Model Performance Report and Recommendation

Model Performance Comparison

Model	MAE	MSE	RMSE	MAPE
SARIMAX	13.9448	459.759	21.442	4.75144
Exponential Smoothing	14.3614	340.511	18.4529	3.86821

Model Recommendation

Based on the comparative analysis of the performance metrics, the **Exponential Smoothing model** is recommended for forecasting tractor sales

Justification:

While the SARIMAX model showed a slightly lower Mean Absolute Error (MAE) of 13.9448 compared to Exponential Smoothing's MAE of 14.3614, other critical metrics strongly favor the Exponential Smoothing model:

- **Mean Squared Error (MSE):** The Exponential Smoothing model significantly outperformed SARIMAX with a lower MSE of 340.5106, as opposed to SARIMAX's 459.7585. A lower MSE indicates that Exponential Smoothing has fewer and smaller large prediction errors, which is crucial for reliability.
- **Root Mean Squared Error (RMSE):** The Exponential Smoothing model also demonstrated a lower RMSE of 18.4529, compared to SARIMAX's corrected RMSE of 21.4420. This further emphasizes that Exponential Smoothing is more robust in penalizing larger errors and provides a better overall fit.
- **Mean Absolute Percentage Error (MAPE):** With a lower MAPE of 3.8682% against SARIMAX's 4.7514%, the Exponential Smoothing model provides predictions with smaller percentage errors relative to the actual sales figures, making it more interpretable and reliable for business decisions.

Although SARIMAX exhibited a marginal advantage in MAE, the superior performance of Exponential Smoothing across MSE, RMSE, and MAPE, which are often more indicative of a model's overall accuracy and ability to handle larger deviations, makes it the preferred choice for this forecasting task.