

## DRIVERS TO PREDICT PROCUREMENT SPEND OF MARINE GASOIL

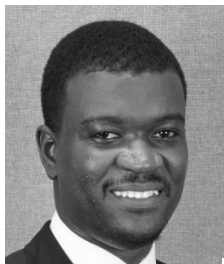
By: Marvin Adjei Kojo Lomo and Muhammad Bin Ibrahim

Advisor: Dr. Shardul S. Phadnis (sphadnis@misi.edu.my)

### ABSTRACT

The experience-based knowledge (or beliefs) of buyers within the procurement organization, as the repository of information on category spend items and hence spend decisions, remains unexamined. This mixed-methods study examines the beliefs of executives about the key cost drivers influencing the procurement spend on a significant spend item, Marine Gasoil (MGO), by capturing knowledge interspersed within the procurement department of a major Oil and Gas firm in South-East Asia. We detail that, the factors affecting *spot spend* transactional prices for MGO significantly differ from those factors needed to ensure an *effective bunker-contract-management-strategy*. We also prove that contrary to the beliefs of buyers, late payment of vendors and crude oil prices do not affect the procurement spend of Marine Gasoil on the spot market. Ultimately, to predict the firm's spot spend transactional prices, we provide a parsimonious but statistically robust model, emphasizing the importance of bunker location decisions in managing the spot spend transactions whilst highlighting Singapore as the location resulting in the lowest procurement spend of Marine Gasoil.

#### *About the authors:*



Marvin A. K. Lomo holds a MSc. in Petroleum Geoscience from the University of Ghana. Before joining the MSCM program, he worked in both the public and private sector for five years.



Muhammad B. Ibrahim holds an undergraduate Bachelor of Accounting from Universiti Tenaga Nasional. Prior to MISI, he worked with a Malaysia based fintech firm.

#### KEY INSIGHTS

1. We detail that cost drivers/factors influencing procurement spend on MGO via contract and spot spend modes are dissimilar hence, each requiring distinctive approaches.
2. Contrary to experience-based knowledge of buyers, we establish that late payment terms with vendors as well as crude oil prices have no impact on MGO procurement spend.
3. We highlight bunker location decisions as the major cost driver of spot spend.
4. We provided a parsimonious but statistically robust model to predict procurement spend of the thesis sponsor with a prediction accuracy of

#### INTRODUCTION

Oil and Gas companies operating with significant assets in the upstream value chain are faced with the new normal of mid-to-low oil prices even as operational costs increase. One such high spend category with a major impact on operational cost (hence a major target for cost reduction) is the Marine Gasoil (MGO) for vessels. In 2017, the thesis sponsor spent RM 270 million on Marine Gasoil for vessel operations. However, interviews conducted with buyers revealed that only a few buyers were knowledgeable about the cost

drivers/factors influencing the firm's on Marine Gasoil. A qualitative survey respondent within the thesis sponsor's supply chain department retorted: "understanding of bunker operation as a buyer for bunker is very important also."

Given the reasons outlined, we present a comprehensive study on Marine Gasoil issues by examining experience-based knowledge to equip buyers within the sponsor company with sufficient information on the influence cost drivers affecting spend on Marine Gasoil for its vessels. In our view, this will inform a MGO procurement game plan that minimizes costs.

## **EXTANT KNOWLEDGE**

Peter Kraljic (1983) noted that buyers are faced with various threats from a variety of stakeholders/factors ending "the days of no surprises" where procurement costs were easily predicted with a high-degree of certainty. In view of this, during negotiations with suppliers of high value items, competitive negotiation tactics is discouraged. In the maritime industry, Ronen (2011) estimates that when MGO prices are around US\$500 per metric ton, MGO cost constitutes about seventy-five percent of the operations cost of large container ships. With 2019 global average MGO prices at \$713 per metric ton and the new Maritime Pollution (MARPOL) regulations capping Sulphur marine fuel emissions to 0.5% (mass over mass), upstream operators must prioritize understanding the complex interplay of the cost drivers influencing MGO transactional prices (the price iceberg).

Hannon (2006) demonstrates how the current dominant design (de-facto standard) for procurement strategies in the supply chain department of many companies is the reverse auction where

spend

pre-qualified vendors compete primarily based on price. These prices quoted by pre-qualified vendors (or traders) form the basis of purchasing decisions for the thesis sponsor and our goal is to understand the factors influencing the procurement spend for these transactions.

## **RESEARCH APPROACH**

We conducted this research using the exploratory sequential mixed-methods design following Phadnis et al. (2017), in which the qualitative strand precedes the quantitative strand. The qualitative strand involved a series of semi-structured interviews with executives of the thesis sponsor, including the head of the category management department and operations procurement, to develop an understanding of their experience-based thinking about Marine Gasoil cost drivers. We examined the outlined cost drivers in the qualitative strand using appropriate statistical learning techniques in the quantitative strand.

Prior to the quantitative strand, we built a database using data provided from the thesis sponsor's SAP system and Invoicing system. Data from the invoicing system was necessary to examine the relationship between payment terms with vendors and transactional MGO prices.

However, we also included data from external sources, i.e. prevailing crude oil prices on the transaction date from the United States Energy Information Administration and Global Average Bunker (MGO) Prices from [bunkerindex.com](http://bunkerindex.com).

## **RESULTS**

The key result from the qualitative strand of this research is summarized in Figure 1. It contrasts the factors influencing the two (2) spend modes i.e. contract vs spot

spend. The factors that affect the spot spend transactional prices

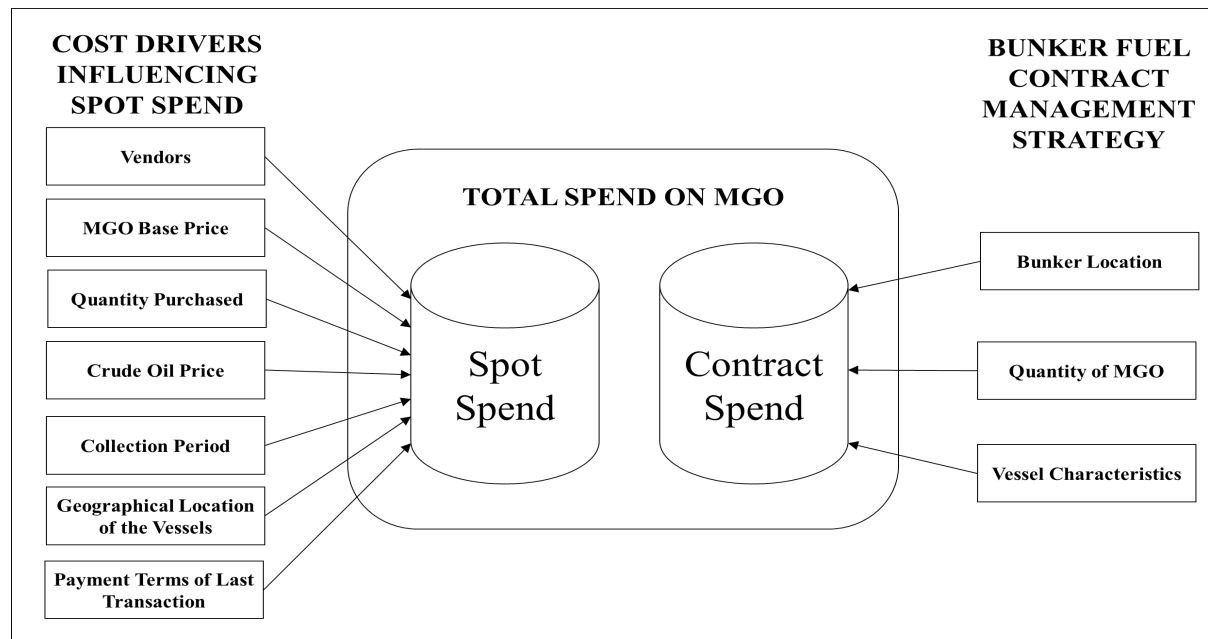


Figure 1: Conceptual Summary of factors influencing Contract and Spot Spend Modes

included the choice of vendor, prevailing MGO price, prevailing crude oil price, the delivery leadtime (estimated as collection period), the geographical location of the vessels (bunker location) and the payment term history with the Vendor. While similar characteristics may pertain to contract spend, we noted that contract spend was project driven and more likely to be determined by the bunker location (determined by the project site), estimated purchase quantity requirement for the project and the characteristics of the vessels and (firm-owned owned plus chartered vessels) required by the project.

Figure 2 shows the relationship between the Global Average MGO prices and the two spend modes. Each transaction of spot and contract prices paid by the thesis sponsor were plotted against the corresponding prevailing Global Average MGO prices on the day of the transaction; revealing that, contract prices paid were significantly higher. For the contract purchases over the period in 2018, MGO procurement was made from a single supplier from India (state-owned Indian

Oil Corporation) as specified by the project contract. Hence, purchases from a single vendor, the state-owned Indian Oil Corporation, as well as taxes imposed on bunker fuel in India (e.g. 18% Goods and Services Tax) are the main drivers of the high contract prices paid by the thesis sponsor for MGO.

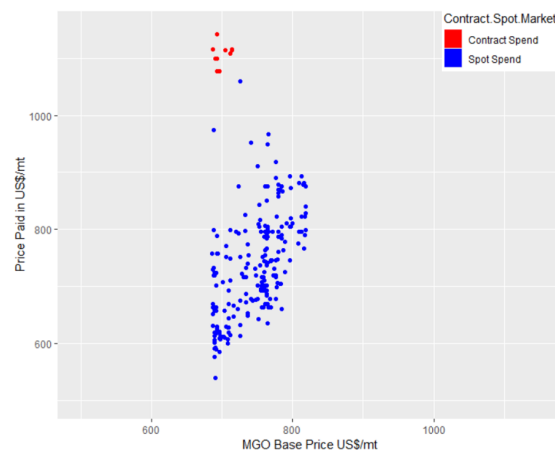


Figure 2: Contract and Spend Prices vs MGO Base Prices

A statistical analysis (two-sample t-statistic test) of the mean across the two spend modes revealed that the means of contract spend prices and spot spend prices were statistically different with a p-value  $\leq$

0.001. This reinforced our concept that affected each spend mode.  
dissimilar influencing cost drivers/factors

In line with the common form of MGO purchasing in the industry, spot market spend dominates the thesis sponsor's purchase of Marine Gasoil i.e. 94.12% of 2018 MGO spend representing 45,585.71 mt of MGO (BunkerEx Limited, 2018). We proceed to find a statistically significant and robust way of validating the factors outlined in Figure 1 as well as examine the relationship between those factors and the spot transactional prices paid via correlations and stepwise linear regressions. Specific findings from the firm's 2018 spend data include:

1. Inspecting the pairwise correlations, we found that contrary to opinions expressed by the buyers, late payment of vendors had no statistically significant association with transactional prices on the spot market. A similar finding was made between the spot spend transaction prices and the prevailing crude oil prices.
2. The critical cost driver/factor in predicting the MGO spot spend transactions is the bunkering location of the vessel i.e. the decision of where to bunker. However, due to MGO price volatility, we recommend that bunkering be pre-planned and scheduled considering the cheapest bunker port options for vessel routes. Our analysis of the firm's 2018 MGO spend data revealed that within the South-East Asian region, bunkering at the Singapore port leads to the lowest spend.
3. In decision-making, we recommend using our statistically robust model to predict the MGO transaction price and hence determine the cheapest bunker ports to a particular route.

This research was however not exhaustive with a key limitation being that, we had a small pool of respondents to interview within the procurement organisation of the thesis sponsor. In addition, the low response rate to our factor validation questionnaire by the buyers within the firm was also a major challenge to this work. These two key limitations constrained the range of factors we hoped to capture from our interactions with the executives of the thesis sponsor.

In conclusion, our statistically robust model built using data provided by the thesis sponsor as well as external data sources provides the firm with an important price-referencing tool in determining MGO transactional spot spend price paid in a particular bunker location.

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