Statistical and Business Insights Before preprocessing Project_217 Iron ore price analysis

Column Name	Mean	Median	Mode	Variance	Std Dev	Range	Skewness	Kurtosis	Statistical Insights	Business Insights
Iron_Ore_Price	13301.2	12532.93	8630.68	77606561.38	8809.46	89633.72	5.89	46.05	Extremely high skewness and kurtosis show significant outliers and volatility in the price.	Volatile iron ore prices can drastically affect profitability. Strategic procurement and risk management, such as using futures contracts, could help the company buy at optimal price points and avoid significant cost increases. Capitalizing on price dips to stockpile may help reduce procurement costs and increase margins. Consider price forecasting models for optimal decision-making.
Global_Demand	1943.92	1948.03	1621.82	67061.84	258.96	896.58	0	-1.2	Low skewness and variance suggest stable global demand for iron ore.	Stable demand ensures a relatively predictable sales market. The company can rely on steady sales and create long-term supply agreements with key customers. Aligning production capacity with demand forecasts can ensure efficient operations without overproduction. Maintaining stock levels based on demand will also prevent holding excess inventory.
Global_Supply	1954	1953.82	1831.94	40739.39	201.84	698.38	-0.04	-1.16	Slightly negative skewness and low kurtosis indicate a normal distribution in supply fluctuations.	Reliable global supply ensures that procurement risks are minimized. Since supply trends are stable, procurement teams can focus on securing cost-effective long-term contracts. Flexibility in supplier contracts can help negotiate better pricing and delivery schedules during surplus periods.
Freight_Rate	2505.28	2523.42	1501.96	739702.64	860.06	2996.64	-0.03	-1.21	Freight rates show moderate variability, with minimal skewness, implying a stable transportation market.	Fluctuations in freight rates could impact total procurement costs. Locking in long-term logistics contracts or using market-based shipping rate models could help manage this cost. Close monitoring of freight markets can help optimize supply chain expenses and ensure competitive pricing.
Stockpile	53.58	53.02	12.31	652.73	25.55	89.96	0.05	-1.15	Stock levels have low variability and minimal skewness, indicating consistent stockpile management.	Consistent stockpile levels offer flexibility in production planning and ensure the company can respond to fluctuations in global supply or demand without disruptions. This allows for strategic purchasing decisions during times of low prices, while ensuring sufficient material is available during periods of increased demand. The company can also avoid costs associated with excessive storage or material shortages.
Production_Volume	138948.75	123401.94	66352.04	20936983469	144696.18	1826436.86	8.57	84.7	Very high skewness and kurtosis show substantial production variability and potential extreme outliers.	The significant variability in production volume suggests that capacity utilization and efficiency need improvement. Streamlining production processes could stabilize output. Addressing this volatility can help the company meet demand consistently, manage costs, and optimize production schedules to take advantage of favorable market conditions, such as during price peaks.
Production_Cost	4471.29	4427.16	2807.24	2051088.24	1432.16	4963.05	0.05	-1.17	Relatively stable production costs with low skewness and moderate variance.	Cost control is manageable, but further efficiency gains in production could result in higher profitability. By analyzing the components of production costs (e.g., labor, materials, energy), the company can identify areas for cost reduction, possibly through automation or supply chain optimization. Understanding cost drivers will help set appropriate pricing strategies to maintain profit margins.
Exchange_Rate_USD	6.49	6.52	5.03	0.74	0.86	2.99	-0.03	-1.18	Low variability in exchange rates indicates a relatively stable international currency environment.	Managing foreign exchange risk is essential for companies importing or exporting in foreign currencies. A stable exchange rate reduces currency risk in global transactions, allowing for better financial planning and more predictable costs. The company can use hedging strategies like forward contracts to mitigate exposure to unfavorable exchange rate fluctuations.

Interest_Rate	5.7	5.8	1.42	6.8	2.61	8.95	-0.12	-1.22	Interest rates show moderate variance, but minimal skewness.	Fluctuations in interest rates affect financing costs for expansion or working capital. Higher rates may increase borrowing costs, affecting profitability. Monitoring interest rates and refinancing options can help the company manage debt more effectively and minimize interest expenses. Low rates could offer opportunities for investment or capacity expansion, increasing long-term profitability.
Inflation_Rate	3.48	3.46	1.56	2.19	1.48	4.99	0	-1.22	Low inflation variability suggests a stable economic environment.	A stable inflation rate ensures predictable cost increases, allowing for better pricing strategies and long-term financial planning. This helps to avoid sudden price hikes in raw materials or operational costs, which could affect profit margins. The company can focus on operational efficiency and productivity improvements rather than worrying about inflationary pressures.
GDP_Growth_Importer	4.47	4.54	3.27	2.02	1.42	4.98	-0.01	-1.19	GDP growth of importing countries shows minimal variability and little skewness.	A stable economic environment in importing countries signals continued demand for iron ore. This can result in sustained revenue from exports and opportunities to form long-term partnerships. The company can focus on maintaining or growing market share in these economies, helping to boost profitability through stable or increasing iron ore sales.
Tariffs	7.73	7.67	5.21	18.23	4.27	14.95	-0.08	-1.1	Tariffs exhibit moderate variance, indicating fluctuations in trade policies.	Changing tariffs can affect the cost of importing/exporting raw materials. Proactively monitoring trade policies will help the company navigate cost increases due to higher tariffs. Diversifying suppliers or optimizing logistics routes can help mitigate the impact of changing tariff policies. Maintaining good relations with governments in key markets could also offer advantages in negotiating better terms.
Steel_Production	1744.36	1742.53	1524.14	20756.18	144.07	499.31	0.05	-1.17	Steel production is consistent, with minimal variability.	Stable steel production offers the company a clear picture of demand for raw materials like iron ore. Aligning production capacity with stable steel demand will enable the company to optimize operations, avoid overproduction, and maintain healthy inventory levels. It also helps forecast demand for iron ore, ensuring the company procures adequate supply without incurring excess costs from over-purchasing.
Carbon_Emissions	1.98	1.98	1.23	0.34	0.58	1.99	0.03	-1.21	Carbon emissions are low and consistent, with minimal variability.	Consistently low carbon emissions can position the company well in a market increasingly focused on sustainability. It can open opportunities for the company to tap into environmentally conscious markets or receive carbon credits. It could also help in avoiding penalties in regions with strict environmental regulations. Ensuring efficient production processes will help keep emissions low, maintain regulatory compliance, and support sustainability efforts.
Aluminum_Price	3.51	3.54	1.55	1.46	1.21	4.95	0.04	-1.12	Aluminum prices are relatively stable, with low skewness and minimal outliers.	Stable aluminum prices are advantageous for the company's procurement strategy, reducing the risk of sudden cost increases in manufacturing processes that involve aluminum. This stability allows the company to focus on optimizing other cost drivers, such as energy or labor, and explore potential aluminum substitutes or cost-saving opportunities.
Copper_Price	2.88	2.86	1.22	1	1	3.99	0.05	-1.21	Copper prices have low variability, indicating stable supply and demand.	Like aluminum, stable copper prices present an opportunity for the company to lock in long-term procurement contracts or explore hedging strategies to reduce volatility. This provides cost certainty in manufacturing processes where copper is used. Optimizing copper usage in production can help manage expenses and improve margins.

Nickel_Price	4.92	4.88	1.45	3.65	1.91	6.91	0.06	-1.19	Nickel prices show moderate variance but overall stability in supply and demand dynamics.	Nickel is critical for stainless steel production, and stable prices provide cost predictability in production processes. The company can explore sourcing strategies for nickel or explore secondary markets for recycled nickel to reduce procurement costs. Diversifying sources of nickel could further reduce risks related to price increases.