



# Rocket Company Performance Insights: Data-Driven Strategies for Satellite Launch Partnerships

Naufal Dzakia Raiffaza



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# ABOUT MYSELF



# who am i?

I'm Naufal Dzakia Raiffaza , an Informatics Engineering graduate from Universitas Muhammadiyah Surakarta, with a strong passion for Data Science and Python programming . I combine technical expertise with analytical thinking to solve real-world problems through data.

With experience in international research collaboration , published work in software ecosystems, and hands-on projects in machine learning and sentiment analysis, I thrive in environments that value innovation, teamwork, and continuous learning. Currently expanding my skills through a Data Science Bootcamp , I'm eager to share insights from my recent projects and explore how data can drive impactful decisions.



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# Project Overview

# about the project

## Description:

This project involves analyzing the performance of various rocket companies in satellite mission launches, focusing on identifying key trends and providing insights to potential business partners.

## Key Insights:

We identified performance patterns across multiple rocket companies, highlighting success and failure rates to support strategic decision-making in satellite mission planning.

## Technology Used:

Utilized Python for data preprocessing and PowerBI for interactive dashboard creation.

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# Main Project: Background





# The background

## Our Goal

The goal of this project was to analyze the mission launch data of multiple rocket companies to identify performance metrics that can guide companies in selecting launch partners and strategizing their own satellite missions.

## Expected Outcomes

We expect to deliver insights that help businesses make informed decisions on partnering with rocket companies based on performance, success rates, and mission outcomes.



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## Business Problem





# Problem Statement

Many companies looking to launch satellites face challenges in choosing the right rocket company for their missions. By understanding the performance trends of various companies, we can assist businesses in making data-driven decisions that reduce risk and increase mission success.

# Impact

By addressing this problem, businesses can optimize satellite launch strategies, avoid costly failures, and increase their chances of success in the highly competitive space industry.

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# Data Understanding



# about the project

## Data Sources:

The data includes launch mission information from multiple rocket companies, sourced from :

- NEXT SPACEFLIGHT.
- but you can access the dataset from this [Link](#)

## Data Structure:

The dataset includes variables such as mission status, company name, country of launch, rocket status, and launch year.

## Data Quality

The dataset required to handle data cleaning due to missing values and duplicated data. After we handle it, the dataset are ready to use!

# How we do data cleaning?

## Duplicated data

drop the duplicated data

## Missing Values

There are missing values in both the Time and Price columns, and here's how we address them:

- Given the large number of missing values in the Price column, dropping it is the most efficient choice as it does not significantly affect the analysis of satellite launch performance, which is crucial for strategic decision-making.
- For the Time column, since satellite launches follow a predictable, sequential pattern, we use forward-fill to handle the missing values. This approach maintains the chronological sequence, making it ideal for trend analysis and calculating launch intervals.

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# EDA



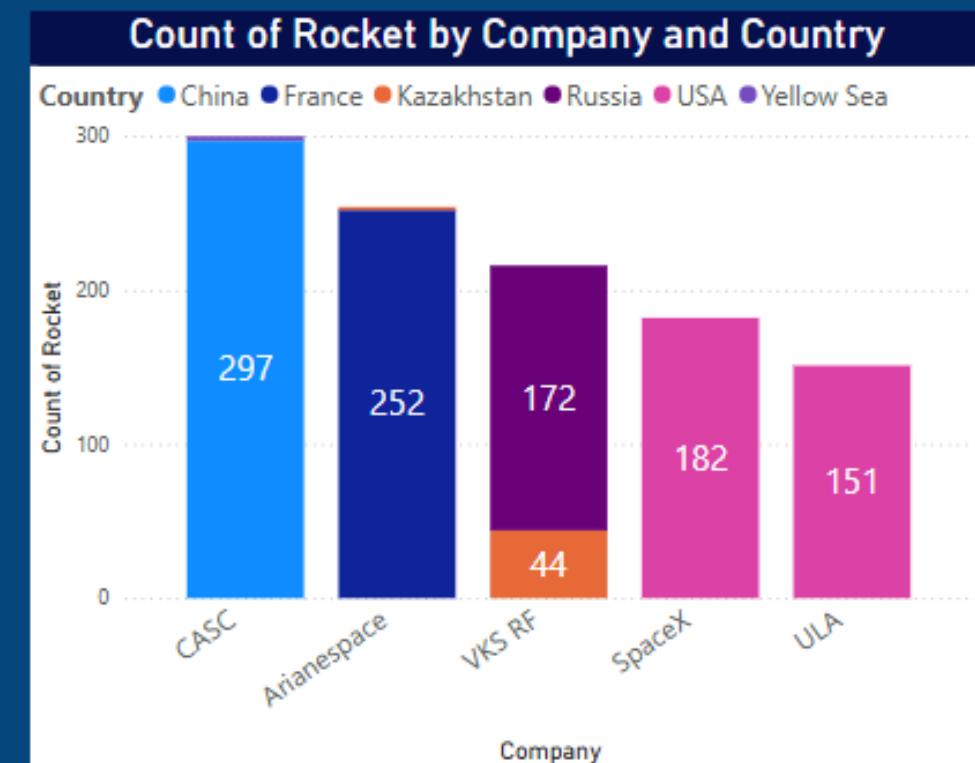
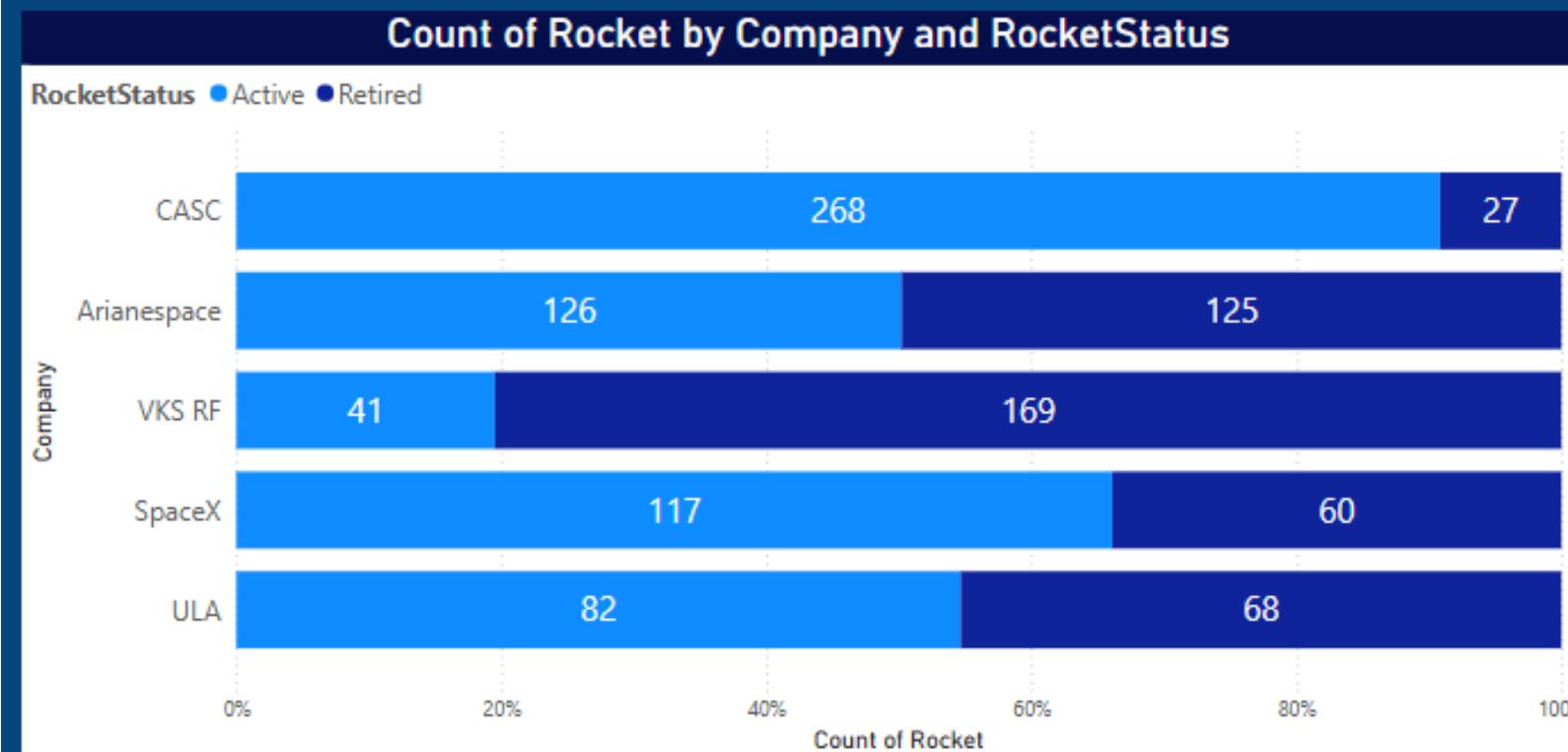
# DASHBOARD

## Rocket Company Performance Analysis and Satellite Mission Launches

TOTAL COUNTRY  
20

TOTAL COMPANY  
50

Company  
All  
Country  
All



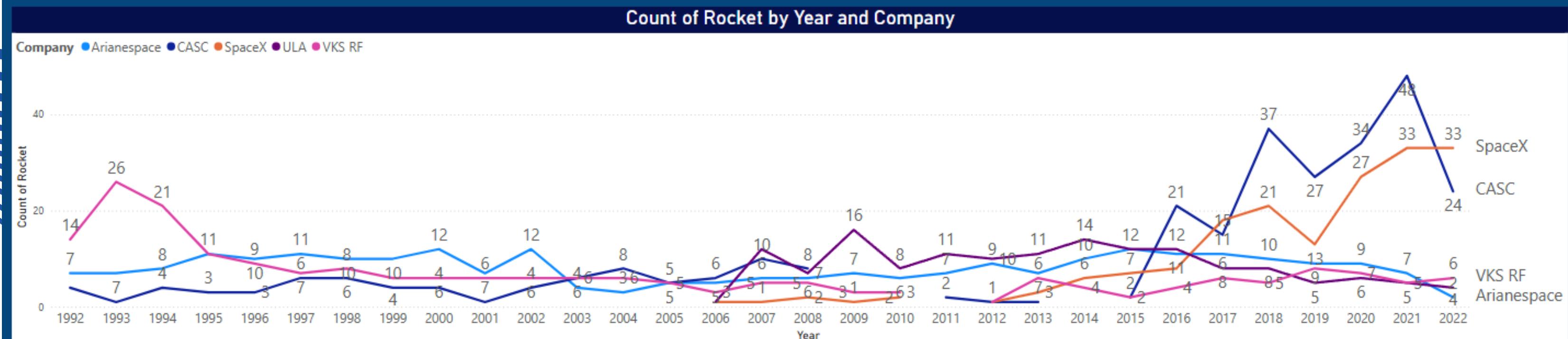
**TOP 5 COMPANY FAILURES**

Company	Count of Mission	MissionStatus
ISA	9	Failure
CASC	8	Failure
VKS RF	8	Failure
Northrop	7	Failure
ISRO	6	Failure
Total	38	

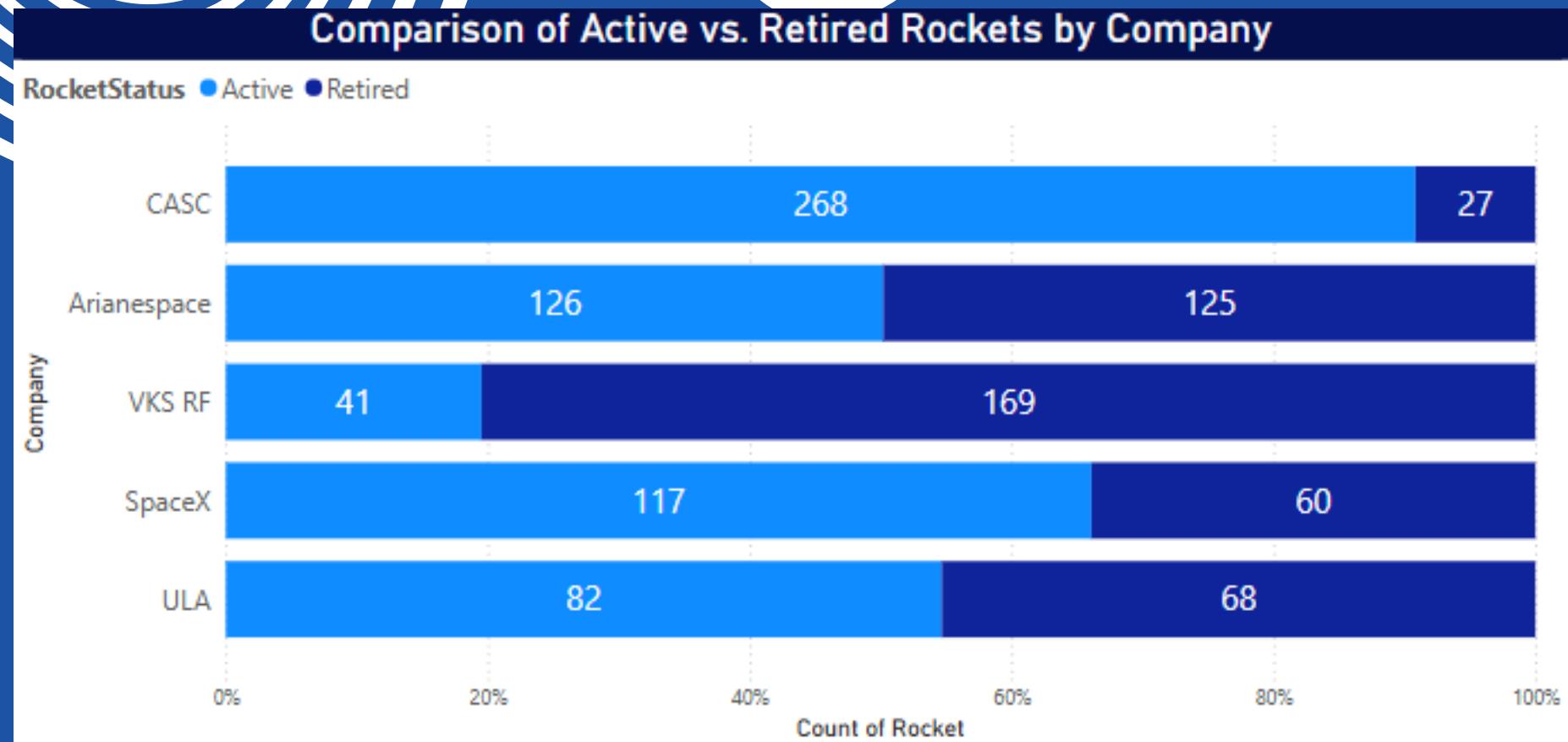
  

**TOP 5 COMPANY SUCCESSED**

Company	Count of Mission	MissionStatus
CASC	287	Success
Arianespace	246	Success
VKS RF	202	Success
SpaceX	172	Success
ULA	150	Success
Total	1057	

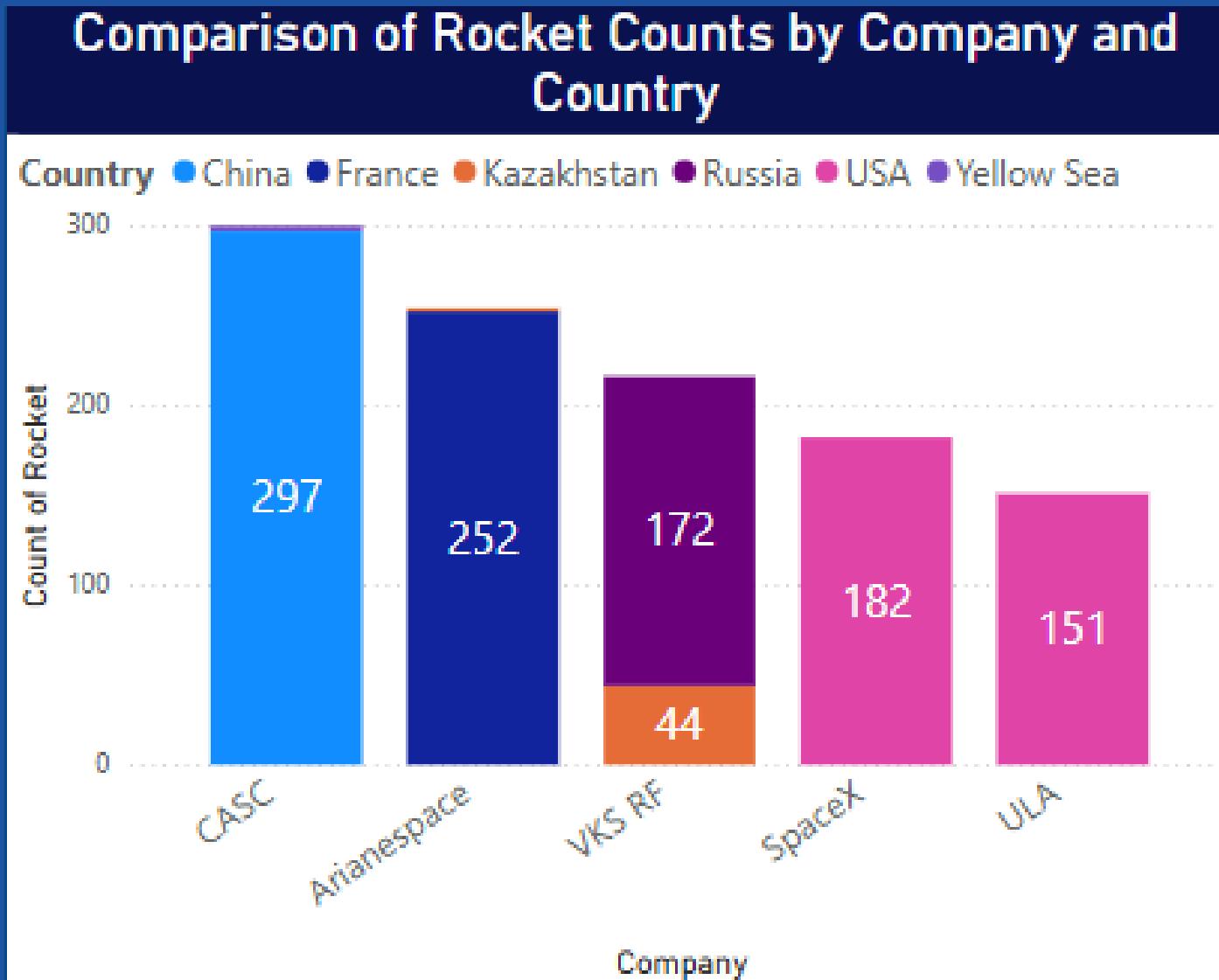


# Comparison of Active vs. Retired Rockets by Company

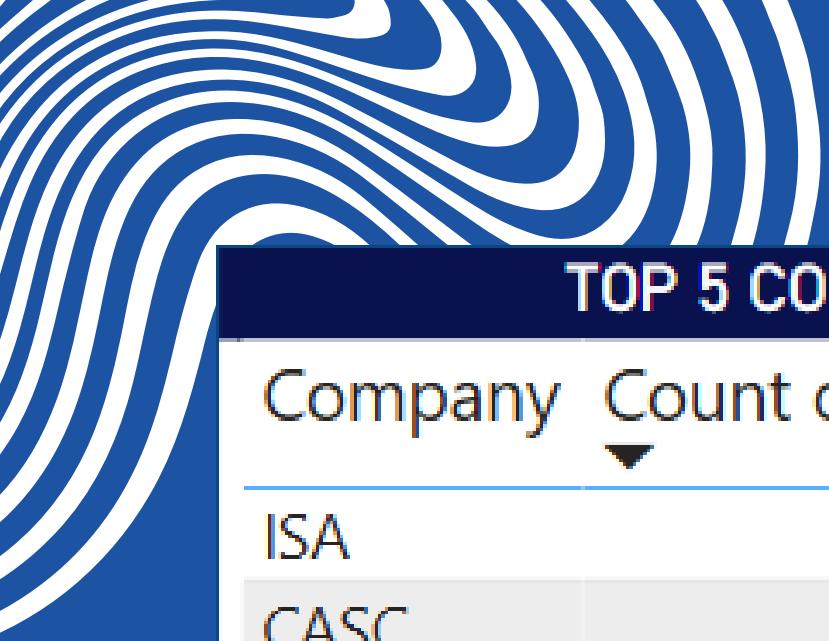


- For a company looking to rent a spaceship to launch a satellite, **CASC** (China Aerospace Science and Technology Corporation) is the best choice based on the visualization. The chart shows that **CASC** has the highest total number of rockets at 295, with 268 classified as active and only 27 retired.
- This indicates a large, operational fleet ready for use, suggesting strong launch capabilities and reliability. Compared to other companies like **SpaceX**, **Arianespace**, **ULA**, and **VKS RF**, **CASC** maintains the most extensive and actively used inventory of rockets, making it the most suitable provider for satellite deployment.

# Comparison of Active vs. Retired Rockets by Company



- This bar chart displays the total number of rockets for five major space companies. **CASC** leads with 297 rockets, all from China, emphasizing its dominant role in space launches.
- **Arianespace** follows with 252 rockets, all from France, showcasing its significant contribution to European space efforts.
- **VKS RF** has 172 rockets, with 44 linked to Kazakhstan, highlighting historical or collaborative ties.
- **SpaceX** and **ULA**, both based in the USA, have 182 and 151 rockets respectively, all from the United States.
- Based on the total number of rockets, **CASC** emerges as the strongest option, reflecting China's central role in global space launch capabilities.



# Comparison of Mission Success and Failure Rates by Company

TOP 5 COMPANY FAILURES		
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Northrop	7	Failure
ISRO	6	Failure
<b>Total</b>	<b>38</b>	

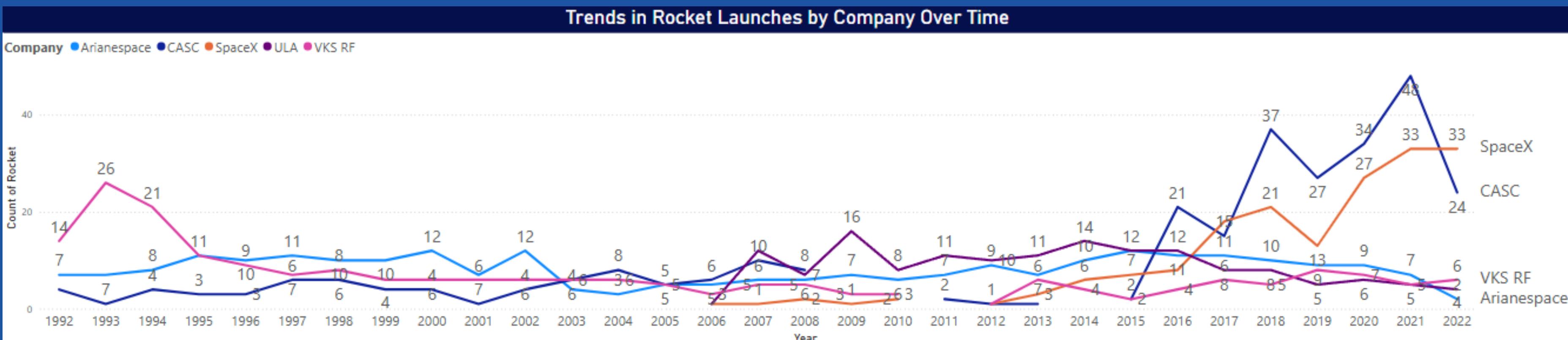
  

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- The analysis of mission success and failure rates across the top five space companies that reveals that **Arianespace** is the most reliable option, with a perfect track record of 246 successful launches and no recorded failures.
- **CASC** also stands out for its high overall activity, with 287 successful launches and only 8 failures, making it a strong contender. While other companies like **VKS RF** and **Northrop** have had some mission failures, they still lead in successful missions.
- Based on the data, **Arianespace** emerges as the most dependable choice, while **CASC** remains a top performer due to its high mission volume and success.

# Comparison of Mission Success and Failure Rates by Company

- Based on the visualization, while CASC matched SpaceX's 48 launches in 2021, SpaceX remains the optimal partner for satellite launches due to its sustained growth (peaking at 48 after scaling from 1 launch in 2006), global infrastructure (multi-site operations), and cost-efficient reusable rocket technology a cornerstone of its business model. Reusable first-stage boosters (e.g., Falcon 9) reduce per-launch costs by ~30% compared to disposable rockets, as detailed on SpaceX's website ([spacex.com/vehicles/falcon-9](https://spacex.com/vehicles/falcon-9)), enabling long-term affordability and scalability.
- Despite CASC's regional strength, SpaceX's technological leadership, predictable scheduling, and future-proof systems (e.g., Starship) solidify its edge for companies prioritizing reliability and cost-effectiveness.



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# Recommendations and Actionable Insights



# Recommendations



## 1. Prioritize Partners with High Success Rates

- **Recommendation:** Companies should prioritize Arianespace for high-stakes missions due to its perfect track record of 246 successful launches and zero failures. This makes Arianespace the most reliable partner for critical satellite launches.
- **Actionable Insight:** For satellite missions with significant risk or valuable payloads, Arianespace's dependability ensures higher chances of success, minimizing the risk of costly failures.

## 2. Focus on Cost Efficiency and Scalability with SpaceX

- **Recommendation:** SpaceX should be considered a primary partner for companies focused on cost-effective, large-scale missions. SpaceX has proven technological leadership and cost-efficient practices, especially with its reusable Falcon 9 rocket technology, which cuts down on launch costs by ~30%.
- **Actionable Insight:** For long-term satellite launch strategies, SpaceX's reusable rocket technology provides a sustainable, cost-effective solution, making it the best choice for frequent launches and companies prioritizing affordability.

### 3. Leverage CASC's Large Fleet for High Availability

- **Recommendation:** For businesses that require a partner with a large and operational rocket fleet, CASC (China Aerospace Science and Technology Corporation) is the ideal choice. With 268 active rockets and a total of 297 rockets, CASC ensures high availability and reliability for satellite launches.
- **Actionable Insight:** Companies needing quick deployment or a diverse range of options should partner with CASC for its extensive fleet, ensuring timely access to rockets and minimizing wait times.

### 4. Consider Regional Strengths for Specific Mission Needs

- **Recommendation:** For companies targeting specific regions or markets, CASC offers strong regional presence and operational flexibility, especially in Asia, while VKS RF and Northrop can be considered for specific geographical or mission-focused needs.
- **Actionable Insight:** For satellite launches in specific regions (e.g., China or Russia), it is essential to leverage companies like CASC, VKS RF, or Northrop, who have strong local knowledge and infrastructure.

# Actionable Insights



## **1. Mission Success and Failure Trends**

Based on mission success rates, businesses should make data-driven decisions when selecting a rocket partner. Companies with consistent success rates like Arianespace should be preferred for critical missions, while others like SpaceX and CASC offer robust performance and scalability for frequent, less critical missions.

## **2. Long-Term Affordability and Technological Leadership**

SpaceX's reusable rocket technology not only enhances cost-efficiency but also positions the company as a leader in technological innovation. Companies looking for a partner who can scale operations efficiently and reduce costs should lean towards SpaceX for future-proof operations.

## **3. Fleet Size and Operational Capability**

- The number of rockets a company has is important for businesses that need to launch satellites frequently or in a short period of time. CASC stands out because it has a large fleet 268 active rockets which means it can handle a high volume of launches.
- This makes CASC an excellent choice for companies looking for consistent, high-frequency launches, especially if they need to deploy multiple satellites quickly. Therefore, if a business prioritizes having frequent launches over the complexity or risk of individual missions, CASC is a strong option.

# Thank You

Wanna discuss it together?  
You can contact me whenever you want.



<https://www.linkedin.com/in/naufal-dzakia-raiffaza/>



<https://github.com/raiffaza>

