**JDC Forecasting – Sales & Inventory Analysis**

**Introduction: Understanding the Makeup of JDC’s Business**  
Jewelry Design Center (JDC) is more than just a jewelry retailer—it is a **full-service jewelry business** offering a unique blend of **retail, custom design, and repair services**. While the primary focus of this forecasting analysis is on **Retail Sales**, it is important to first understand the **broader scope of JDC’s business model** and what differentiates it in the industry.

An in-depth analysis of **five years (2020–2024) of sales data** reveals that JDC’s revenue is driven by **three core revenue streams**:

* **Retail Sales (78.82%)** – The largest contributor, encompassing finished jewelry, watches, and other retail items.
* **Repairs & Services (12.71%)** – A significant portion of JDC’s business, reinforcing its role as a trusted service provider.
* **Custom Design (8.47%)** – A reflection of JDC’s expertise in creating **one-of-a-kind jewelry pieces** tailored to individual clients.

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While JDC’s stakeholders requested that this project focus on **Retail Sales forecasting**, it was imperative to **exclude Loose Diamonds—both Natural and Lab-grown—from the analysis**. JDC is the **largest supplier of loose diamonds in the Northwest region of the United States**, making this segment **a unique and substantial revenue driver**. However, including these categories in a **Retail Sales forecast** would distort trends due to their **distinct purchasing behavior**.

By refining our scope, we ensure that the **forecasting model accurately represents core retail sales trends** rather than being influenced by fluctuations in **loose diamond sales, custom design projects, or service transactions**. This distinction is crucial for **improving inventory planning and sales forecasting**, allowing JDC to **optimize operational efficiency** while continuing to provide **exceptional products and services**.

A graph with different colored squares

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A further breakdown of **Retail Sales** reveals that:

* **25.5% of total retail sales** comes from **Loose Natural Diamonds**,
* **6.3% of total retail sales** comes from **Lab Diamonds**,
* **68.3% of total retail sales** comes from **finished jewelry and other retail products**.

As a result, **this forecasting analysis will focus on the 68.3% of revenue derived from finished retail products**, ensuring that inventory planning is aligned with **the true retail segment of JDC’s business model**.

***Sales Data: EDA***

***Overall Sales Trends Over Time***

A graph showing sales revenue

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***Key Findings***  
**Strong Seasonality**

* Pronounced **sharp peaks each year**, representative of the holiday season November-December
* This suggests that forecasting should **account for seasonal fluctuations** (SARIMA or Prophet would be good models for this).

**General Upward Trend**

* Although there is some growth over time, it **is not exponential**, which means expansion (like a 3rd store opening) **may not have had an immediate impact** on revenue.

**April 2020 – COVID Impact**

* Sales **dropped to near zero**, likely due to store closures.
* Did sales **recover quickly afterward**, or was there a slow rebound? (We could check month-over-month % change).

**New Store Opening (October 2023)**

* **No immediate major increase in sales** in 2024 despite the expansion.
* Possible explanations:
  + **Store cannibalization?** Some customers may have shifted from existing locations instead of generating all-new demand.
  + **Marketing delays?** A new store might take time to ramp up customer awareness and traffic.
  + **Inventory constraints?** Were supply chain issues limiting stock availability?
  + **Lower-than-expected demand?** The new location might not have drawn as much foot traffic as anticipated.

***Quantifying Growth - YoY Percent Change in Total Sales***

A graph with blue squares

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Since we don’t have 2019 sales, there is no reference point for a 2020 YoY calculation. This means 2020 sales appear as the baseline, but 2020 was disrupted by Covid closures. If sales in 2020 were unusually low, then 2021’s recovery seems massive by comparison. To understand the impact of the Covid closure and determine if 2021’s rebound is exaggerated, we need to verify if sales were abnormally low. Therefore, quantifying the Covid impact is necessary.

***Covid Impact?***

1. Check 2020 vs 2021 sales (absolute values not just growth %)
2. Look at MoM trends in 2020 and 2021

A graph with blue and orange lines

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As we can see in the chart above, both 2020 and 2021 exhibit similar seasonal patterns and sales trends. This confirms that Covid had a short-term impact rather than a long-term disruption. By March of 2021, sales had stabilized. Since sales rebounded quickly, I won’t need special corrections when forecasting 2025-26. Therefore, moving forward, forecasting models should focus on growth drivers in store expansions, marketing impact, and product mix.

***2020-2024 Sales Comparison***

A graph with lines and dots

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***Observations*  
Seasonality Remains Strong**

* Sales patterns are **consistent across all years**, with a **major spike in December** every year.
* No major deviations in seasonality, meaning consumer behavior hasn’t fundamentally changed.

**2024 Shows Some Growth, But Not a Big Jump**

* **2024 is slightly above previous years**, indicating **growth**, but **not an exponential increase**.
* The new store **should have** contributed to higher sales growth in 2024, but the increase is modest.

**Potential Cannibalization?**

* If **existing customers** shifted their purchases to the new store **instead of generating new sales**, total revenue wouldn’t increase dramatically.
* If the new store is in a market that overlaps with the existing stores (e.g., Spokane or Kennewick), it might not be reaching **enough new customers**.

**No Drastic Uptick After October 2023 (New Store Opening)**

* If the new location **significantly boosted revenue**, we’d expect a noticeable **uptick in late 2023 and throughout 2024**—but the pattern looks similar to past years.
* This suggests that the new store **isn’t drastically expanding total demand**.

***Breakdown Sales by Location***

A graph of sales

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### ***Key Findings* Sales Growth Was Strong in 2021-2022, Then Slowed**

* Spokane: **+57.69% in 2021**, but slowed to **+8.2% in 2022**.
* Kennewick: **+82.55% in 2021**, then slowed to **+9.5% in 2022**.
* This suggests that the **post-COVID recovery boosted sales initially**, but growth **leveled off in 2022**.

**Spokane’s Sales’ Decline in 2023 (-10.21%)**

* This happened **the same year Missoula opened (2023)**.
* This suggests **Missoula may have pulled some customers away from Spokane** instead of bringing all-new business.

**Missoula Grew Rapidly (+301.76%) in 2024**

* Expected, since **2023 was its first partial year**.
* However, Kennewick’s growth **dropped to +2.18%**, which is almost flat.
* Spokane **only grew +5.89% in 2024**, which is still relatively slow.

**Company-Wide Sales Growth is Weak in 2024**

* If Missoula’s launch was purely **adding new customers**, we’d expect **stronger overall growth** in 2024.
* Instead, Spokane and Kennewick’s growth has **nearly stalled**, meaning some Missoula sales **were likely cannibalized from other locations**.

*(I am not going to speculate on the reason for this slowing of growth in retail sales at this time.)*

**Seasonal Decomposition**

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The 4 components that make up the graph above are: **Observed (Raw Sales Data), Trend (Long-Term Growth), Seasonality (Repeating Yearly Patterns), and Residuals (Unexplained Variability**). What the lines in each of these component graphs tell us:  
  
1. Observed (Raw Sales Data)

* 1. This is the actual sales data over time.
  2. There are big spikes in Nov/Dec, indicating holiday shopping.
  3. The overall shape mirrors what we’ve already seen in our line charts earlier.

2. Trend (Long-Term Growth)

a. The trend plot shows the underlying long-term pattern in sales.

b. Sales increase sharply in 2020-2021 (post-Covid recover).

c. Growth slows down from 2022 onward.

d. Flattens slightly in 2023-2024 confirming that sales growth is not accelerating.

3. Seasonality (Repeating Yearly Patterns)

a. This shows recurring patterns in sales, independent of long-term growth.

b. The graph has clear holiday spikes every year.

c. Other months are relatively stable.

d. Since these seasonal spikes are very pronounced, they are a key feature of the business.

***Note:***

* Helps to build a model that accounts for seasonality (SARIMA, Prophet).
* Important for inventory planning – you’ll want to stock up before November each year.

4. Residuals (Unexplained Variability)

a. The Residuals plot shows what’s left over after removing the trend and seasonality.

b. If this were pure noise, the values would fluctuate randomly around zero.

c. In this case, there are some visible dips and spikes, meaning: there are unexpected factors affecting sales, e.g. economic downturns, store closures, promotions, etc.

***Note:***

* Helps check if data is predictable or highly volatile.
* If residuals are too random, forecasting becomes more difficult.

***Key Findings:***

**Trend:** Strong growth **until 2022**, then flattens.  
**Seasonality:** **Huge holiday spikes** (important for forecasting).  
**Residuals:** Some volatility, but not extreme - forecasting **is feasible**.

***Inventory Data: EDA***Why does inventory turnover matter?  
Helps manage cash flow and avoid overstocking slow-moving items

Ensures popular items are in stock while minimizing dead inventory

How does vendor performance impact JDC?  
Strong vendor relationships can lead to better pricing, exclusive products or favorable terms.

Why analyze sold vs. unsold inventory?   
Identifies aging inventory that ties up capital  
Helps determine markdown or promotional strategies

(Part of the JDC story is that they carry very high-end luxury brands that don't turn as often as something more basic that would be worn every day.)

**Inventory Overview – The Big Picture  
  
Summary Statistics**

* Count of total inventory items - 90286
* Count of unique SKUs - 90286
* Count of unique vendors – 326

Total Inventory Value & Units on Hand