

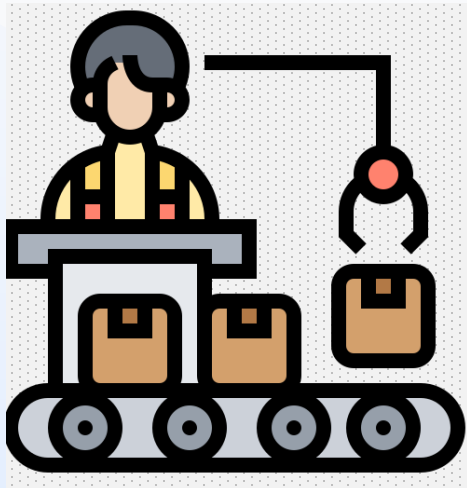
Adventure Works Cycles

Production & Inventory Highlights

Dec, 2014



Agenda



1. Production
Optimization



2. Inventory
Controlling



3. Summary

Background

ADVENTURE WORKS CYCLE

1. What is Adventure business?

- Multinational company, produce and distribute metal and composite bicycles
- 3 markets: North America, Europeann, Asian
- 1 manufacturing in Mexico since 2000

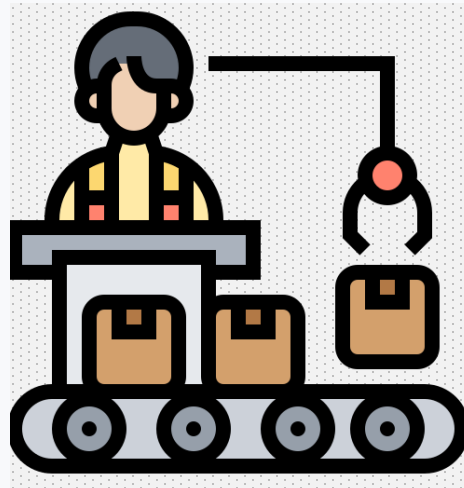
2. What is Adventure objective?

- Growth: expanding their business to more markets
- Optimization: reduce production costs

3. What is our focus today?

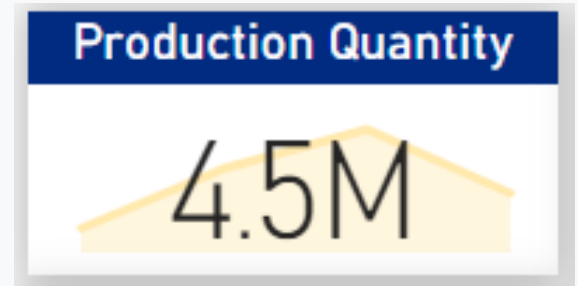
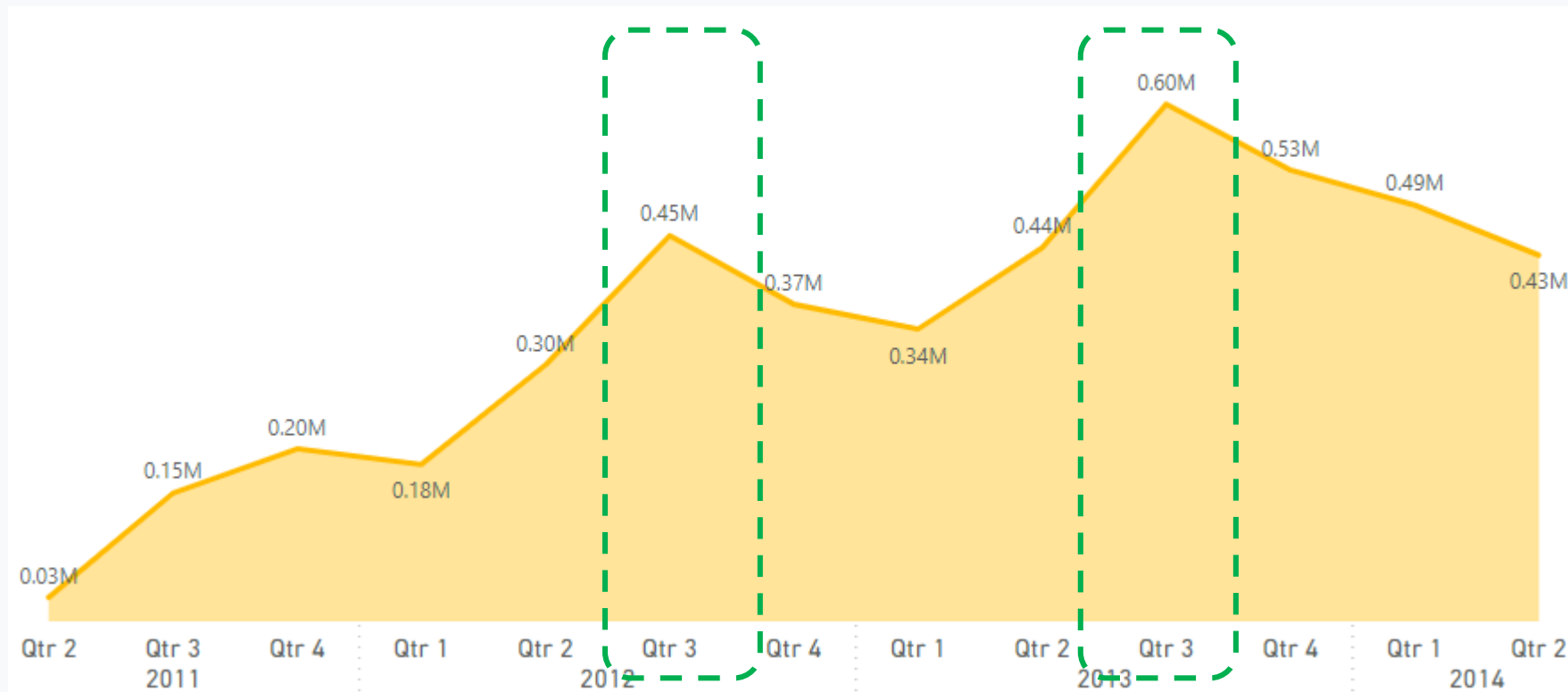
- Production insights to track cost & optimize manufacturing processes
- Inventory Status to manage the current stock which help to design business strategy to maximize the sales and profit



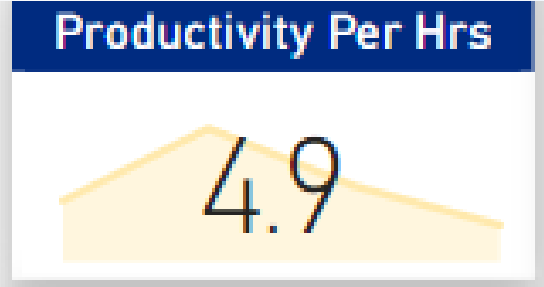
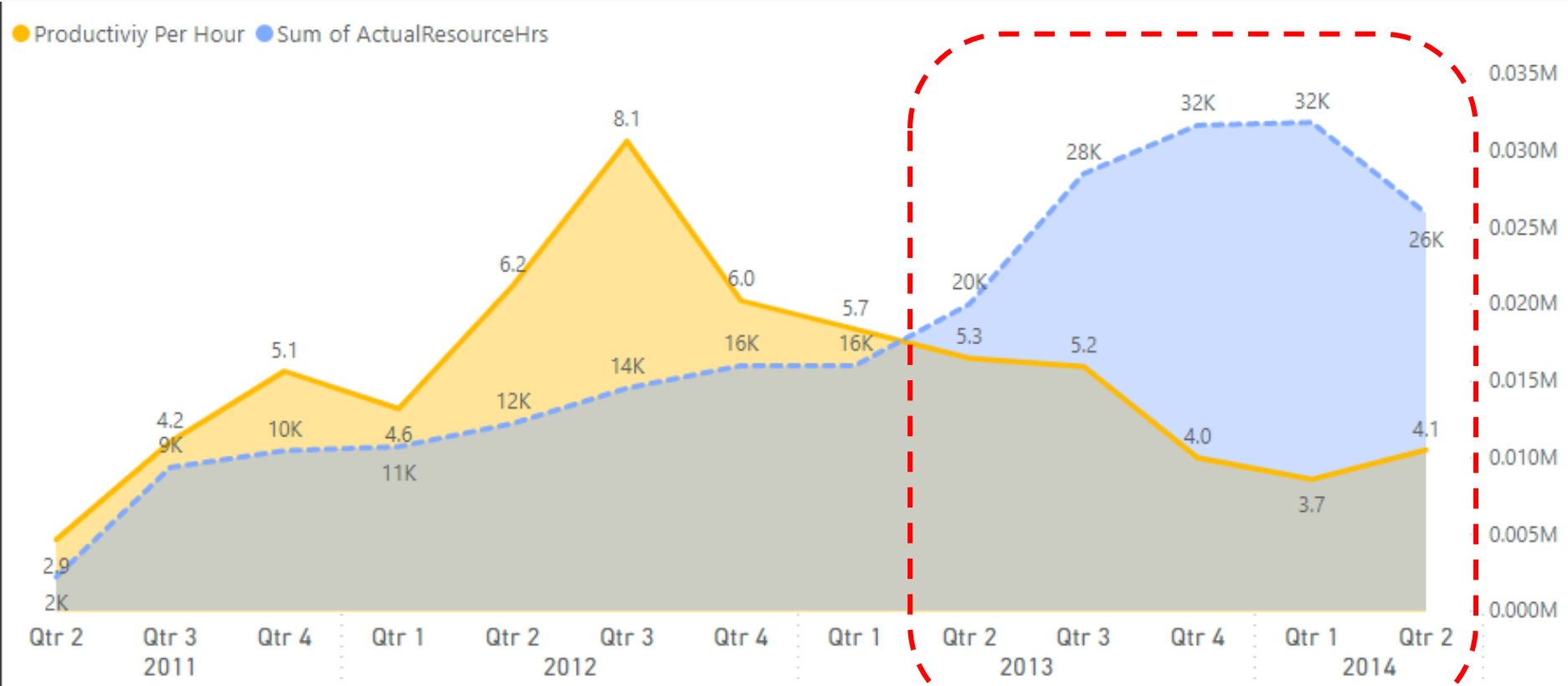


1. Production

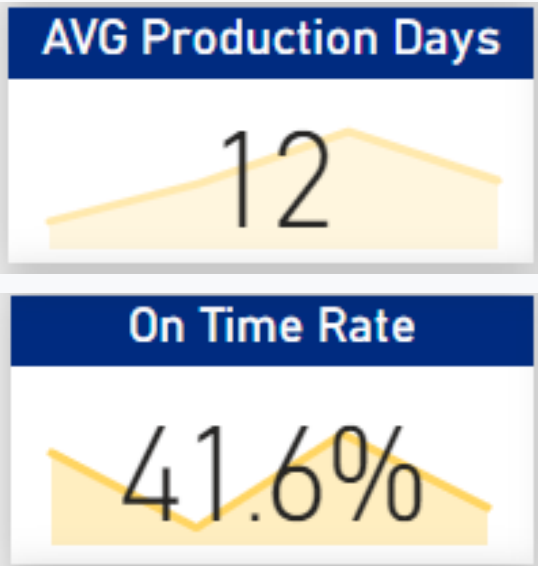
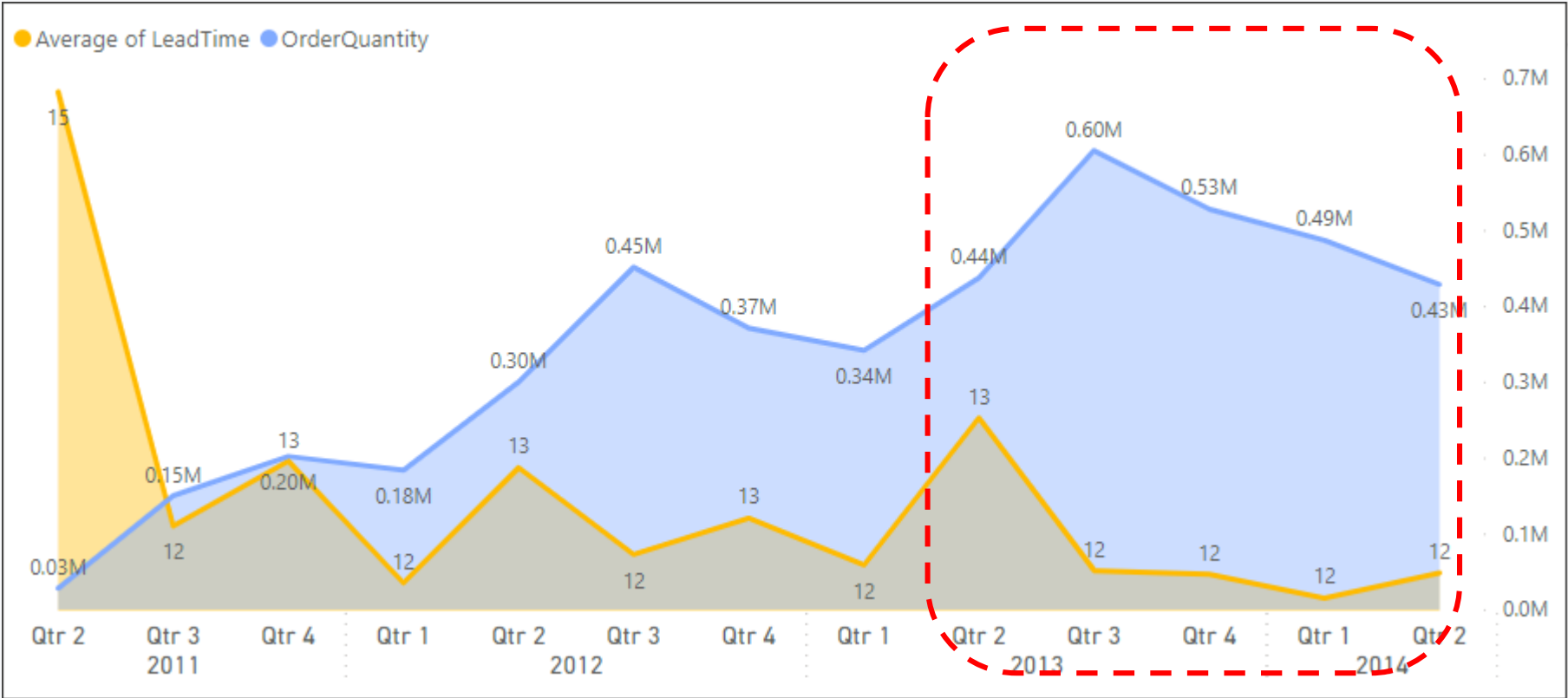
AdventureWork was able to maintain an impressive **overall production yield of 98%**, **producing approximately 1 million items per year**, which grew almost double YoY. As with most businesses, there is expected to be a **significant increase in order demand during Q3 to prepare for the end-of-year seasonal sales**.

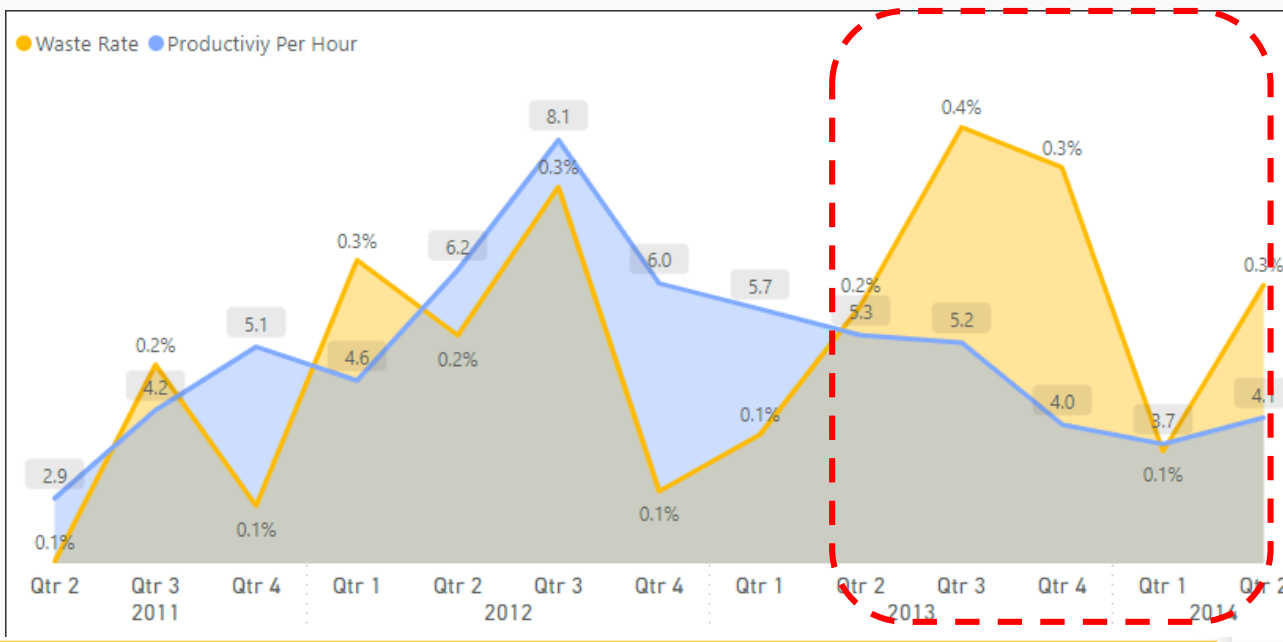


There was a notable decrease in productivity (quantity per hour) during FY13-14, dropping from an average of approximately 6 items per hour to a low of 4.1 items in per hour in the last fiscal quarter. This decline in productivity resulted in a significant increase in the total number of resource hours spent in 2014.



In contrast to the productivity trend, the time taken to complete an order **has improved by 20%, reducing from 15 days to approximately 12 days**. It should be noted, however, that this improvement may be attributed to the lower order quantity observed in 2014. Furthermore, the critically **low rate of on-time delivery**, which was **only around 41.6%**, indicates a significant issue in the manufacturing operation. Therefore, minimizing lead time is crucial for timely order fulfillment and efficient resource utilization.

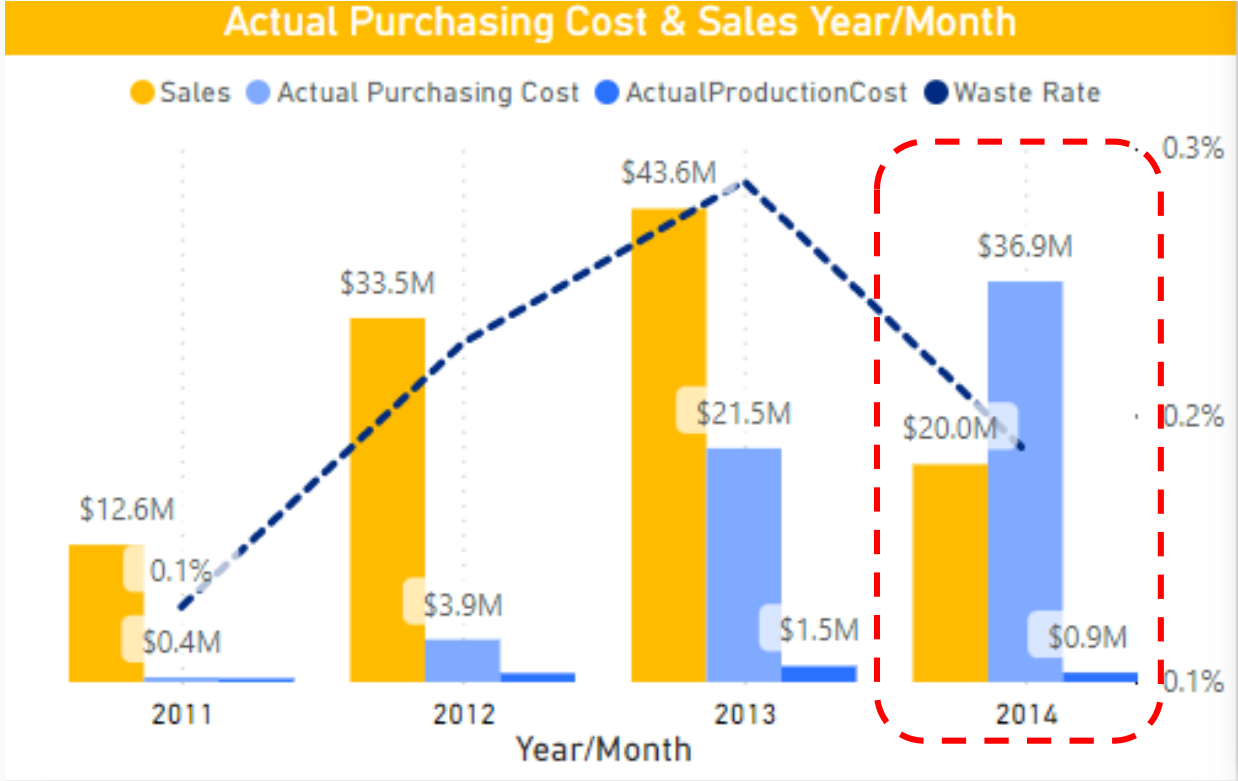




- During production, approximately **3,000 items** were scrapped every year, **resulting in roughly \$600,000 of waste cost annually**, although the waste rate remained low at around 0.2%. **The highest recorded waste rate was approximately 1% in September 2013.** In addition to scrap and waste reduction, it is also important to consider other metrics such as rework rate and first-pass yield, which may have contributed to the low productivity and high resource working hours in 2014 as previously mentioned.

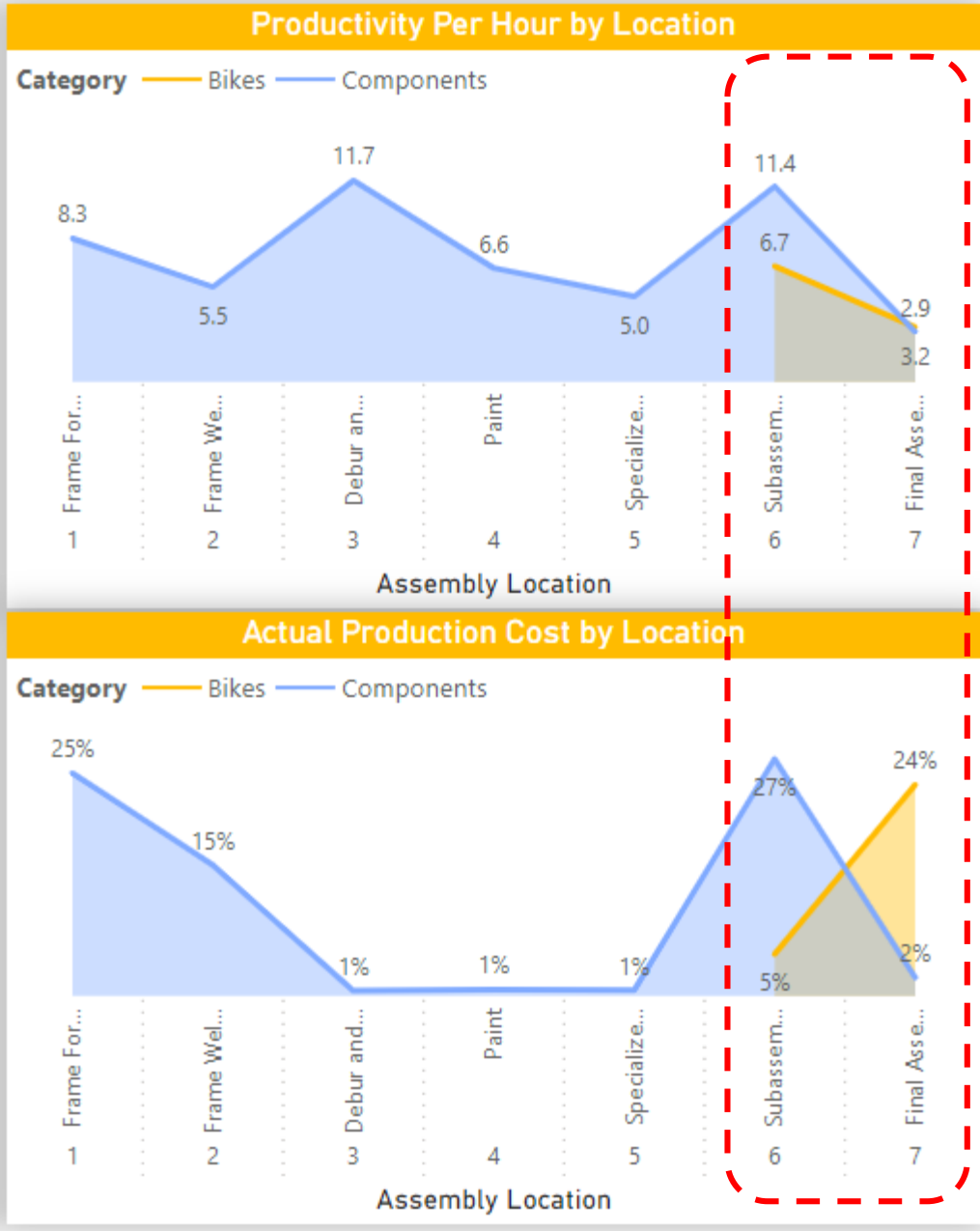
Subcategory	% Resource Hrs	OnTime Rate	Waste Rate	% WasteCost	Productivity/Hour
⊕ Road Bikes	25.47%	41.8%	0.2%	54.25%	2.64
⊕ Handlebars	20.52%	42.3%	0.2%	0.21%	2.02
⊕ Wheels	10.75%	43.0%	0.3%	1.69%	7.57
⊕ Mountain Frames	9.42%	37.1%	0.1%	0.74%	0.64
⊕ Forks	7.87%	43.2%	0.2%	0.59%	6.60
⊕ Mountain Bikes	6.75%	39.6%	0.2%	1.46%	2.29
⊕ Derailleurs	4.87%	43.7%	0.2%	0.48%	15.32
⊕ Touring Bikes	3.55%	39.2%	0.1%	0.51%	2.55
⊕ Bottom Brackets	3.50%	43.2%	0.2%	0.29%	11.10
⊕ Headsets	2.63%	43.4%	0.3%	0.32%	14.80
⊕ Cranksets	2.63%	43.4%	0.3%	1.15%	14.84
⊕ Road Frames	2.04%	38.1%	0.2%	1.60%	0.77
⊕ Touring Frames			0.2%	0.49%	
Total	100.00%	41.6%	0.2%	100.00%	4.93

- Upon further examination of subcategories, it was found that **the main causes of the high waste rate in Headsets and Cranksets were from technical process (a trim length that was too long and a Thermoform temperature that was too high)**



Upon reviewing the operational costs, it is evident that the purchasing cost in 2014 increased significantly to \$36.9 million, which is 1.7 times higher than the previous year. **Meanwhile, sales saw a rapid decline of almost 50%.** It is clear that there are factors that have contributed to the low sales, and further analysis is required to understand market trends, customer preferences, the competitive landscape, and pricing strategies to identify the root cause.

When examining the operation sequence, it becomes evident that the last two steps of the assembly process consume a significant amount of time and production cost (a share of 51% actual production cost). It is clear that assessing the utilization of manufacturing equipment and optimizing production costs through targeted cost reduction projects, such as process improvements, waste reduction, or efficiency enhancement measures, could be beneficial.



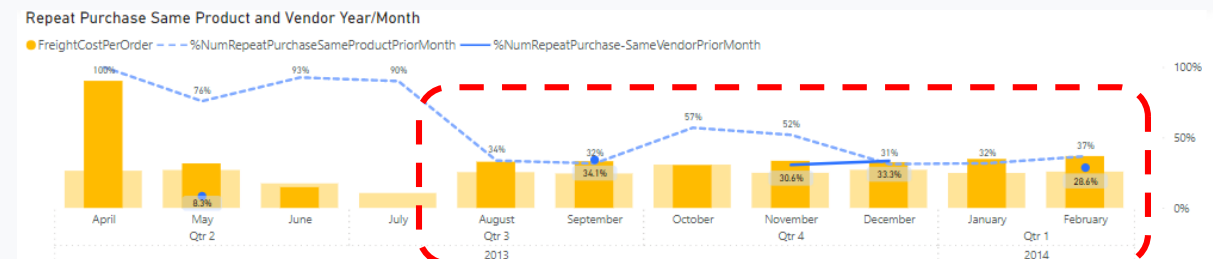
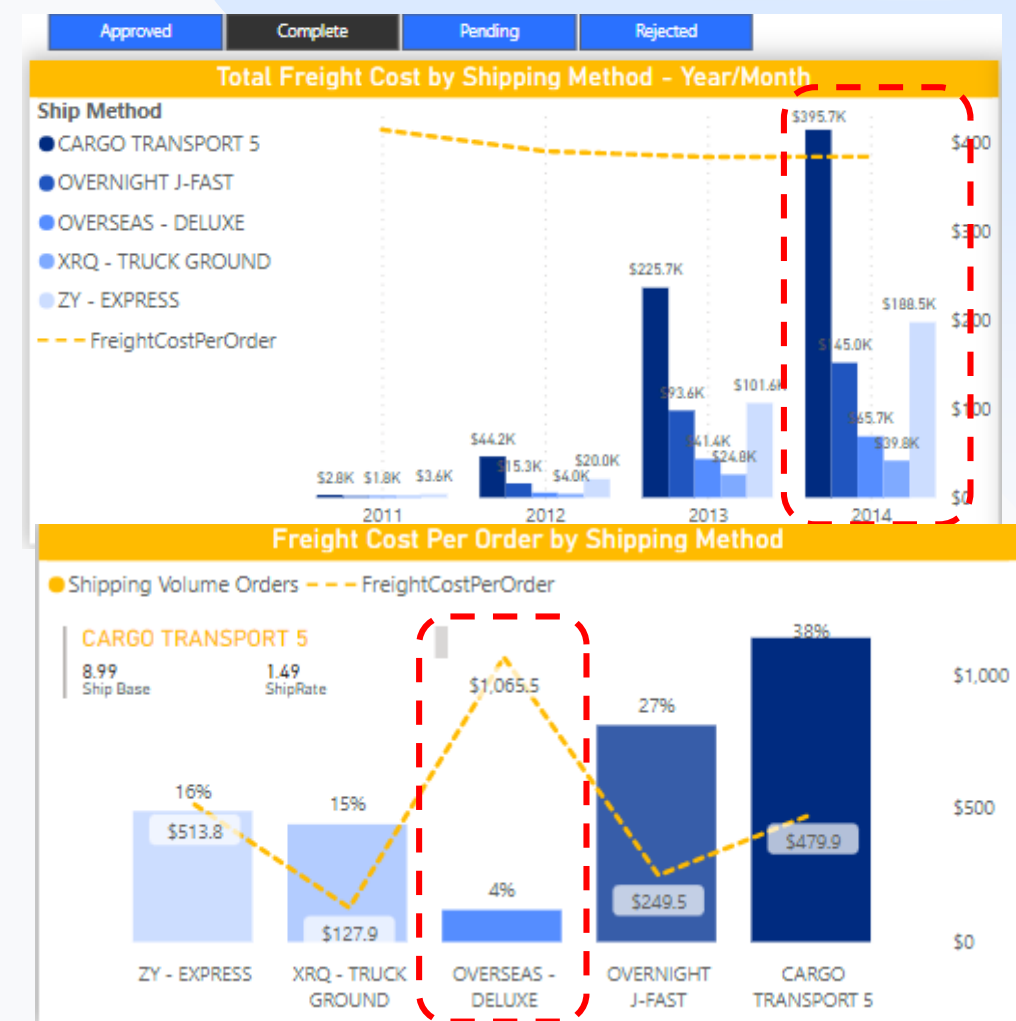
According to the Pareto 80/20 theory, it is clear that **80% of the production and waste costs** are attributable to Adventure Works' **main business category, Bikes**. However, within the bike components category, there are specific areas that require attention:

- **Road Frames and Mountain Frames** have **relatively low production levels but incur high costs**.
- Conversely, **Derailleurs and Handlebars** have high production volumes but are associated with lower costs (a room for learn best practices which might apply for other areas)



FOOD FOR THOUGHTS

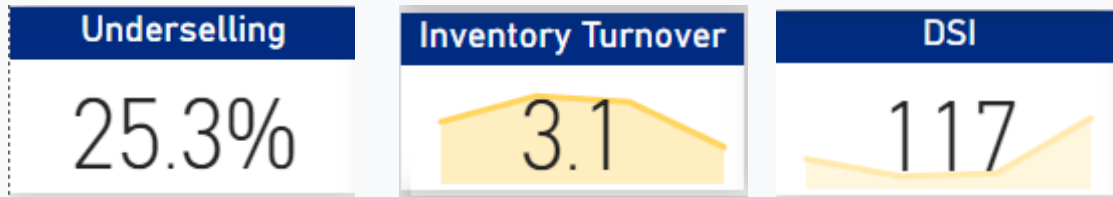
- An overlooked factor within our control is the Logistics Cost, which accounted for **approximately 2.7% of the total actual purchasing cost** with vendors. **The prevailing shipping methods used were CARGO and J-FAST** due to their low shipping base and rates.
- Upon examining complete orders, **the freight cost per order experienced a slight decrease from \$383 to \$401**. However, there was a significant increase in the cost of the most expensive shipping method, OVERSEAS_DELUXE, which resulted in its share of total freight costs **growing from just 0.37% to nearly 5% (~\$65K freight cost)**. It appears that the company may have shifted away from cheaper shipping methods like TRUCKGROUND towards this more expensive method.
- To help reduce shipping costs, **increasing the percentage of repeat purchases for the same product** from the same vendor could be beneficial by enabling more mass-shipping at once. **Additionally, consolidating shipments, negotiating favorable freight rates, and implementing efficient inventory management practices** can all help minimize carrying costs.



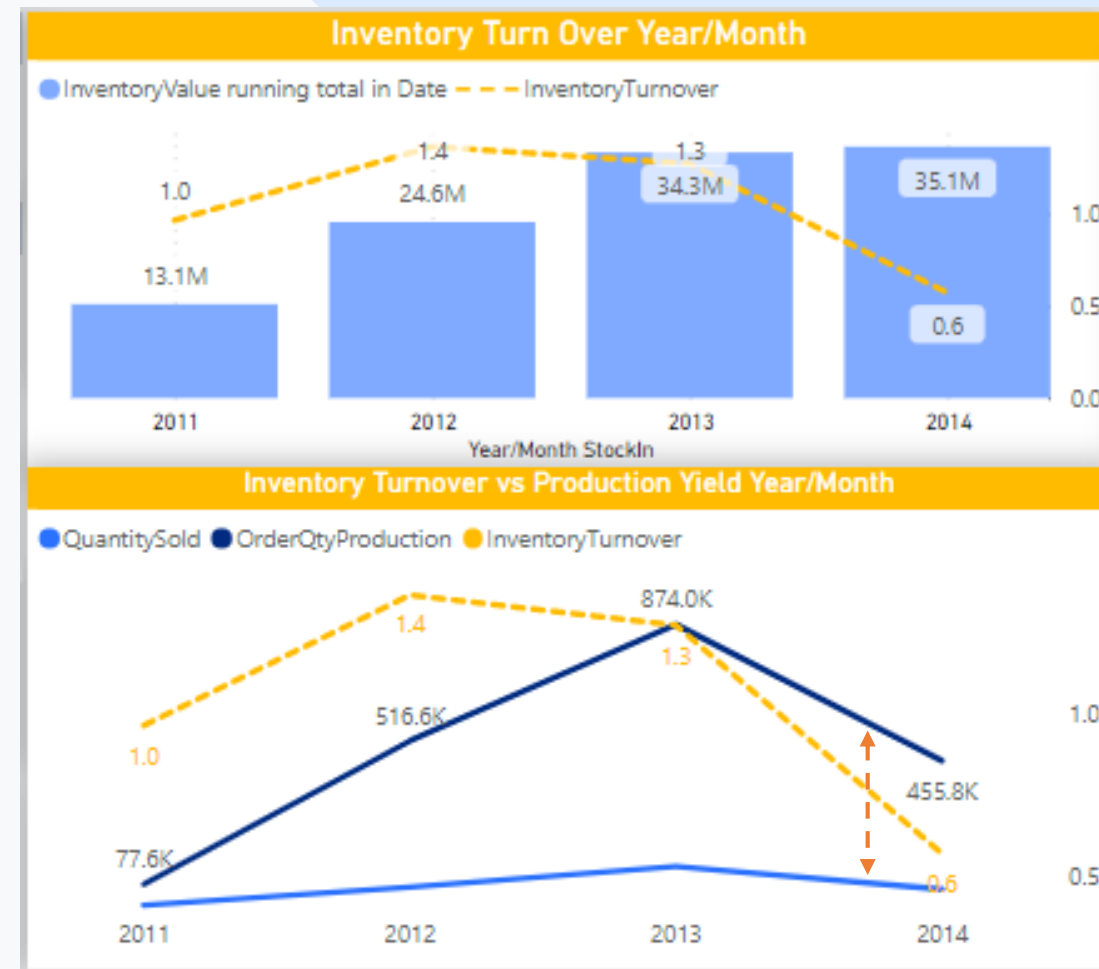


2. Inventory

- The overall inventory turnover ratio indicated a **sluggish conversion of stock into sales, with a lifetime turnover rate of 3.1**. This rate started at 1.0 before plummeting to its lowest point of 0.6 in 2014. Notably, **approximately 75% of the stock of road bikes was newly imported and remained 'not available for selling'**, potentially creating challenges in inventory management.

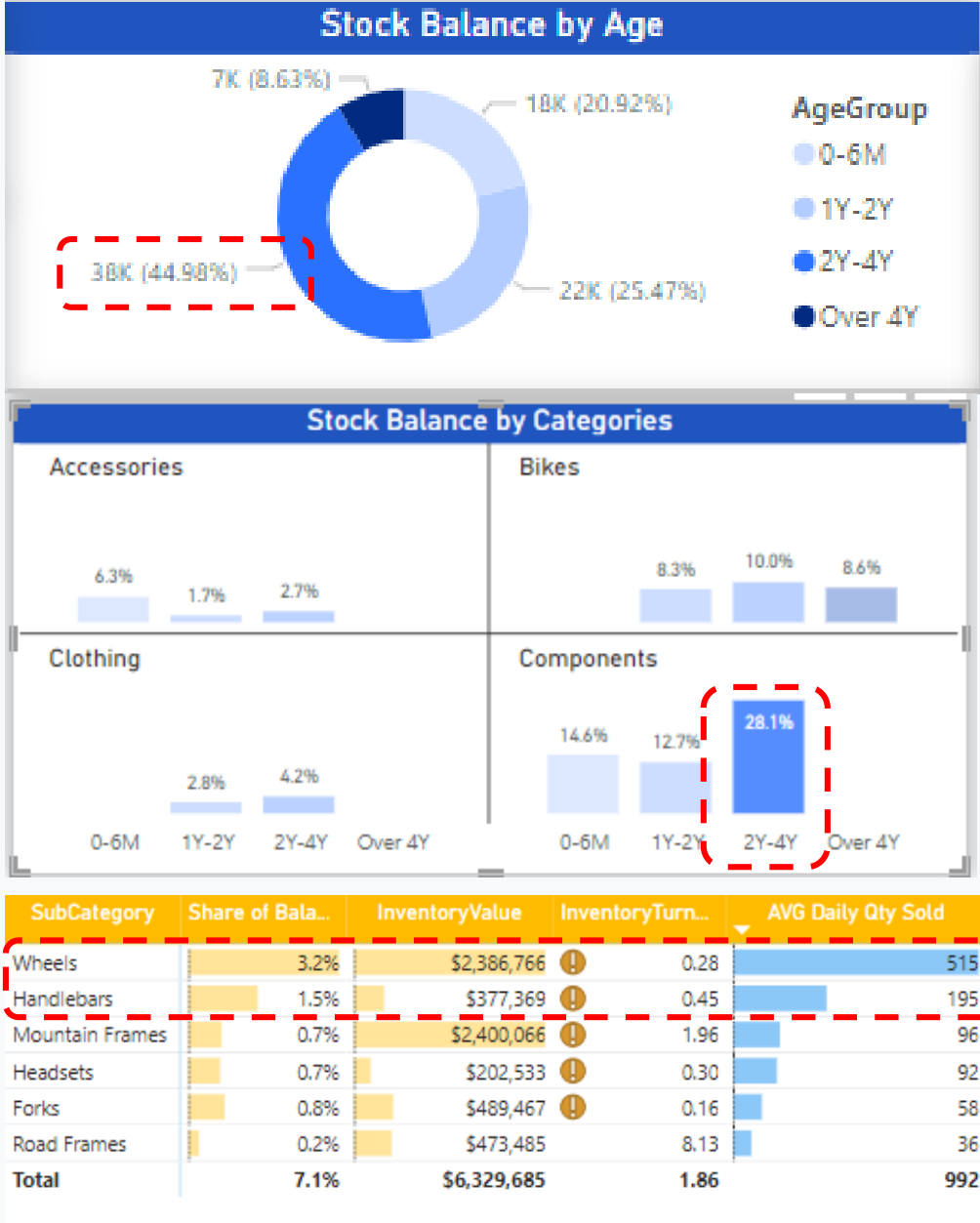


- A closer examination of the correlation between production and inventory turnover reveals a significant disparity, indicating an excess inventory situation. This gap highlights the mismatch between the purchasing power of consumers and the accumulated inventory levels.

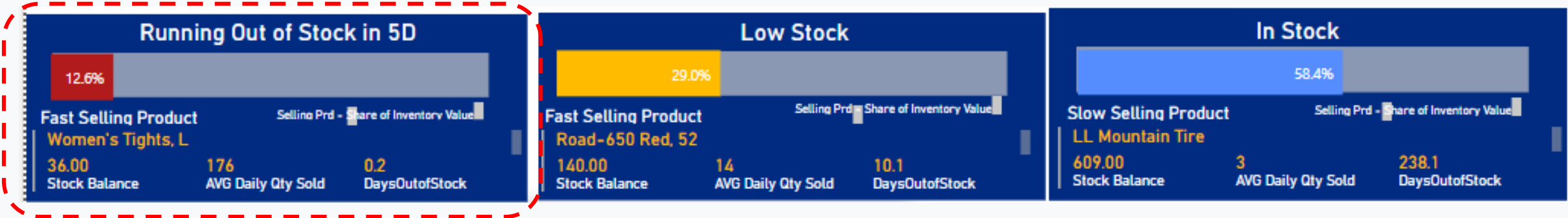


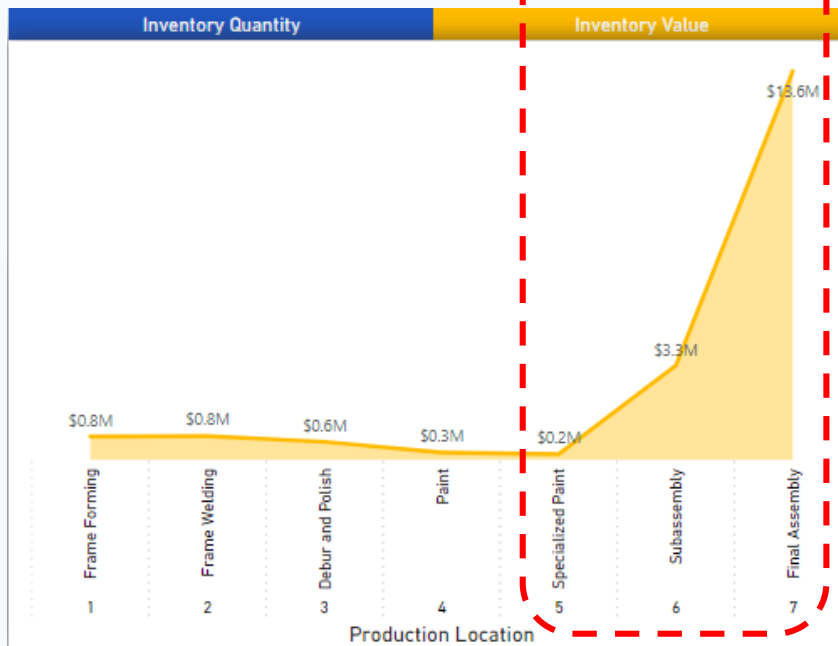
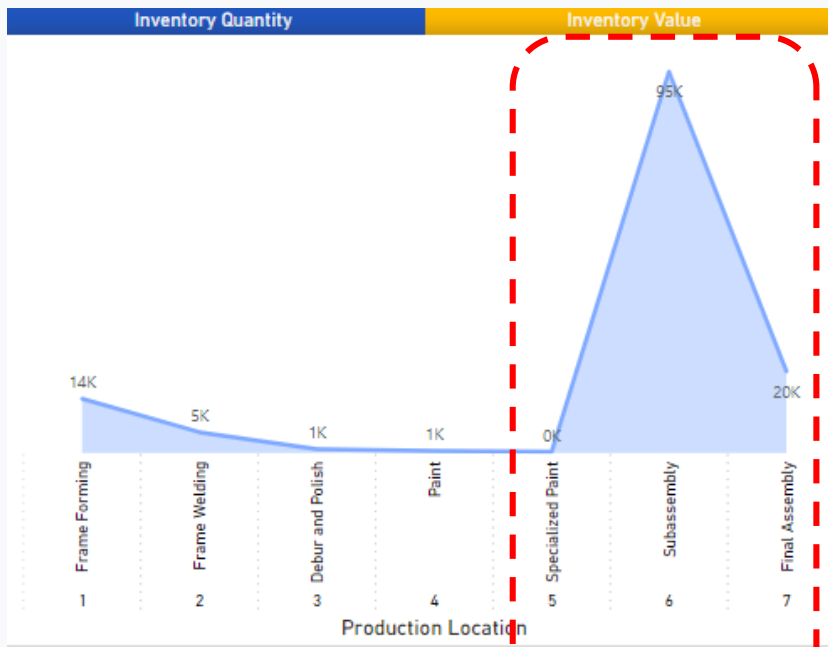
- Upon examining the age of the "under selling" stock, it can be observed that **the majority of the stock balance falls within the age range of 2 years to 4 years, accounting for approximately 45% of the total.**

- Drilling down to further analysis of inventory turnover rate by category, it was found that **the majority of the 2-4 year age group of under-selling stock belonged to the Bike Components category (28%)**. Specifically, the turnover rate for two sub-categories, **Wheels and Handlebars**, was **low due to a high number of stocks**. However, it is worth noting that the average daily quantity sold for these sub-categories was higher compared to other categories.



The current stock status is concerning, as there are **61 products (equivalent to 12.6% of inventory value or 22K quantity)** that will be out of stock within 5 days, while **7.2% of inventory (24K quantity)** is overstocked which require expected >60D to be out of stock. To ensure proper inventory management, it is necessary to review the existing reorder point and safety stock thresholds and set up automated alerts to enable timely actions.





A significant proportion of the inventory is allocated to Subassembly and Final Assembly, with Subassembly occupying the largest space (~28.5%) and Final Assembly comprising only 6% of the quantity but representing 39% of the inventory value across locations. In order to optimize inventory, it is recommended to develop marketing strategies targeting Subassembly items to increase their liquidation and create room for more profitable products.



3. Summary

- Low Productivity, High Working Resource Hours, High Breach Delivery Lead Time
- Waste Rate is not a matter but still there is a room for utilization
- Freight Cost require attention for optimization
- Overstock Production and Low Inventory Turn over rate
- High share of items with Days Out of Stock within 5 days
- Inaccurate reorder points and safety stock level