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Environmental governance mechanisms in shipping firms and their environmental performance

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ABSTRACT

A growing number of shipping firms seek to improve their environmental performance in the hope of developing environmentally sustainable shipping operations. Although environmental governance plays an essential role in leading shipping firms to improve their environmental performance, there is scant knowledge on the relationship between environmental governance and environmental performance in the shipping literature. We propose and empirically validate an integrated model to study how various environmental governance mechanisms (i.e., contractual, relational, and organizational) are enacted by shipping firms and their influence on shipping firms' environmental performance. Our study also examines the mediating roles of the relational and organizational mechanisms on shipping firms' environmental performance.

1. Introduction

Global economic development and growth is facilitated and supported by the commercial shipping industry, which physically helps complete commercial transactions. Following rapid increases in global sourcing activities and dispersion of production and market sites, global trade volume has grown significantly in recent years. On the other hand, the International Maritime Organization (IMO) estimates that carbon dioxide emissions by the shipping industry will increase by 72% in 2020 as international trade continues to flourish and prosper. As shipping firms play an imperative role in facilitating global cargo flow, the sustainable development of shipping and logistics operations has attracted increasing attention of different stakeholders including shippers, governments, and the public (Sheu, 2008).

Many shipping firms are looking for ways to enhance the environmental sustainability of their operations (Skovgaard, 2014). As seaborne trade has grown significantly in the past decades, there have been increasing concerns about the environmental impacts caused by shipping activities (Ng et al., 2013). To address these concerns, a growing number of shipping firms (e.g., Maersk) have begun to adopt green operations with the aim to achieve environmental sustainability. Green operations are an environmentally sustainable management approach to perform shipping activities in the shipping industry. In addition, a shipping firm operates in the transport chain where various operators (e.g., ocean carriers, freight agents, land transport service providers, warehouse operators, and barge operators) in the shipping community are closely linked in the chain. As a result, the environmental performance of each operator has a bearing on the environmental sustainability of the entire shipping chain (Lai et al., 2013).

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To improve the adoption of green operations, it is essential to examine how organizations govern their activities. Tiwana et al. (2014) consider a governance cube as being "conversant with spotting theoretical blind spots". Key questions in the governance cube include who to govern, what to govern, and how to govern. Emergent governance arrangements have made changes to inter-firm and intra-firm configurations. Cao et al. (2014) discuss the evolution of governance and propose the "ambidexterity pendulum" to reveal the balance between contractual and relational governance. Various governance mechanisms help shipping firms achieve their environmental performance in managing their shipping activities. For instance, the relational and contractual governance mechanisms can be complements or substitutes (Poppo and Zenger, 2002; Rai et al., 2012), depending on how these governance mechanisms are managed in the relationship. Due to the imperative role of shipping in facilitating global cargo flows, the sustainable development of shipping operations has become a concern to different stakeholder groups (Kim et al., 2013). Having identified environmental management improvements within the shipping industry as one of the key issues, the World Wide Fund (WWF) introduces sustainable shipping initiatives, which refer to "innovative schemes that encourage shipping firms to go beyond standard compliance with environmental behaviour and become exemplary in their approach to shipping operations and the environment". The continuing growth in international trade and the increasing environmental concerns for shipping activities suggest that shipping firms need green operations to enhance their environmental performance (Clott and Hartman, 2013).

The issue of performance has received increasing research and managerial interests in the shipping industry (Lun, 2011). For instance, Lun et al., 2013a,b examine the greening and performance relativity in shipping operations. Environmental protection activities are embedded in treatment of business operations (Zhu and Sarkis, 2004). One of the key drivers for shipping firms to adopt green operations is performance, which comprise both economic and environmental dimensions. Potential gains from implementing green (or known as environmentally sustainable) operations include cost reductions in energy consumption and waste treatment. Examples of environmental performance include increases in energy saving rate and resource recycle rate. Implementation of green operations also strengthens the commitment of shipping firms to satisfy customer expectations for environmental protection. It is reasonable to expect that shipping firms can enhance their environmental performance through green operations adoption.

Green operations is one of the most important topics to explore in the shipping community (Lam and Gu, 2013). Environmental governance is also an important concern to stakeholders including policy makers, the private sector, and researchers (Leiblein, 2003; Larcker et al., 2007). The environmental governance mechanism implemented by a shipping firm is considered as a part of its green operations. Although environmental governance plays an essential role in facilitating the adoption of green operations, there is a lack of studies devoted to the shipping industry examining how environmental governance should be structured to enhance environmental performance in shipping operations. This study targets to advance knowledge on environmental governance mechanisms in shipping operations for shipping firms. Specifically, we develop a theory-driven conceptual model (see Fig. 1) to guide this research, formulate several hypotheses from the model, and empirically test them to explain how various environmental governance mechanisms (i.e., contractual, relational, organizational) enacted by shipping firms can affect their environmental performance. Academically, our findings provide theoretical insights into the development of environmental governance mechanisms and their linkages with green operations in the shipping context. On the practical side, our work contributes knowledge on environmental governance issues and helps re-frame the debate surrounding the use of environmental governance mechanisms to enhance green operations in the shipping industry. We also provide managerial guidelines for shipping firms on green operations adoption for enhancing their environmental performance.

2. Conceptualization

Managers in the shipping industry struggle with the adoption of green shipping practices (GSPs). GSP can be considered as "performing shipping activities in environmentally sustainable ways" (Lai et al., 2013). In the shipping industry, upstream and downstream business partners of shipping firms are increasingly conscious about the environmental damages caused by the latter's operations. Their customers may ask such questions as how they source cleaner materials at the acquisition stage, how they design green operations at the pre-operations stage, how they optimize their ships' engines to enhance energy efficiency, how they use waste heat recovery systems to reduce fuel consumption, and how good their environmental performance is in terms of energy saving rate and recycle rate. Nowadays, many shipping firms are keen on seeking solutions to facilitate the adoption of GSPs with the aim to satisfy the rising expectations of customers and business partners for environmentally friendly operations. In the light of the growing importance of GSPs, various studies (e.g., Lun, 2011; Lai et al., 2011; Lun, 2013; Lun et al., 2013a,b) have observed a lack of research on environmental governance as a means to facilitate shipping firms' adoption of GSPs. In this study, we broadly define environmental governance (EG) of business operators in the shipping industry as their "specifying the decision rights and accountability framework to mitigate environmental risk in performing shipping operations and to reduce its negative environmental impacts in handling shipping activities" (Zsidisin and Siferd, 2001). We suggest that environmental governance is composed of contractual governance mechanism (CM-EG), relational governance mechanism (RM-EG), and organizational governance mechanism (OM-EG). These environmental governance mechanisms adopted by business operators in the shipping industry are important for them to pursue GSPs. Both industrial managers and academic researchers have acknowledged the importance of implementing GSPs in shipping operations to enhance environmental and economic performance (Lun, 2011). Although environmental governance plays an