

# *Project 3 Report*

## International Lead Time

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GitHub: <https://github.com/nestingen/International-Lead-Time>

Video: <https://www.youtube.com/watch?v=qFiyQcwx2GY>

### **Introduction**

Reducing Lead Time is a tradeoff between costs. There is a cost holding inventory longer during transit times and there is a cost to using a faster mode of transportation. A portion of Graphic Packaging's business is produced in the United States and then shipped internationally to be finished. Paper rolls are produced in the United States and then converted into cartons abroad. To understand inventory levels and production rate, lead time must be fully understood. Once the lead time data is collected additional projects can be implemented to reduce lead time and costs from the supply chain. The data used in this report is from Graphic Packaging but it has been manipulated to protect any proprietary information.

### **Data**

The dates in my analysis include manufacturing date, containerization date, sail date, and delivery to international port date. This data came from three different sources. The first source is SAP. I pulled the production data from SAP. This provides the manufacturing date and containerization date. The containerization date is the day the paper roll leaves SAP. The sail and delivery date comes from a third party that keeps track of our shipments that go by boat. A report gets emailed daily stating what is on each boat currently on the water. The third source came from a data warehouse where I collected the sales data.

I have combined 4 tables together for the analysis. The production, containerize, sales, and ocean table. Each table provided keys dates and dimensions for the analysis. The production and containerize tables are combined with the roll number. This gives me the information of the manufacture date and containerize date for each roll number produced for an international order. The sales and production are combined by order number. I needed to add in the sales data to get the sold to country. The containerize and ocean tables are combined by the container number and order number. Between batch, order number, and container number, the tables can be joined together.

### **Analysis**

I created my analysis in Qlik Sense so it would be accessible by anyone in the company. This way people can better understand the changing lead time. When projects are put in place to reduce lead time, this analysis can be used to see if the changes caused a reduction.

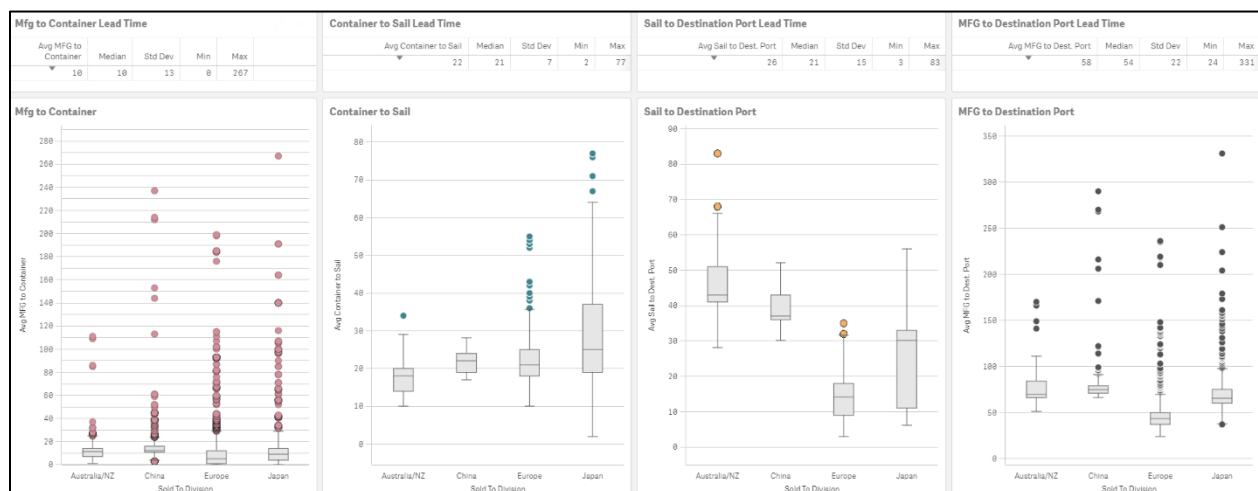
## Summary of Statistics

The first step to my analysis was creating a summary of statistic for each leg of the supply chain. Below is an example of the table for the manufacturing to destination port for quarter four of 2020. This includes all of the legs of the lead time in the analysis. The pivot table is separated by sold to division and manufacturing mill. The table includes average, median, standard deviation, minimum, and maximum lead time. The Summary of Statistics shows the very long lead time to Australia/NZ, Japan, and China and the large variation in lead time to Japan. By looking at the different legs in the supply chain, it can be determined where the lengthy lead time and variation is occurring.

Sold To Division 🔍	Sail Quarter 🔍	Values					
Mfg Mill 🔍	Q4						
	Avg MFG to Dest. Port	Median	Std Dev	Min	Max		
Totals	58	54	22	24	331		
Australia/NZ	74	69	13	51	170		
Macon0031	78	73	13	53	166		
West Monroe0033	70	66	11	51	170		
China	77	74	11	66	290		
Macon0031	77	74	11	66	290		
West Monroe0033	77	79	6	72	114		
Europe	45	43	15	24	236		
Macon0031	48	46	12	31	138		
West Monroe0033	40	37	18	24	236		
Japan	71	65	27	37	331		
Macon0031	70	65	24	37	251		
West Monroe0033	75	63	34	53	331		

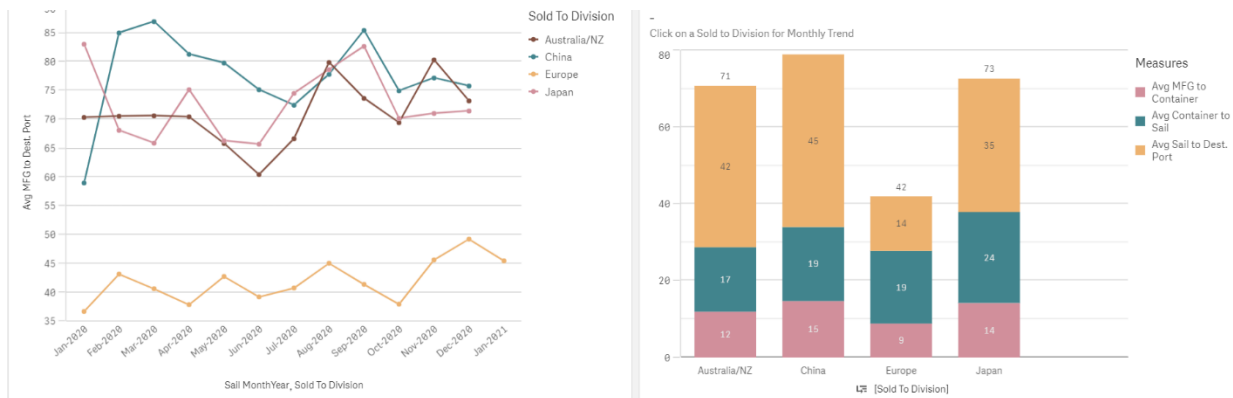
## Box Plots

I also wanted to create a box plot for each leg of the lead time. I separated the sold to division since the lead time varies so much between country. From the box plots, it is easy to see the large variation in container to sail for Japan. This is represented in the blue box plot. This variation needs to be investigated and reduced if possible. It is also interesting how much longer the sail to destination is for Australia and New Zealand versus China and Japan. This is in the yellow box plot. This may be how the shipments are dropped off at each port down the coast of Asia and Australia. They may be dropped off in the order of Japan, China, Australia, and finally New Zealand.



## Model

This Qlik Sense app can be used to evaluate lead time. Projects that are put in place that affect lead time can be better understood with real time data. I created a lead time line graph as well as a drillable bar graph to understand how the data changes over time. This analysis can be used to model inventory levels, order frequency, and production runs. The bar charts show what portion of the lead time takes the most time on average. The line graph shows how the lead time has changed as a whole during the course of last year.



## Conclusion

Lead time abroad has been hard to analyze at Graphic Packaging because the information is coming from multiple sources. Now that the International Lead Time Qlik Sense app is in place, there is a central place for the information. Because of the ETL work that was done in Qlik Sense, it only takes 30 minutes to update the app. This data can be used to reduce inventory and optimize ordering. Shortening a lead time can save money on inventory. The shorter the lead time, the less inventory you need. If lead time is less variable, you also can have less inventory. Looking at shipping lanes where the lead time is long or more variable could save the company a lot of money.

## References

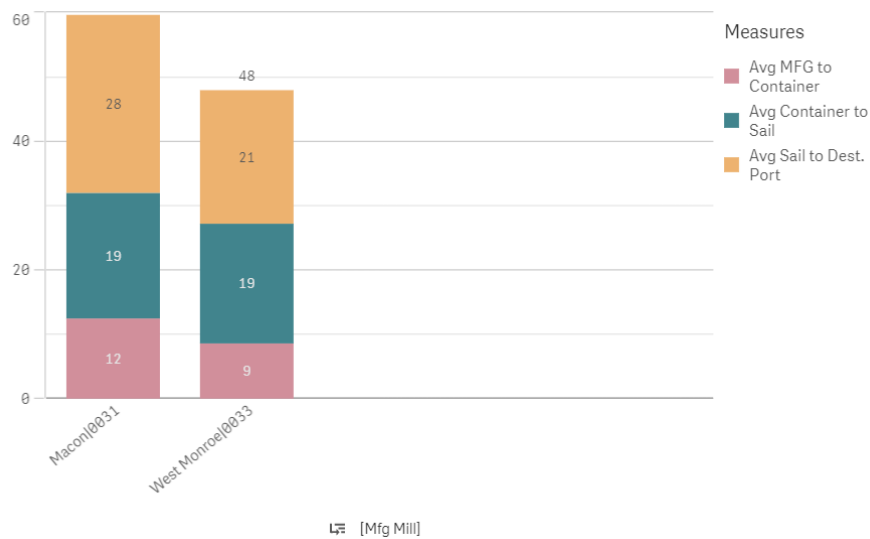
Commerce, Q. (n.d.). What is lead time in inventory management? Retrieved February 17, 2021, from <https://www.tradegecko.com/blog/small-business-growth/lead-time-for-small-business>

MelanieArticle by Melanie Chan in collaboration with our team of Unleashed Software inventory and business specialists. Melanie has been writing about inventory management for the past three years. When not writing about inventory management. (2021, January 13). 5 factors Affecting lead times for manufacturers. Retrieved February 17, 2021, from <https://www.unleashedsoftware.com/blog/5-factors-affecting-lead-times-for-manufacturers>

Team, C. (n.d.). Supplier lead times impact inventory management. Retrieved February 17, 2021, from <https://www.cgnglobal.com/blog/node/710>

# Appendix

Lead Time by Manufacturing Mill



Lead Time by Ship Point

