

In this case study I built a shipment and inventory dashboard to assist with tracking key metrics affecting the business such as shipment delay, % of delayed orders, calculating over and understock for various product categories. I went further to summarize my findings with a data story where I conveyed the key takeaways of my analysis.

DELIVERABLES

- Shipment dashboard: Reporting major shipment KPIs (% of delayed orders & shipment delays(days)) and investigating the evolution of these shipment KPIs.
- Inventory dashboard: Visualizing supply and demand, then providing an interactive exploration tool per product category

DATASET AND DATA MODEL

I started by getting an in depth understanding of the tables provided namely:

1. Inventory table: containing information about products, current stock and price per unit monthly.
2. Orders & shipments table: This table contains product, warehouse, customer & shipment information for each order made.
3. Fulfilment table: the table provides information about the time on average it takes in days to restock each product.

Table name	Column name	description
Orders & shipment	Order id	Unique order identification
Orders & shipment	Order item id	Unique Order Item identification. Order Item always belong to just one Orde
Orders & shipment	Order year	Year of the order
Orders & shipment	Order month	Month of the order
Orders & shipment	Order day	Day of the order
Orders & shipment	Order time	Timestamp of the order in UTC
Orders & shipment	Order Quantity	The amount of a product that was ordered within a given order (1 record of the data)
Orders & shipment	Product categories	Product grouping into categories
Orders & shipment	Product name	Name of the purchased product
Orders & shipment	Customer id	Unique Customer identification
Orders & shipment	Customer market	Grouping of customer country e.g. LATAM, Pacific Asia, EUROPE.
Orders & shipment	Customer region	Grouping of customer country e.g. Northern Europe, Western Europe.
Orders & shipment	Customer country	Customer's country

Orders & shipment	Warehouse country	Country of warehouse that fulfilled the order
Orders & shipment	Shipment year	Shipment year for the order
Orders & shipment	Shipment month	Shipment month for the order
Orders & shipment	Shipment day	Shipment day for the order
Orders & shipment	Shipment mode	Category of shipment dispatch e.g. standard, first & second class
Orders & shipment	Shipment days- scheduled	Typical number of days needed for dispatch
Orders & shipment	Gross sales	Revenue before discount generated by sales for the item (1 record of the data)
Orders & shipment	Discount %	Discount % applied on the catalog price
Orders & shipment	Profit	Profit generated by the sales of the Order Item (1 record of data)
Inventory	Warehouse inventory	The monthly level of a product e.g 30 units
Inventory	Inventory cost per unit	The monthly storage cost per unit
Fulfilment	Warehouse order fulfilment (days)	The average number of days it takes to restock a particular product if it drops below zero

With an in depth understanding of the data, I proceeded to connect all relevant datasets into a data model in Tableau, creating the correct relationships and cardinality between the tables and related columns. I corrected datatype mismatches then classified the columns into dimensions and measures.

orders_and_shipments+

Filters
0 | [Add](#)

orders_and_shipments.csv

inventory.csv

fulfillment.csv

inventory.... — fulfillment...

100 → rows ⚙️ ▼

new relationships and more joins. [Learn more](#)

inventory.csv

Operator

fulfillment.csv

Abc Product Name (▼)

=

Abc Product Name (▼)

+

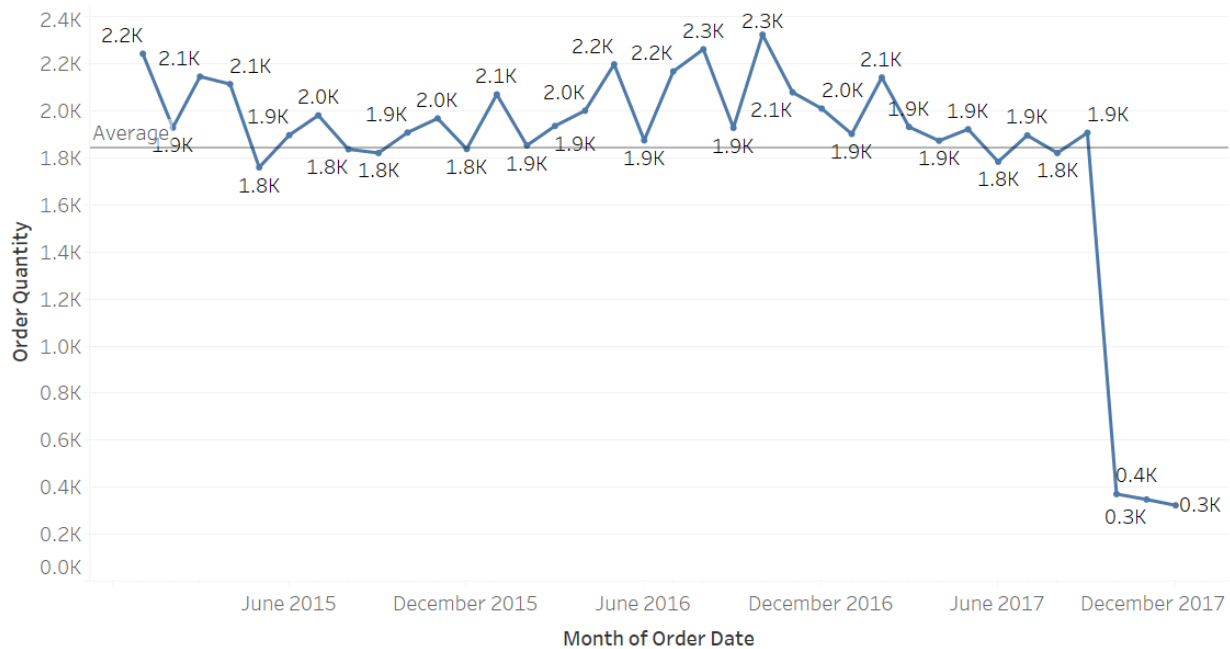
Add more fields

# orders_and_shipments.csv Order ID	# orders_and_shipments.csv Order Item ID	# orders_and_shipments.csv Order YearMonth	# orders_and_shipments.csv Order Year
3535	8,793	201502	2
4133	10,320	201503	2
7396	18,517	201504	2
11026	27608	201506	2

DATA EXPLORATION & VISUALIZATIONS

I explored the quantity of orders by presenting its evolution on a monthly basis, I created a calculated column to combine the order date fields using the `MAKEDATE()` function and then by using a trend line I was able to observe a sharp drop in order quantity from September 2017, that continued to December 2017, this could have be occasioned by multiple factors like missing data, customer dissatisfaction, inventory issues etc.

Visualizing orders



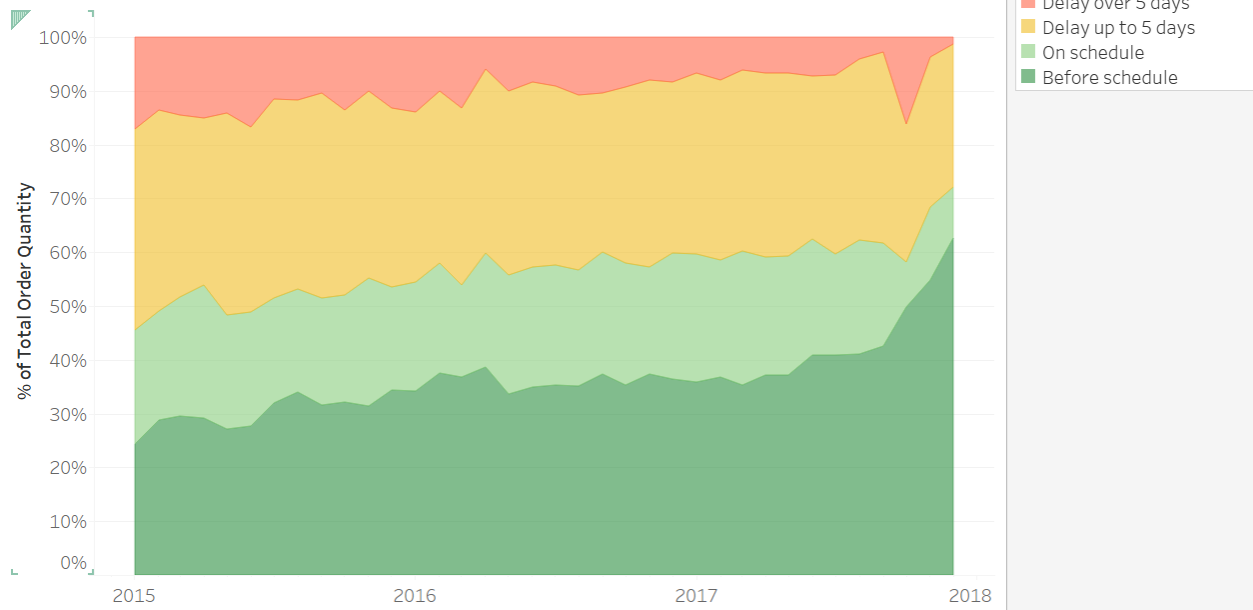
I proceeded to look at shipments, as this is a critical element in our supply chain, to see if our business suffered from delayed shipments. Using the shipment days scheduled and the shipment days actual that was gotten by subtracting the prior from the order date, I created a new metric shipment delay which split all orders into four categories

- Before schedule
- On schedule
- Delay up to 5 days
- Delay over 5 days

```
IF [Shipment Days - Actual]-[Shipment Days - Scheduled]<0 THEN 'Before schedule'  
ELSEIF [Shipment Days - Actual]-[Shipment Days - Scheduled]=0 THEN 'On schedule'  
ELSEIF [Shipment Days - Actual]-[Shipment Days - Scheduled]<=5 THEN 'Delay up to 5 days'  
ELSEIF [Shipment Days - Actual]-[Shipment Days - Scheduled]>5 THEN 'Delay over 5 days' END
```

I then visualized the monthly evolution of the summed order quantity split into the shipment delay categories.

Investigating shipments



Although the overall proportion of the delayed shipments is decreasing, we still have quite a percentage of them, with a delay peak in October 2017.

Noticing this trend, it became necessary to build two KPI's to monitor this delay namely Average shipment delay and % of delayed orders

```
COUNTD(IF [Shipment Delay] = 'Delay up to 5 days' OR  
[Shipment Delay]='Delay over 5 days' THEN [Order ID] END)  
/  
COUNTD([Order ID])
```

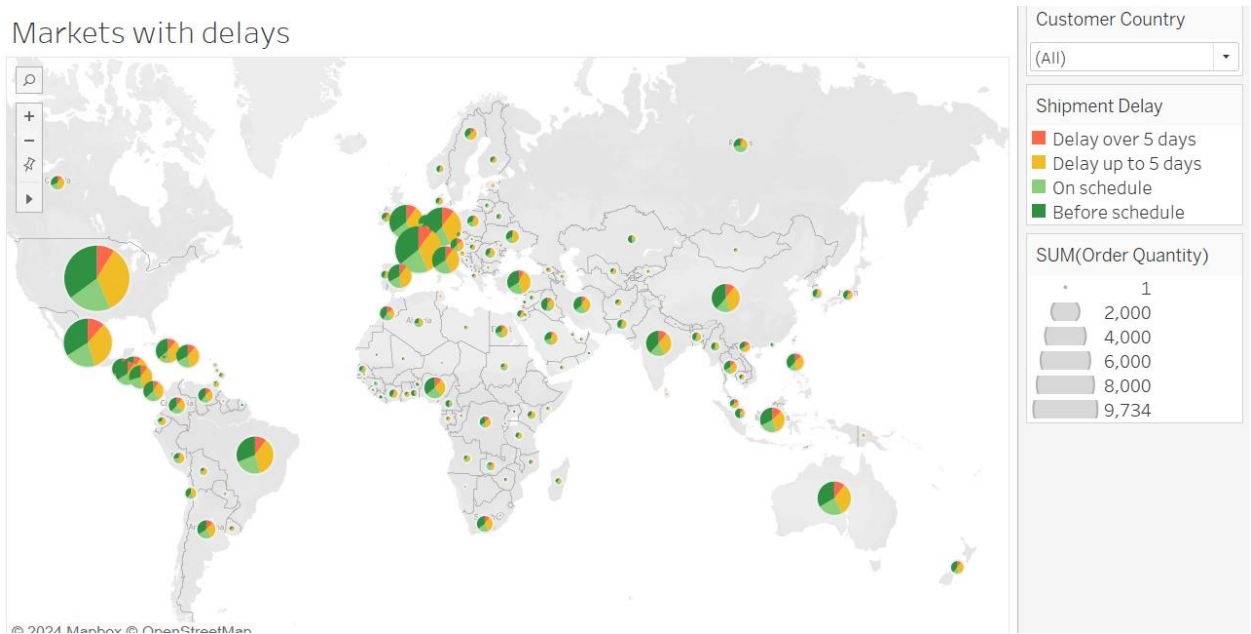
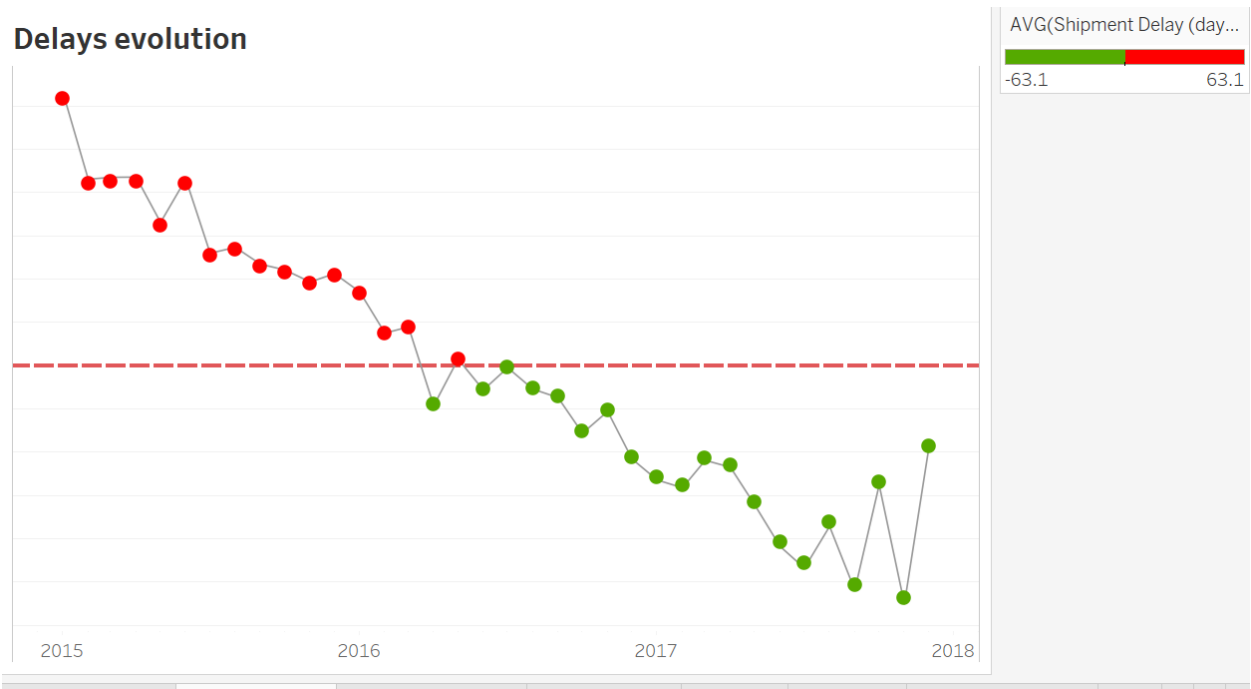
% of Delayed Orders

61.0%

Shipment Delay (days)

0.5 day(s)

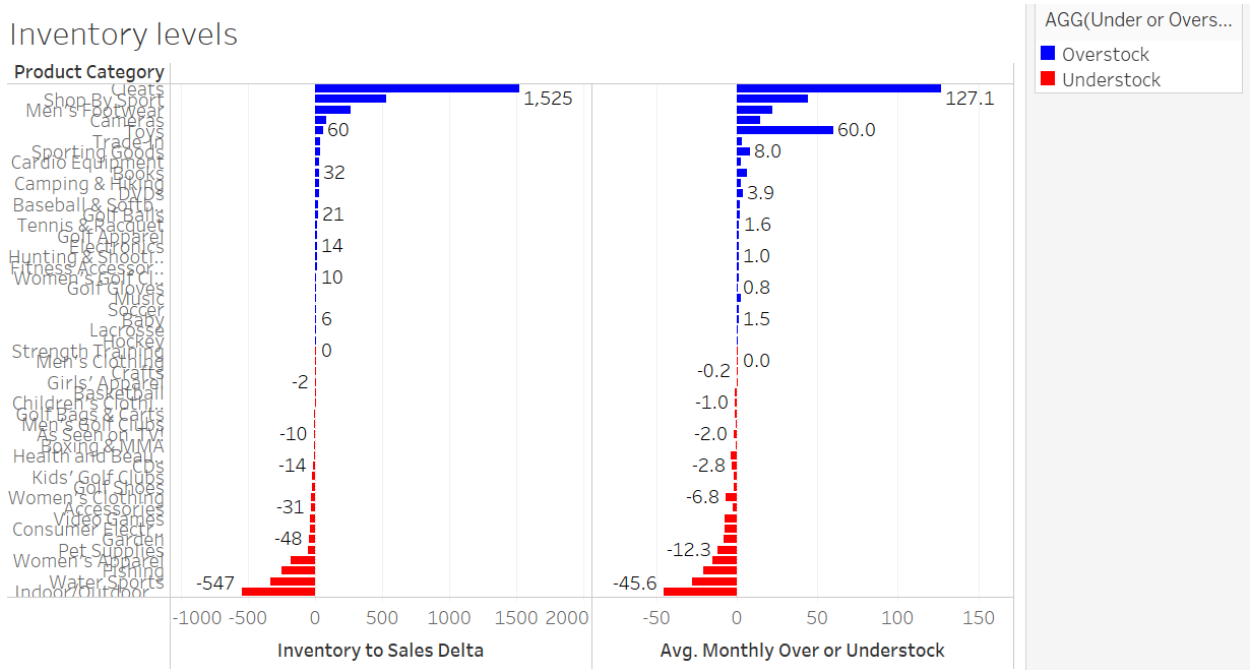
It was also necessary to know if this KPI's were increasing or decreasing over time, and if it was particular to some markets i.e. last mile inefficiencies, two visualizations delay evolution & markets with delays were used to present these findings.



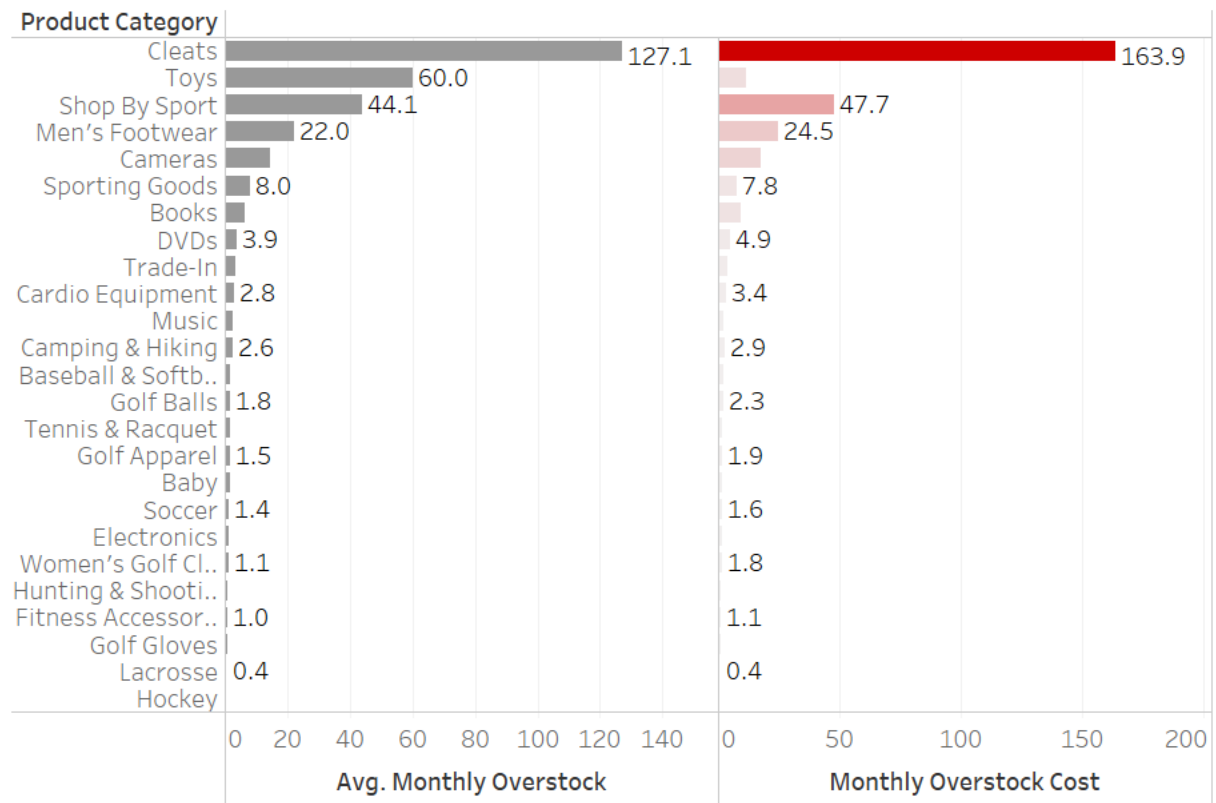
Looking at the map, it seems that in majority of countries over 50% of orders arrive on or before schedule, on closer observation it was also noticed that in Europe countries like Estonia, Sweden & Finland had a larger proportion of delayed shipments compared to other countries. This should help in discussions between the company and its logistics partners.

Inventory management

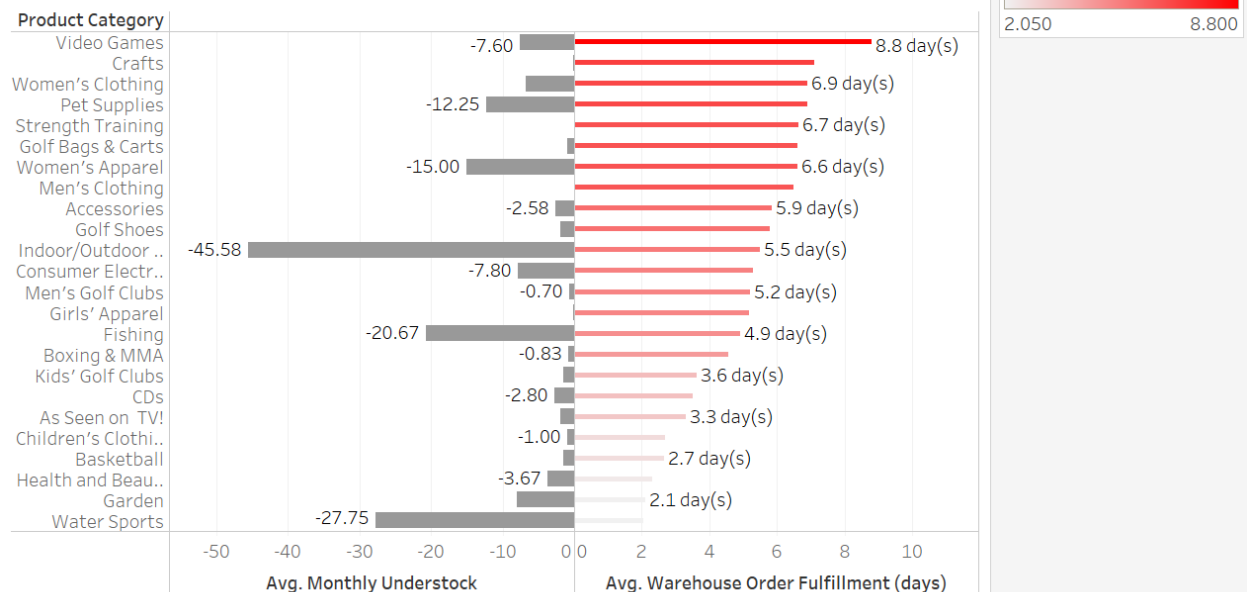
Inventory Management can be challenging, it is necessary to maximize stock to avoid Understock, Overstock to avoid delayed shipments, storage costs & user dissatisfaction, three visualizations were developed to monitor inventory levels closely on an overall and monthly average basis



Overstock

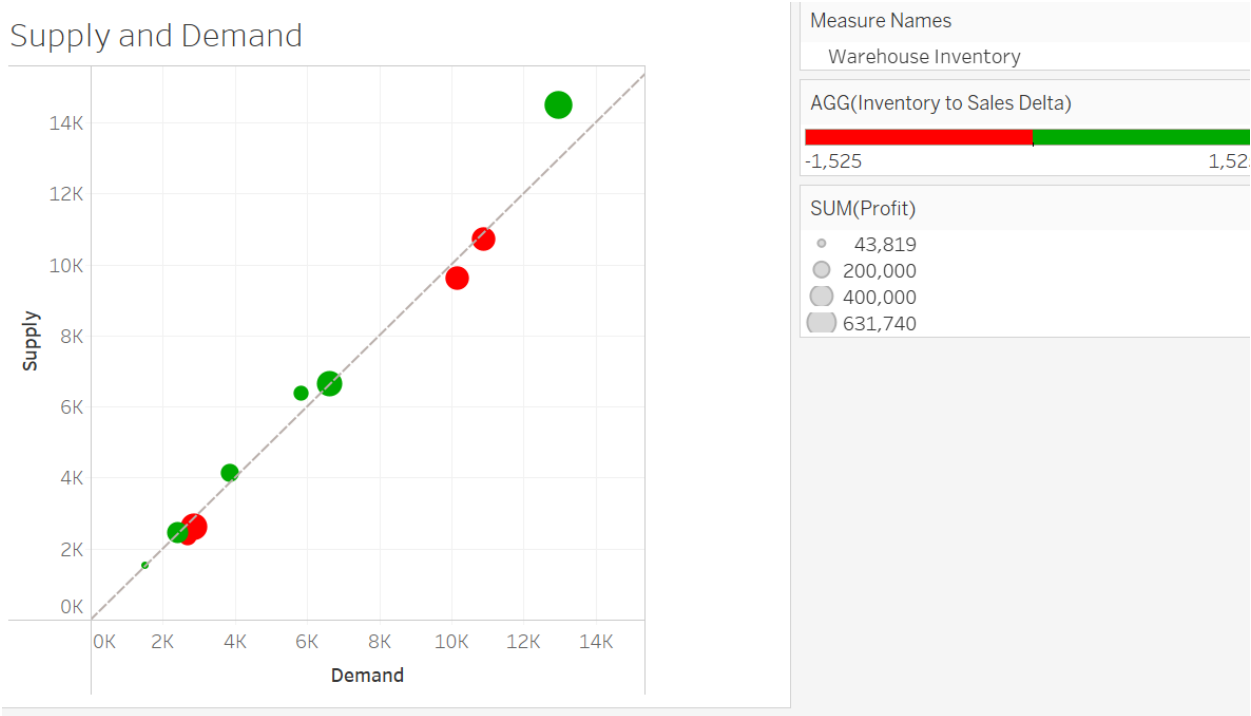


Average fulfillment days per Product



It was be observed that cleats have a high avg monthly overstock which leads to a higher storage cost for the product category, on the opposite spectrum indoor and outdoor games are largely understocked, more information on supply and demand of the products categories for optimized inventory management.

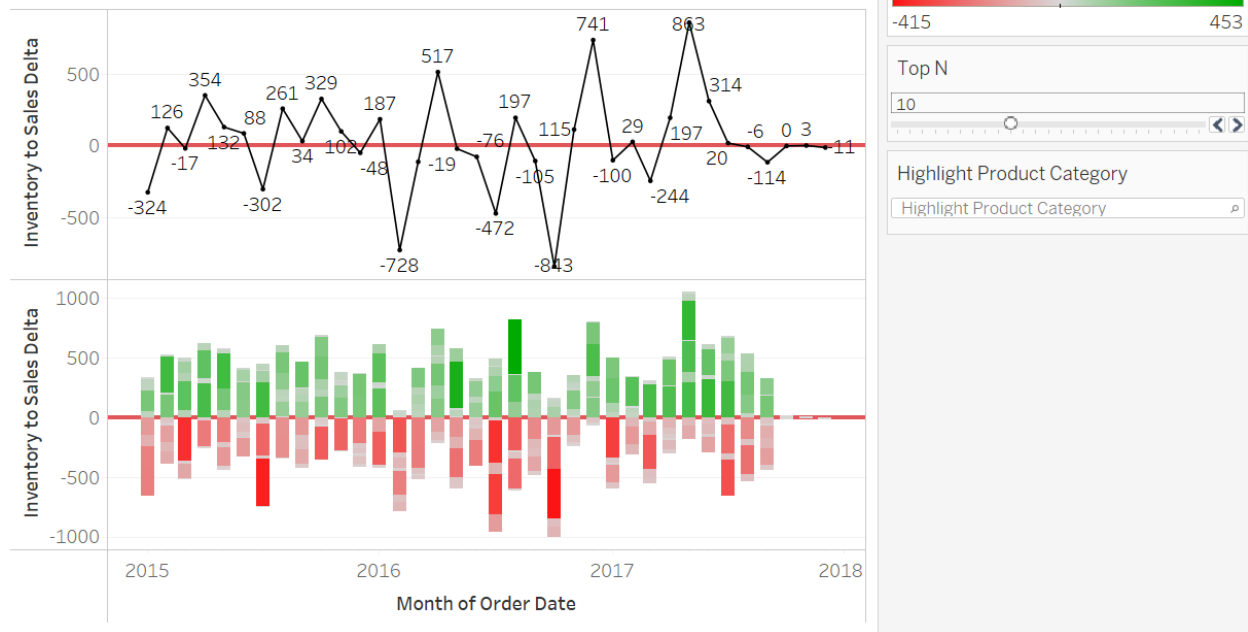
Using inventory as our supply metric and order quantity as demand, we visualize the supply vs demand with a line of best fit to monitor product categories.



Confirming what we have seen earlier in the overstock visualization, Product category Cleats supply exceeds its demand greatly and needs to be optimized.

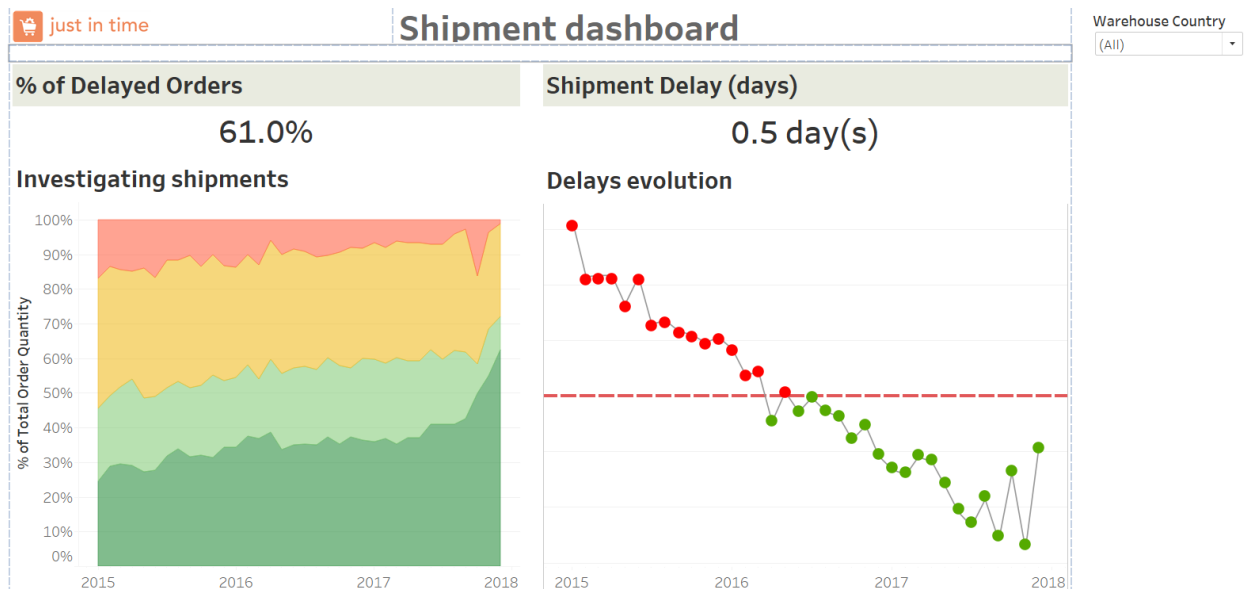
To solve these inefficiencies, I created a monitoring visualization to track the inventory levels for products monthly, with a dynamic selection tool to select the Top N products and a quick highlighter for product categories.

Stock levels - top 10 product categories.



DASHBOARD AND STORY

Finally, I assemble my Shipment and Inventory dashboard, selecting the most insightful visualizations and KPI's that reinforce the message, I also made the dashboards interactive using filters and dashboard actions so that the end users can dig deeper into the visualizations, I also presented a summary of insights gained with a short data story.



Inventory dashboard

Highlight Product ..

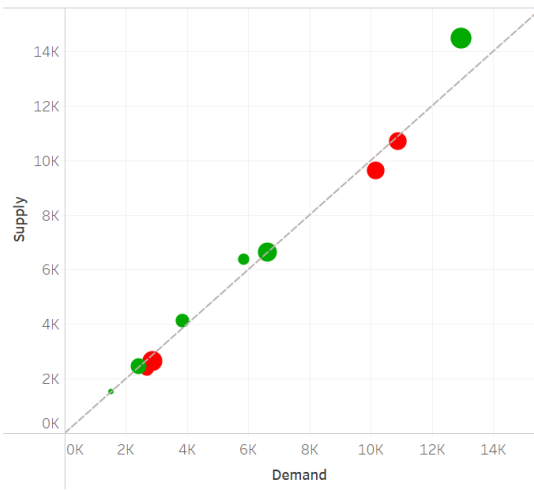
Highlight Produ... p

Top N

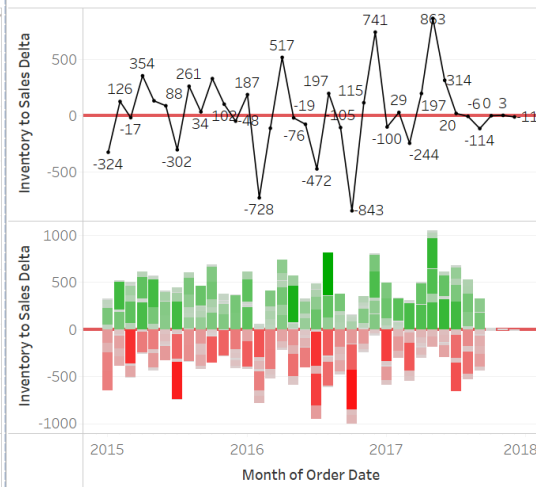
10

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Supply and Demand



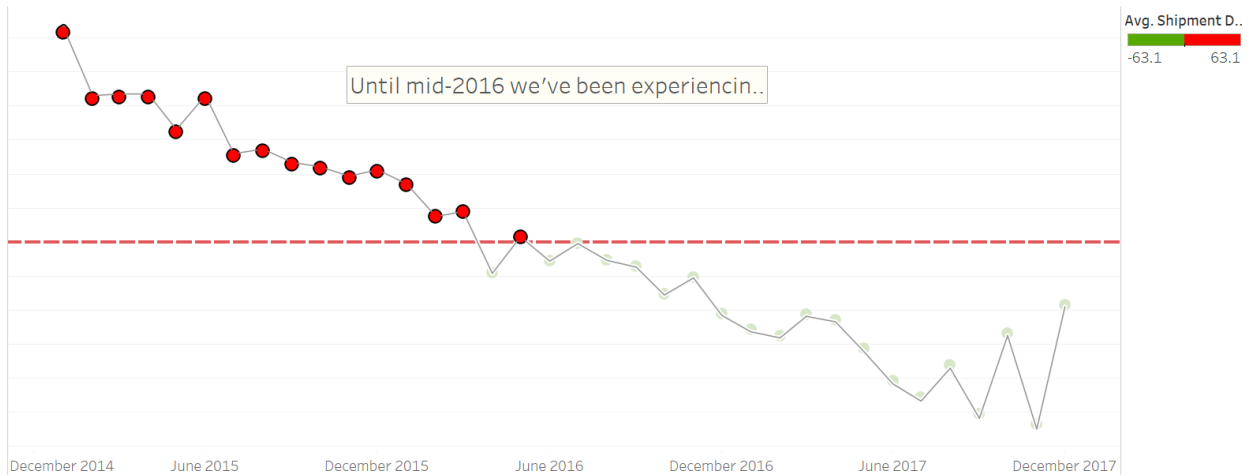
Stock levels - top 10 product categories.



Our findings so far

< Until mid-2016 shipments were largely delayed.

Some of our Product Categories are severely understocked. >



Our findings so far

