 2017; Frankel 1989). Although it has been suggested for the strategic planners to build and strengthen the capacity to develop sustainable strategies for freight transport (Youssef et al. 2017), the literature rarely concerned strategic planning issues in shipping (Wu and Zhang 2016; SteadieSeifi et al. 2014). For instance, as one of the pioneers, Kumar (1976) highlighted the urgent need for a comprehensive and long-term plan for shipping in most developing countries. Later on, Koufopoulos et al. (2005) and Fagerholt et al. (2010) pointed out that few studies have examined strategic planning for shipping. However, most of the planning works in the literature are at tactical or operational level, such as ship routing and scheduling (Kelareva et al. 2014), fleet planning (Fagerholt et al. 2009), stowage planning (Kroer et al. 2016), container reposition and allocation planning (Myung and Moon 2014), transport network planning (Dong et al. 2015); or on specific issue, such as environmental planning (Roberts 2007), financial planning (Min et al. 2009). Hence, the research question is whether the existing strategic planning in shipping can ensure the sustainability in international shipping.

As an emerging field, maritime logistics has been commonly assumed to provide door-to-door services (Nam and Song 2011; Wu and Zhang 2017). Panayides (2006) first introduced the core of maritime logistics and its research agenda. Subsequently, this emerging field attracted much attention in research and practices (Panayides and Song 2013; Heilig and Voß 2017; Lee and Song 2010). Yet its concept is still vague, and the scope and role are yet to be established (Song and Panayides 2015). Consequently, this paper also seeks to answer the following questions. What is maritime logistics? Is there any strategic

¹ <https://www.independent.co.uk/environment/ships-emissions-carbon-dioxide-pollution-shipping-imo-climate-change-a8303161.html>.

planning in maritime logistics that can contribute to improving sustainability in door-to-door services?

To answer these questions, this study reviews and analyzes the existing literature in the field of strategic planning in international shipping and maritime logistics. The review for maritime logistics is based on published academic papers. That for strategic planning in shipping is grounded in both published articles and existing documents from official websites because many organizations have implemented strategic planning processes for their forward-oriented thoughts and actions. The international shipping issues have often been considered as private rather than a public matter, but the fact is that the government intervention is needed to support it toward sustainability for its powerful influence (Youssef et al. 2017; OECD Publishing 2002; Pallemmaerts 2003). To confine the research scope, an attention of this study is limited to strategic planning for public and nonprofit organizations embracing government ministries, departments and agencies, and intergovernmental bodies which interface with international shipping (Mukherjee and Brownrigg 2013).

Next, the research method is explained first, followed by the initial results and refinements. Then the literature review results and summary are presented. The findings, research gaps, and future research directions will be discussed to conclude this study.

2 Research methodology

Literature review is a key tool to manage the knowledge for a specific academic inquiry, which aims to map and assess the existing body of literature, and identify research questions in order to develop and extend the body of knowledge further (Tranfield et al. 2003). A structured literature review has been recognized as a replicable, scientific, and rigorous approach for knowledge exploration than traditional literature reviews (Massaro et al. 2016). It is now a popular evidence-based approach for knowledge management (Feng et al. 2017; Seuring and Gold 2012). Given that the existing reviews of strategic planning in shipping are unstructured (Fagerholt et al. 2010; Koufopoulos et al. 2005), a structured review in strategic shipping planning and maritime logistics is carried out in this study. Therefore, four steps of data collection, initial search results, refinements, and data analysis (Feng et al. 2017) are employed to identify and analyze the related literature, find research gaps, and provide a basis for future researches.

This study also uses word-to-word content analysis, which is useful for generating reliable and valid findings (Ahi and Searcy 2013; Seuring and Gold 2012). We followed a replicable process to collect data, used the “discursive alignment of interpretation” approach (Seuring and Gold 2012) to solve the ambiguous contents and applied a stable and replicable “feature-based categorization” (Cohen 1982) for methodology summary.

3 Data and initial analysis

3.1 Data collection

This study collects relevant publications from the Scopus database, as it has a broad coverage of peer-reviewed literature. In addition, official websites of public and nonprofit organizations related to shipping are selected for the review on practical strategic planning. Such public organizations include the United Nations Conference on Trade

and Development (UNCTAD); Organization for Economic Co-operation and Development (OECD); International Maritime Organization (IMO); World Trade Organization; European Commission; United States Federal Maritime Commission (USFMC); United States Department of Transportation (USDOT); Transport Canada; United Kingdom's Department for Transport; Ministry of Infrastructure and Water Management of the Netherlands; German Federal Ministry of Transport, Building and Urban Development (BMVBS); Spanish Ministry of Public Works and Transport; Dutch Government; Greek Ministry for Economy, Infrastructure, Shipping and Tourism; Ministry of Transport (MOT) of the People's Republic of China; Hong Kong Government; Institute of Transportation (MOTC) of the Republic of China; Ministry of Transportation and Communications of the Republic of China; Maritime and Port Authority of Singapore (MPA); Ministry of Land, Infrastructure, Transport, and Tourism (MLITT) of Japan; Transport and Infrastructure Council of Australia, etc. (Mukherjee and Brownrigg 2013). Nonprofit organizations include World Association for Waterborne Transport Infrastructure (PIANC), Forum for the Future, and World Wildlife Fund.

Through experts' consultation, it is recommended to use two keywords "strategic planning AND shipping" and "maritime logistics." However, due to the vagueness in the definition of strategic planning for shipping (Wu and Zhang 2016), "shipping planning" is considered a better keyword. Therefore, "shipping planning" and "maritime logistics" are used as the keywords in data collection. In this study, the "title, abstract, keywords" search is used to collect literature published in English and Chinese language from the Scopus database. The time range was set from "All Years" to "Present," and all of the document type and access type are chosen. For practical strategic planning, the selected official sites search of "shipping planning" by using the "Google's web search" engine is employed. It should be noted that even if the authors did their best to collect all available data and extensive literature is reviewed, it is never exhaustive.

3.2 Initial search results

As of March 26, 2018, for the two categories—shipping planning and maritime logistics, the Scopus search identified a total of 1906 and 197 papers in each category. Then, a series of steps are taken to remove the unwanted papers. Firstly, the subject areas irrelevant to shipping in the Scopus database are excluded. These areas are (1) Pharmacology, Toxicology, and Pharmaceuticals, (2) Dentistry, (3) Nursing, (4) Neuroscience, (5) Health Professions, (6) Veterinary, (7) Psychology (8) Chemistry, (9) Biochemistry, Genetics and Molecular Biology, (10) Physics and Astronomy, (11) Materials Science, (12) Chemical Engineering, (13) Arts and Humanities, (14) Medicine, (15) Agricultural and Biological Sciences, and (16) Earth and Planetary Science. Secondly, some document types, such as short survey, book chapter, business article, note, abstract report, erratum, and editorial, are excluded. Thirdly, trade publications and book series were also excluded. This resulted in 1188 publications between 1946 and 2018, and 144 publications between 2004 and 2018 for the two categories. Finally, after deleting duplications and publications without author name and journal names, a total of 1109 and 135 publications remained in the two categories. In addition, 54 documents for shipping planning from selected official sites were collected. These are exported to Endnote bibliography software for further refinement.

3.3 Refinements of the search results

The first refinement is to remove the publications based on their abstracts. If the content cannot be grouped into the shipping planning and maritime logistics, such as special planning for the port, ship, and channel; planning for a company and private shipping organizations; planning for other industries like manufacturing; and planning without consideration of maritime industry, the publications are removed. Consequently, 383 and 61 publications in the two categories are retained for analysis.

Secondly, it is important to differentiate publications addressing the planning issues at different levels. Planning includes three levels: strategic, tactical, and operational (Benowitz 2001). These three levels are explained below:

- “A strategic plan is an outline of steps designed with the goals of the entire organization as a whole in mind, rather than with the goals of specific divisions or departments,”
- “A tactical plan is concerned with what the lower level units within each division must do, how they must do it, and who is in charge at each level,” and
- “An operational plan is one that a manager uses to accomplish his or her job responsibilities, the goals of which are precise and measurable” (Benowitz 2001).

It should be noted that a strategic plan can also target at the industrial level (McMillan 2012). As strategic planning should have a long-term planning horizon (Ewing 1972; Grünig and Kühn 2010; Bryson 2011) and generate strategies instead of tactics and specific measures, this study only focuses on strategic planning to pursue the long-term goal of sustainability (WCED 1987; Engelman 2013). An exhaustive discussion on tactical or operational planning is beyond the scope of this paper. Then, most publications from the Scopus database and 30 documents from selected official websites are excluded based on their full papers in accordance with the long-term planning horizon and strategies outputs.

3.4 Initial data analysis

After the refinements, 4 publications from the Scopus database and 24 documents from selected official sites were identified for strategic planning in shipping, but no publication of strategic planning for maritime logistics. Figure 1 shows the number of publications on shipping planning, strategic planning in shipping, and maritime logistics over the last 10 years. It can be seen that the strategic planning in shipping appeared in 2010, and maritime logistics has gained increasing attention.

4 Results

4.1 Strategic planning in shipping

4.1.1 Review on strategic planning in shipping

Only four papers remained in the strategic planning in shipping. Among them, Kumar (1976) identified the paradox and problems of the shipping industry to shed light on the need for a comprehensive and long-term plan for most developing countries. Frankel

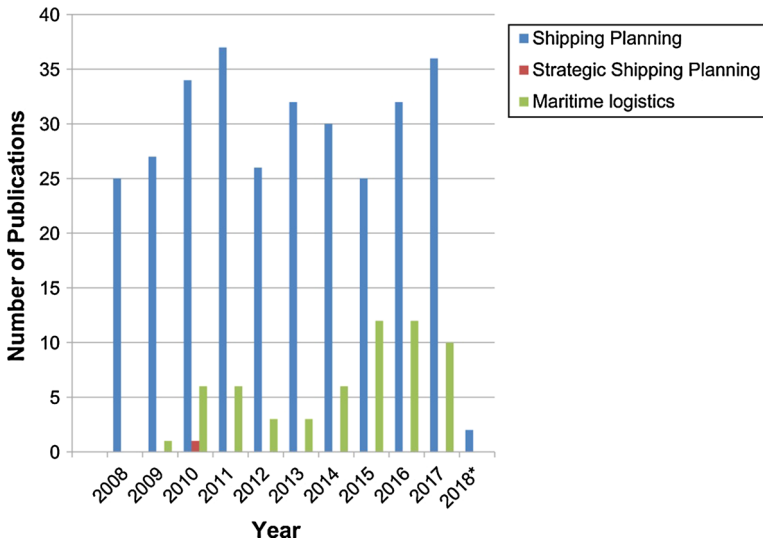


Fig. 1 Distribution of the publications reviewed. *Note: Data for the year 2018 include publications published up to March 26

(1989) proposed a process of strategic planning for the shipping industry. Koufopoulos et al. (2005) investigated and described the strategic planning practices in the Greek shipping industry to provide a benchmark for the measurement. Fagerholt et al. (2010) provided a step-by-step conceptual model to support decision-making for strategic planning in shipping. On the other hand, there are 24 documents regarding the strategic planning for shipping from official websites which are shown in Table 1.

4.1.2 Efforts on strategic planning for sustainability in shipping

In the literature of strategic planning in shipping, numerous efforts exist in green or sustainable shipping, which encourages the improvement in environment and sustainability. They are summarized below.

At the international level:

- IMO proposed the strategic plan integrating environmentally sound and sustainable shipping into its mission, and the strategic directions of developing and maintaining a comprehensive framework for environmentally sound shipping and enhancing the environmental conscience (IMO 2014).
- European Union developed policy objectives and policies including infrastructure, funding, technology, legislative framework, behavior, governance and external dimension for sustainable transport (European Commission 2009a) and built strategic maritime transport options based on the core values of sustainable development that is “economic growth and open markets in fair competition and high environmental and social standards” (European Commission 2009b).

Table 1 Strategic planning for shipping from selected official websites

Organizations	Strategic planning	Horizon	Scope	What planning does	Outputs	Source
IMO	Strategic Plan for the Organization (for the 6-year period 2012–2017)	6 years	Maritime transportation	Outlining broad directions and strategic objectives	Strategic directions and performance indicators	IMO (2014)
European Commission	Future of Transport	Long term	European transport	Defining a sustainable future for transport	Vision, and views to translate the vision into concrete actions	European Commission (2009a)
	Maritime Transport Strategy 2018	About 20 years	European maritime transport system	Presenting main strategic goals for the maritime transport system	Strategic goals and recommendations	European Commission (2009b)
USFMC	Strategic plan for the Federal Maritime Commission	2–6 fiscal years	International ocean transportation system	Setting goals and objectives for the international ocean transportation system	Strategic goals, objectives, and performance measures	USFMC (1999, 2000, 2003, 2008, 2011, 2013)
USDOT	USDOT's Strategic Plan	5–6 fiscal years	US transportation system	Developing a framework to improve transportation system	Strategic goals, performance goals, and indicators	USDOT (2014, 2006)
	The Maritime Administration and the U.S. Marine Transportation System: A Vision for the 21st Century	Long term	Marine transportation network for door-to-door	Setting a vision for the marine transportation system	A vision	USDOT (2007)
	Leading the Future: 2008–2013 Strategic Plan	6 fiscal years	US marine transportation system	Planning and implementing a better future for the marine transportation system	Strategic goals, performance indicators, and measures	USDOT (2008)

Table 1 (continued)

Organizations	Strategic planning	Horizon	Scope	What planning does	Outputs	Source
Transport and Infrastructure Council of Australia	Australian Transport Assessment and Planning Guidelines	1–5 years and 10–15 years	Overall transportation system	Providing a transport planning and decision-support framework	Strategies	ATAP Guidelines Steering Committee (2016)
MOT of the People's Republic of China	Thirteenth Five-year Development Planning for Modern Comprehensive Transportation System	5 years	Comprehensive transportation system	Building a modern comprehensive transportation system	Strategic goals, objectives, and programs	MOT (2017)
	Thirteenth Five-year Development Planning for Waterway Transportation	5 years	Waterway transportation	Planning for waterway transportation development	Strategic objectives, main tasks, and safeguards	MOT (2016)
MOTC of the Republic of China	The Forth Stage of Overall Transportation System Planning in Taiwan	4 years	Overall transportation system	Planning of overall transportation system toward sustainability	Indicators and tactics	MOTC (2010)
MPA	Maritime Singapore 2030	Long term	Maritime industry	Developing a future of Singapore maritime	Strategic directions	MPA (2013)
MLITT of Japan	Basic Plan on Transport Policy	7 years	Transportation	Planning for Japanese transportation followed the Basic Policy	Basic directions, targets, and measures	MLITT (2014)
German BMVBS	Maritime Development Plan	Long term	Maritime issues	Forming a framework for maritime strategies in the long term	Strategic targets and action	BMVBS (2011)
Maritime UK	Shipping strategic partnership plan	Long term	Shipping, ports and maritime business services	Planning a strategic partnership for the UK maritime	Tasks	Maritime UK (2013)

Table 1 (continued)

Organizations	Strategic planning	Horizon	Scope	What planning does	Outputs	Source
Dutch government	The Dutch Maritime Strategy 2015–2025	11 years	Maritime issues	Developing a Dutch maritime strategy	Objectives, strategies, and measures	Dutch Government (2015)
PIANC	Sustainable Maritime Navigation	Long term	Maritime navigation	Developing an overall picture for sustainable maritime navigation	Strategies	PIANC (2013)
Forum for the Future	Sustainable Shipping Initiative	Long term	Ship transportation	Establishing a new and sustainable approach as the norm	Vision, future innovation, and wider action	Kimmins et al. (2011)

At the national level:

- In the USA, the strategic plan of USDOT for years 2006–2011 described how to reduce pollution and other adverse effects for environmental protection (USDOT 2006), and the marine transportation system was constructed with the consideration of environmental sustainability in 2007 (USDOT 2007). Later on, the Maritime Administration of USDOT developed the strategic goal to increase the capacity and operations of the environmentally sustainable transportation system (USDOT 2008). The United States Federal Maritime Commission gave high consideration to sustainability and environmental benefits when evaluating the net impact of shipping on competition, transportation cost, and transportation service (USFMC 2011, 2013). Recently, environmental sustainability has been adopted as a strategic goal in USDOT's Strategic Plan 2014–2018 (USDOT 2014).
- In China, the demand model of transportation has been built for Taiwan overall transportation system development planning toward sustainability in 2010 (MOTC 2010). The strategic objective of green development and tasks including energy-saving and efficient use, and the intensive and economic use of shoreline resources has been proposed for the 5-year planning of waterway transportation (MOT 2016). The strategic goal of greening level improvement and strategic objectives including energy-saving and low-carbon, ecological protection and pollution prevention, and resources intensive and economical utilization has been provided by the comprehensive transportation system's 5-year planning (MOT 2017).
- In Singapore, green programs and green technologies have been initiated to boost the shipping industry (MPA 2013).
- Australian transportation system has put environmental sustainability as one of the societal objectives (ATAP Guidelines Steering Committee 2016).
- Germany developed a "Maritime Development Plan" based on the "National Strategy for the Sustainable Use and Protection of the Seas" in 2011 (BMVBS 2011).
- The Maritime UK in the UK delivered an ambition of sustainable shipping through strategic shipping partnership (Maritime UK 2013).
- Japan's Basic Plan for Transportation in 2014 initiated a plan to build a sustainable transportation network for the future (MLITT 2014).
- The Dutch government supported the pursuit of "zero-emission vessels" by removing obstacles in related legislation and regulations (Dutch Government 2015).

Moreover, the PIANC published "Sustainable Maritime Navigation" to identify, assess, and evaluate the maritime navigation in a sustainability criterion (PIANC 2013). Sustainable Shipping Initiative brings together leading companies, Forum for the Future, and World Wildlife Fund in 2013 to set up a four-step planning—The Case for Action, Vision 2040, Future Innovation, and Wider Action for a sustainable future (Kimmins et al. 2011).

4.1.3 Summary of approaches and methods of strategic planning in shipping

The approaches and methods for strategic planning are summarized next. Kumar (1976) and Fagerholt et al. (2010) examined the strategic planning through analyzing problems in the shipping industry. Frankel (1989) offered a step-by-step process for strategic planning including factor identification using a database, threat or opportunity analysis, strategy identification, strategy selection, implementation of plans, review, evaluation, and

objectives updating. Koufopoulos et al. (2005) investigated the planning practices from six dimensions.

The approaches of practical strategic planning in shipping are listed below:

- *Strategic Plan for the Organization (for the 6-year period 2012 to 2017)* (IMO 2014): Stating mission, analyzing trends and developments, setting strategic directions, and identifying performance indicators.
- *Future of Transport* (European Commission 2009a): Collecting existing results, draft scenarios, and time plans; qualitative analysis; quantitative analysis; policy synthesis, and validation.
- *Maritime Transport Strategy 2018* (European Commission 2009b): Setting strategic goals and identifying key areas for action while enhancing its environmental performance.
- *USDOT's Strategic Plan* (USDOT 2014, 2006): Analyzing outcomes or challenges, developing strategies, making performance measures, and identifying external factors.
- *The Maritime Administration and the U.S. Marine Transportation System: A Vision for the twenty-first century* (USDOT 2007): Setting a vision based on situation analysis.
- *Leading the Future: 2008–2013 Strategic Plan* (USDOT 2008): Stating mission and vision, developing strategic goals and outcome, identifying performance indicators, and evaluating the program.
- *Strategic plan for the Federal Maritime Commission* (USFMC 2011, 2013): Setting strategic goals and objectives, analyzing the factors, and evaluating the program.
- *The Fourth Stage of Overall Transportation System Planning in Taiwan* (MOTC 2010): Analyzing demand, selecting indicators, and analyzing tactics.
- *Thirteenth Five-year Development Planning for Modern Comprehensive Transportation System, and Thirteenth Five-year Development Planning for Waterway Transportation* (MOT 2017, 2016): Developing strategic goals based on background or situation analysis.
- *Maritime Singapore 2030* (MPA 2013): Developing strategies by analyzing key trends and directions.
- *Australian Transport Assessment and Planning Guidelines* (ATAP Guidelines Steering Committee 2016): A top-down strategic focus-with bottom-up information approach includes goals; objectives, transport targets, and key performance indicators; problems identification, assessment, and priority; options generation and assessment; business cases for proposed initiatives; prioritization of initiatives and program development; delivery, and; post-completion review.
- *Maritime Development Plan* (BMVBS 2011): Analyzing challenges, outlining strategic targets, and driving integrated maritime action.
- *Shipping strategic partnership plan* (Maritime UK 2013): Setting out an overview and classifying tasking for shipping strategic partnership.
- *Basic Plan on Transport Policy* (MLITT 2014): Analyzing basic directions and developing targets and measures.
- *The Dutch Maritime Strategy 2015–2025* (Dutch Government 2015): Describing the objectives and ambitions and developing the measures.
- *Sustainable Maritime Navigation* (PIANC 2013): Setting the scene, drives, and instruments; analyzing ship and port-based sustainability issues; and proposing continued support.

Table 2 Methods for strategic planning in shipping

Types	Methods
Data analysis	Statistical analysis (Frankel 1989); empirical analysis (Koufopoulos et al. 2005); trend analysis (Kimmins et al. 2011); problem analysis (Fagerholt et al. 2010; PIANC 2013; Kumar 1976)
Predictive analysis	Scenario analysis (Frankel 1989; USFMC 1999, 2000, 2003; European Commission 2009a)
Decision-support	Cross-impact Analysis (Frankel 1989); SWOT analysis (Frankel 1989); economic analysis (European Commission 2009a); risk assessment (Frankel 1989); environmental impact assessment (European Commission 2009a; PIANC 2013); strategic environmental assessment (European Commission 2009a); environmental management system (PIANC 2013); social impact assessment (ATAP Guidelines Steering Committee 2016); equity and distributional impact assessment (ATAP Guidelines Steering Committee 2016); regional and employment impact assessment (ATAP Guidelines Steering Committee 2016)
Decision-making	Expert judgment (European Commission 2009a, 2009b; USFMC 1999, 2000, 2003, 2008, 2011; Kimmins et al. 2011; PIANC 2013; USFMC 2013; ATAP Guidelines Steering Committee 2016; MOT 2016, 2017; MOTC 2010; MPA 2013; MLITT 2014; BMVBS 2011; IMO 2014; USDOT 2008, 2014, 2006); stakeholder participation (USFMC 1999, 2000, 2003, 2008, 2011, 2013; European Commission 2009b; Kimmins et al. 2011; ATAP Guidelines Steering Committee 2016; Maritime UK 2013; Dutch Government 2015); public engagement (USDOT 2007; Frankel 1989; USFMC 1999, 2000, 2003, 2008, 2011; European Commission 2009a; PIANC 2013); multi-criteria decision-making (European Commission 2009a); analytical hierarchical process (Frankel 1989); modeling (European Commission 2009a; Fagerholt et al. 2010); analogy analysis (USFMC 2008, 2011)

- *Sustainable Shipping Initiative* (Kimmins et al. 2011): Developing the Case for Action, Vision 2040, Future Innovation, and Wider Action.

Additionally, methods of strategic planning in shipping can be summarized into four categories, in line with their features: data analysis, predictive analysis, decision-support, and decision-making (see Table 2).

To sum up, the existing approaches in strategic shipping planning are either data-driven or vision-/goal-oriented. The only exception is the Australian transport planning, which uses the top-down strategic focus-with bottom-up information approach (ATAP Guidelines Steering Committee 2016). In general, the data-driven approach includes data and scenario analysis, decision-making, implementation, evaluation, and monitoring. The vision-/goal-oriented approach comprises a mission and vision statement, or goals and objectives setting, data analysis or scenario analysis, planning decision-making, implementation, evaluation, and monitoring. Most of the strategic planning in shipping uses qualitative or subjective methods.

4.2 Maritime logistics

As shown in Sect. 3.4, nothing remains in the category of maritime logistics after the screen for strategic planning. To evaluate the potential of applying the knowledge of maritime logistics in strategic planning for sustainability in international shipping, we

provide a review of the concepts and research on sustainability issues in this emerging field.

4.2.1 Concepts of maritime logistics

The concept of Maritime Logistics is first appeared at the 2005 annual conference of the International Association of Maritime Economists, to describe the door-to-door services with sea leg (Panayides 2006). In this conference paper, Panayides (2006) initiated the concept based on the scope and characteristics of the maritime transport, logistics and supply chain management, and their integration, but the lack of a well-illustrated definition. Later on, most scholars tried to define the concept on a basis of the integration of maritime transportation and logistics. Representatively, Lee and Song (2010) defined maritime logistics as “the process of planning, implementing and managing the movement of goods and information which is involved in the ocean carriage.” From this definition, maritime logistics is still about the sea leg, not door-to-door. It differentiates with maritime transportation in that it is focused on “an effective logistics flow as a systematic entity of the logistics integration system” (Lee and Song 2010). However, having the difference in mind, Nam and Song (2011) proposed that maritime logistics is “a process of planning, implementing and managing the movement of goods and information with ocean carriage being involved.” This definition is much broader, as it only requires the logistics that have sea leg. Therefore, this is much closer to the door-to-door logistics services.

Recently, Panayides and Song (2013) clarified the integration as the management of physical maritime transport flows, information flows, and interfaces between the participants. Caliskan and Ozturkoglu (2016) expanded the concept with a broader philosophy which is comprised of “integration, coordination, value-added customer services, lower costs, higher flexibility, reduced response time, and higher quality.”

4.2.2 Research on maritime logistics and sustainability

Some proactive efforts, such as green or sustainability initiatives, have emerged to improve the sustainability in maritime logistics. For instance, Lindstad et al. (2012) described the reason for and the importance of green maritime logistics and sustainability topics, offered a framework and a model to measure the greenhouse gas emission, and compared the results. Davarzani et al. (2016) reviewed the evolution of green maritime logistics, provided the number of publications, and identified the primary research clusters. Psaraftis (2016) proposed a working definition of green transportation logistics, i.e., “an attempt to attain an acceptable environmental performance in the transportation supply chain, while at the same time respecting traditional economic performance criteria,” and tried to explore “win–win” solutions for both environment and economic performance (Psaraftis 2016).

5 Discussion

5.1 Strategic planning in shipping

From our review, most of the papers in shipping planning are focused on the tactical or operational levels, and only 4 out of 383 publications are in the strategic level. Tactical and

operational plans, although a key role in shorter time horizon, cannot ensure the long-term goal of sustainability in international shipping. More practical strategic shipping planning works from the public and nonprofit organizations than publications from Scopus database are observed to chart shipping's strategy and development. Nevertheless, it appeared that almost all of the strategic shipping planning papers and most of the practical strategic shipping planning works are designed to lay down strategic directions from the angle of "port-to-port," and only very few proposed to integrate shipping, as the mode for sea transport, into the transportation system. This cannot meet the needs of improving the sustainability of international shipping door-to-door. The Maritime Administration of USDOT have recognized this trend and provided a vision for the entire shipment process (USDOT 2007), but no appropriate approaches or methods are applied to generate strategies.

Both the data-driven approach and vision/goal-oriented approach, two commonly used methods for strategic shipping planning, have limitations because they rely on either limited data or the subjective judgment of the strategic planners. A better "top-down strategic focus-with bottom-up information approach" is proposed in the Australian transport planning guideline. However, it also has a limitation—it is based on "port-to-port" operations in international shipping (ATAP Guidelines Steering Committee 2016). As a result, the strategic shipping planning still cannot satisfy the need for door-to-door services, nor do the corresponding methods exist because of their subjectiveness and vagueness.

In addition, the existing efforts in "green" or "sustainable" shipping, similar to the strategic planning for sustainability, are all motivated by the environmental consideration. They are fragmented, ambiguous, and confusing. Because a precise concept is critical to the subsequent approach and methodology to achieve the goal (Psaraftis 2016), it is necessary to clarify these concepts.

5.2 Maritime logistics

Maritime logistics, an emerging discipline, is an active research area. It has a widely accepted essence, i.e., the integration of maritime transportation and logistics, and a potential to be integrated into the door-to-door services for international shipping. It can initiate the evolution of the marine transportation industry even though the definition is still under discussion, and several studies have tended to address specific environmental issues within the recent years, such as emissions and energy efficiency (Davarzani et al. 2016). Yet key gaps in current studies include the lack of strategic planning for maritime logistics and the fragmented efforts for green or sustainable maritime logistics. In addition, lacking a precise definition, appropriate approaches, and methods would also be the major obstacles to the strategic planning for sustainability in maritime logistics. To provide a reference, the above-mentioned "top-down strategic focus-with bottom-up information approach" could be used for the future strategic planning for maritime logistics.

5.3 Barriers, matters, and challenges

The barriers to the strategic planning for sustainability in international shipping may include: (1) Cross-region: The activities of international shipping happen across local to global scales. It is very difficult to build a stable multi-jurisdictional or multi-stakeholders' collaboration and partnerships. (2) Trans-disciplinary: Many different mixes of transport modes like road transport, sea transport, and rail transport, and logistics in international shipping bring about great difficulties for knowledge sharing and collaboration (Klinsrisuk

et al. 2013). (3) Insufficient understanding of the terms of sustainability, green and sustainable: Most of strategic planners or academics confuse about the essence of sustainability, and the distinction between “green” and “sustainable,” which matter to the subsequent approach and methodology. (4) Passiveness and lack of support: Many of the efforts toward sustainability are reactive, and act as a command and control logic (Walmsley 2012). The governments and intergovernmental platforms ignored their adequate supports for the public sustainability issues (OECD Publishing 2002). (5) Data limitation: The freight transport-related data are not available and limited in scope or outdated (Youssef et al. 2017), which is unable to support the effective and meaningful analysis.

Strategic planning is not insurance to the future success. It is designed to develop strategies for achieving the long-term goals. Without strategic planning for sustainability, the international shipping would be fragmented because of the multi-jurisdictional and trans-disciplinary nature. This increased jurisdictional and multi-stakeholder complexity will affect the efficiency and effectiveness of strategy formulation and implementation. Besides, shorter-range planning cannot direct the international shipping toward a long-term goal of sustainability for its narrow view, and data limitation may also be a difficulty. Moreover, strategic planning is proactive, which seeks to change before problems arise, rather than responding to situations (Kaufman 1992). It has been considered as a necessity to bring sustainability into the policy process for international aviation (McManners 2016).

It is noted that maritime logistics has been regarded as an emerging discipline to serve the international shipping, but lack of strategic planning, even far from that for sustainability. The challenges to strategic planning for sustainability in international shipping include (1) the definitions for sustainability, “green,” and “sustainable”; (2) a reliable and effective strategic planning approach for sustainability; (3) a collaborative research-practice network for the process of strategic planning and application.

6 Summary and conclusion

Strategic planning in international shipping is facing challenges due to the door-to-door services and the requirements of sustainability. In this study, a structured literature review in conjunction with content analysis was provided to identify whether the existing strategic planning enables to direct the international shipping to meet the challenges and if maritime logistics as an emerging discipline in international shipping contributes to sustainability. We found only 4 publications from the Scopus database and 24 documents from selected official sites of public and nonprofit organizations on strategic planning in shipping, but none from the field of maritime logistics. The research on strategic planning in international shipping and maritime logistics is still scarce or in the early growth.

Nevertheless, the challenges drive the academics and practitioners to develop strategic planning for sustainability in international shipping. They are proactive, coherent, and collaborative works, instead of passive, fragmented, and disruptive responses to current states. Insights from our in-depth literature analysis indicate that the most recent strategic planning in shipping cannot meet the needs of door-to-door services, due to the current “port-to-port” concerns. Few strategic planning concerned the door-to-door services, but lack an appropriate approach and methods. It is also noticeable that strategic planning for sustainability in international shipping is just fragmented efforts in “green” or “sustainable” shipping. The differences in the concepts of sustainability, “green,” and “sustainable” are

vague and confusing. For the active emerging discipline to enable the door-to-door services for international shipping, maritime logistics still lags behind the strategic planning. Although a range of barriers has emerged, strategic planning for sustainability is necessary to overcome the difficulties in the multi-jurisdictional and trans-disciplinary international shipping networks.

The study provides an illustration of broad trends and helps readers to better understand the gaps in strategic planning for sustainability in international shipping, but limitations do exist: (1) Keywords were selected through experts' consultation to ensure a reliable and effective literature search, but it may influence by the expert experiences. (2) Although several measures were used to enhance the reliability and validity of the word-to-word content analysis, different researchers may classify the planning levels differently.

For future perspectives, the differences in the concepts of "sustainability," "sustainable," and "green" are required to be identified. In addition, the strategic planning for sustainability in international shipping urgently needs an appropriate approach, methods, and a collaborative international research-practice network. The IMO and global multimodal shipping companies, such as Maersk, may help to integrate the international shipping network and plan a sustainable future, and the United Nations Sustainable Development Goals launched in 2015 may have an advantage in being able to deliver the integration response to operationalizing sustainability, especially in the context of longer term strategic planning. Furthermore, a case study can be conducted to examine the strategic planning of major global shipping companies on their short-term, mid-term, and long-term strategies, to review the nature of sustainability of international shipping.

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