

## Seasonality Patterns in Dry Bulk Cargo Handling at the Port of Galle, Sri Lanka

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### Abstract

The dry bulk cargo trade plays an important role in international trade by assisting the delivery of the dry bulk cargo demanded by different nations. Dry bulk cargoes cover a wide variety of produce/ raw materials and are transported using a wide range of ships from Mini Bulkers to Very Large Bulk Carriers (VLBC). Regarding both econometric and economic purposes, it is important to understand the differences between various seasonality patterns in the main dry bulk cargo types that arrive at the port in order to conduct operations more effectively and profitably. The study aims to analyse trends in dry bulk cargo unloading, mainly Clinker and Gypsum, under different months of the year to understand port congestion patterns at the Galle port, which operates primarily as a bulk cargo port, with a focus on dry bulk cargo unloading process. This study has used a longitudinal research approach with a quantitative design. This data includes the name of the vessel, capacity, the amount of cargo unloaded, the type of cargo, and the achievement rate over the previous ten (10) years employed for the time series analysis. The descriptive analysis of data shows that the number of vessels arriving increased from sixteen (16) to ninety (90), and the annual handling tonnage has sharply increased by 88.2%. In order to determine the nature of the phenomena represented by the sequence of data to predict the pattern of vessel arrival and handling tonnage, time series analysis has been applied. Data for Clinker and Gypsum were initially examined for stationary behaviour and analysis proved that Clinker and Gypsum are time-invariant and the model will not become spurious. The linear model test in Clinker and Gypsum displayed that Clinker has a volatility clustering and Gypsum does not. Further analysis using ARCH and GARCH models provided that there is no volatility effect on the Gypsum market, but the Clinker market has the volatility effect. The Dummy variables' regression model shows the months of January have the highest Clinker unloads, while April has the lowest and the Gypsum unloads are high in October and August and minimum unloads are observed in the month of May. This analysis reveals clearly that the Gypsum unloading at the port of Galle can be forecasted with a pattern but the Clinker unloading pattern is associated with uncertainty. The limitations of the study face challenges due to random sample formation and assessing the single event impact due to multiple events occurring simultaneously at the port, making it difficult to determine the most intractable problem. The study is mainly focusing on the unloading quantity of the dry bulk and other factors may have an impact on data that are not being addressed in this study. Ship owners and charterers may find it useful when making choices about shipping operations to consider the kind and size of fluctuations in bulk cargo markets. Additionally, the study's findings will be contributed to use by local businesses involved in dry bulk cargo unloading operations at the Port of Galle to comprehend patterns and put into place the necessary adjustments to determine safety standards, demurrage, and the efficiency of unloading operations.

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