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**Dynamic determination of vessel speed and selection of bunkering ports for liner shipping under stochastic environment.** (English) [Zbl 1290.90016](#)

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Summary: We study a liner shipping operational problem which considers how to dynamically determine the vessel speed and refueling decisions, for a single vessel in one service route. Our model is a multi-stage dynamic model, where the stochastic nature of the bunker prices is represented by a scenario tree structure. Also, we explicitly incorporate the uncertainty of bunker consumption rates into our model. As the model is a large-scale mixed integer programming model, we adopt a modified rolling horizon method to tackle the problem. Numerical results show that our framework provides a lower overall cost and more reliable schedule compared with the stationary model of a related work.

**MSC:**

**90B06** Transportation, logistics and supply chain management

Cited in **6** Documents

**Keywords:**

liner shipping; vessel speed; bunker prices; bunker consumption rate; scenario tree generation; rolling horizon

**Full Text:** [DOI](#)

**References:**

- [1] Baker, KR, An experimental study of the effectiveness of rolling schedules in production planning, *Decis Sci*, 8, 19-27, (1977)
- [2] Besbes, O; Savin, S, Going bunkers: the joint route selection and refueling problem, *Manuf Serv Oper Manag*, 11, 694-711, (2009)
- [3] Dougherty J, Kohavi R, Sahami M (1995) Supervised and unsupervised discretization of continuous features. In: *Machine learning-international workshop then conference*. Morgan Kaufmann Publishers, Inc, pp 194-202
- [4] Dupačová, J; Gröwe-Kuska, N; Römisich, W, Scenario reduction in stochastic programming, *Math Program*, 95, 493-511, (2003) · [Zbl 1023.90043](#)
- [5] Growe-Kuska N, Heitsch H, Romisch W (2003) Scenario reduction and scenario tree construction for power management problems. In : *Power tech conference proceedings, vol 3. 2003 IEEE Bologna, IEEE* · [Zbl 1023.90043](#)
- [6] Heitsch, H; Römisich, W, Scenario reduction algorithms in stochastic programming, *Comput Optim Appl*, 24, 187-206, (2003) · [Zbl 1094.90024](#)
- [7] Heitsch, H; Römisich, W, Scenario tree reduction for multistage stochastic programs, *Comput Manag Sci*, 6, 117-133, (2009) · [Zbl 1171.90485](#)
- [8] Kotsiantis, S; Kanellopoulos, D, Discretization techniques: a recent survey, *GESTS Int Trans Comput Sci Eng*, 32, 47-58, (2006)
- [9] Maersk (2010) Super slow steaming customer presentation. <http://shippersassociation.org/ihsa/NewsletterItems/MaerskSteaming.pdf>. Accessed 15 Feb 2011 · [Zbl 0920.90008](#)
- [10] Mulvey, JM; Rosenbaum, DP; Shetty, B, Strategic financial risk management and operations research, *Eur J Oper Res*, 97, 1-16, (1997) · [Zbl 0920.90008](#)
- [11] Notteboom, TE; Vernimmen, B, The effect of high fuel costs on liner service configuration in container shipping, *J Transp Geogr*, 17, 325-337, (2009)
- [12] Oh, HC; Karimi, IA, Operation planning of multiparcel tankers under fuel price uncertainty, *Ind Eng Chem Res*, 49, 6104-6114, (2010)
- [13] Perakis, AN; Papadakis, N, Fleet deployment optimization models. part 1, *Marit Policy Manag*, 14, 127-144, (1987)
- [14] Perakis, AN; Papadakis, N, Fleet deployment optimization models. part 2, *Marit Policy Manag*, 14, 145-155, (1987)
- [15] Ronen, D, The effect of oil price on the optimal speed of ships, *J Oper Res Soc*, 33, 1035-1040, (1982)
- [16] Ronen, D, The effect of oil price on containership speed and fleet size, *J Oper Res Soc*, 62, 211-216, (2011)
- [17] Yao Z, Ng SH, Lee LH (2012) A study on bunker fuel management for the shipping liner services. *Comput Oper Res* 39(5):1160-1172

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