

In an increasingly urbanized world grappling with the aftermath of a global pandemic and major geopolitical conflicts, our global food systems face unprecedented challenges. The State of Food Security and Nutrition in the World 2023, launched on 12 July 2023, provides a comprehensive overview of these complexities. This report captures the state of global hunger, malnutrition, and the rapidly changing dynamics of food security. Urbanization, once thought to blur the lines between rural and urban food accessibility, is now drastically reshaping food systems and affecting the availability and affordability of healthy diets.

<https://data.unicef.org/resources/sofi-2023/>



The Mosaic Company, a Microsoft agriculture customer, is a Fortune 500 company based in Tampa, Florida which mines phosphate, potash, and collects urea for fertilizer, through various international distribution networks. It is the largest U.S. producer of potash and phosphate fertilizer. Without fertilizers, the world's crop yields would be cut in half, and farmers around the world look to Mosaic to help keep their soils healthy, to nourish their crops and to maximize their yields.

With the responsibility to maintain food production and enhancement of food security across the world, the Mosaic company is faced with an unprecedented opportunity during the current high inflationary times. However, Mosaic's DAP pricing models are unable to predict prices during COVID-19, Supply chain disruptions due to war in Ukraine, and inflationary market trends ensured thereafter.



# Diammonium phosphate (DAP) – Demand

Diammonium phosphate (DAP) is the world's most widely used phosphorus fertilizer. It's made from two common constituents in the fertilizer industry, and its relatively high nutrient content and excellent physical properties make it a popular choice in farming and other industries.

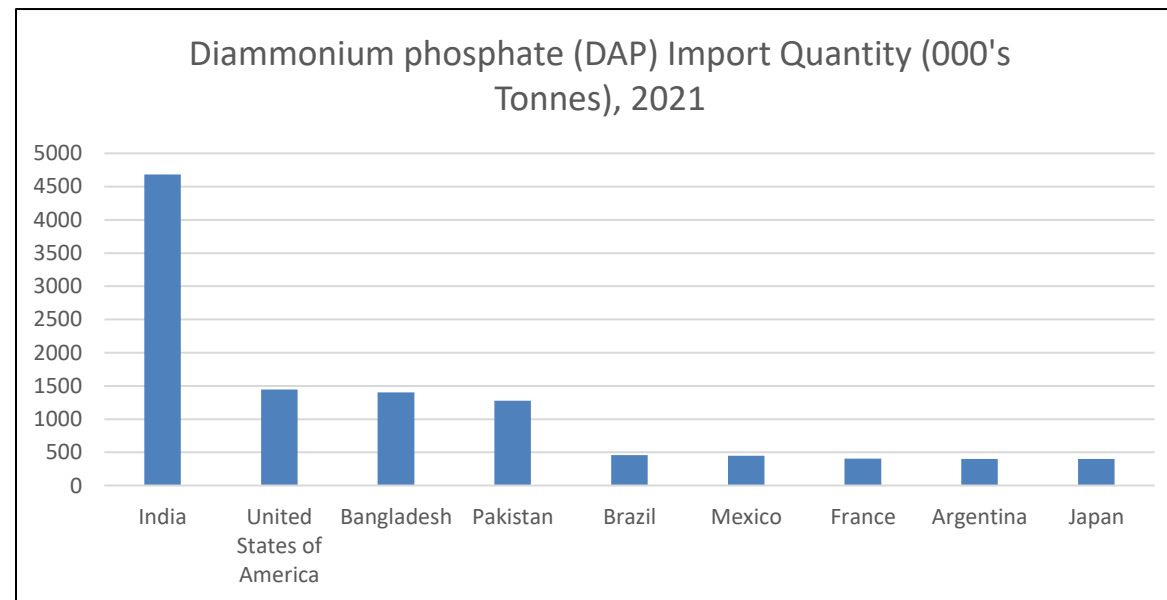
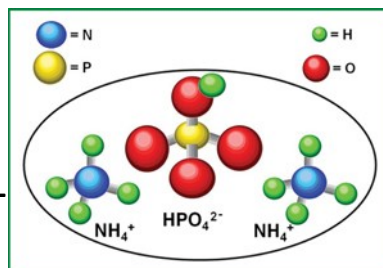
Ammonium phosphate fertilizers first became available in the 1960s, and DAP rapidly became the most popular in this class of products. It's formulated in a controlled reaction of phosphoric acid with ammonia, where the hot slurry is then cooled, granulated and sieved. DAP handles and stores well. The standard nutrient grade of DAP is relatively high, at 18-46-0, so fertilizer products with lower nutrient content may not be labeled DAP.

Chemical formula:  $(\text{NH}_4)_2\text{HPO}_4$

Composition: 18% N, 46%  $\text{P}_2\text{O}_5$  (20% P)

Water solubility (20 degrees C): 588 g/L

Solution pH: 7.5 to 8

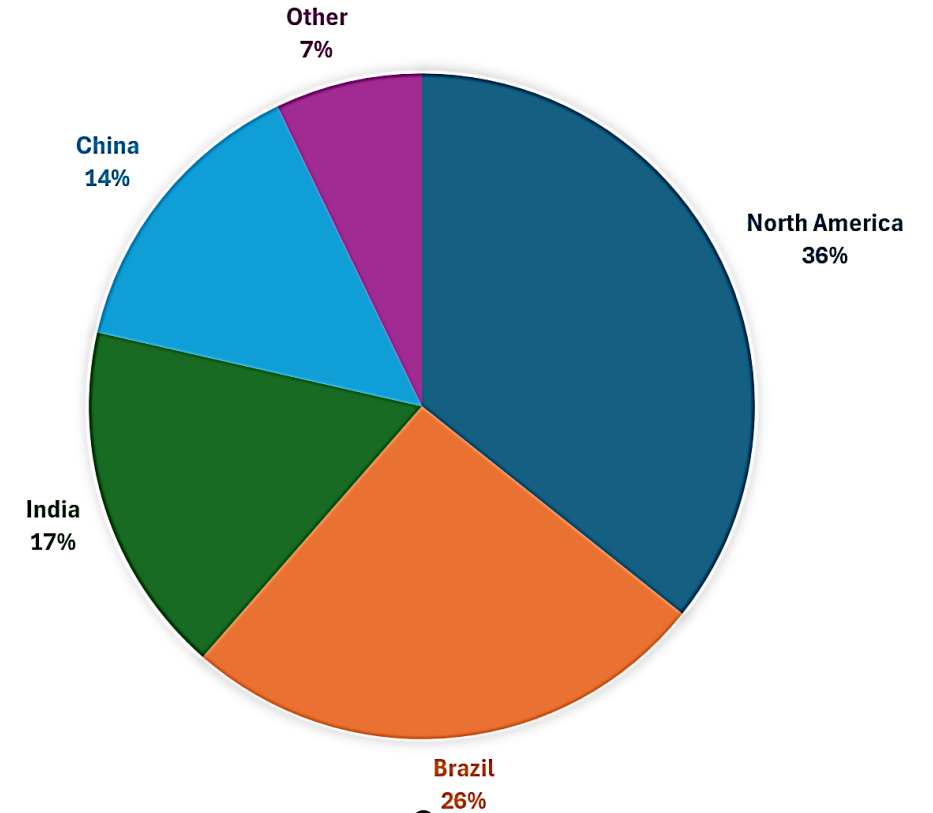


DAP fertilizer is an excellent source of P and nitrogen (N) for plant nutrition. It's highly soluble and thus dissolves quickly in soil to release plant-available phosphate and ammonium. A notable property of DAP is the alkaline pH that develops around the dissolving granule.

The Mosaic Company is one of the world's leading producers and marketers of concentrated phosphate and potash crop nutrients. The company operates in four segments: Phosphates, Potash, Mosaic Fertilizantes, and Corporate and Other. The company serves customers in approximately 40 countries.

This document provides a revenue forecast for The Mosaic Company in 2022, based on the company's financial reports, market trends, and industry outlook. The document focuses on the revenue numbers from the major markets of the company, namely North America, Brazil, India, and China.

REVENUE (IN MILLION USD)



Market	Revenue (in million USD)	Growth Rate (in %)
North America	2,500	10
Brazil	1,800	15
India	1,200	20
China	1,000	5
Other	500	10
Total	7,000	12

The Mosaic Company also faces several threats and challenges that could adversely affect its business and financial results. Some of the key threats are:

- **The volatility and uncertainty of the global fertilizer market, which is influenced by factors such as supply and demand dynamics, weather conditions, crop prices, trade policies, currency fluctuations, and geopolitical events.**
- The competition from other fertilizer producers, especially those with lower costs, higher capacities, or greater market access.
- **The regulatory and legal risks, which include the compliance with environmental, health, safety, and tax laws and regulations, the resolution of litigation and arbitration matters, and the potential for changes in trade agreements or tariffs.**
- The operational and financial risks, which include the availability and cost of raw materials, energy, and transportation, the reliability and performance of the company's assets, the maintenance of adequate liquidity and capital resources, and the management of debt obligations and pension liabilities.



The Mosaic Company is a leading producer and marketer of phosphate and potash fertilizers, serving customers in more than 40 countries. The company is committed to sustainability, which it defines as "the ability to meet the needs of the present while improving the ability of future generations to meet their own needs". The company's sustainability strategy is aligned with the **United Nations Sustainable Development Goals (SDGs)** and focuses on three pillars: environmental stewardship, social responsibility and governance excellence.

## **Environmental Stewardship**

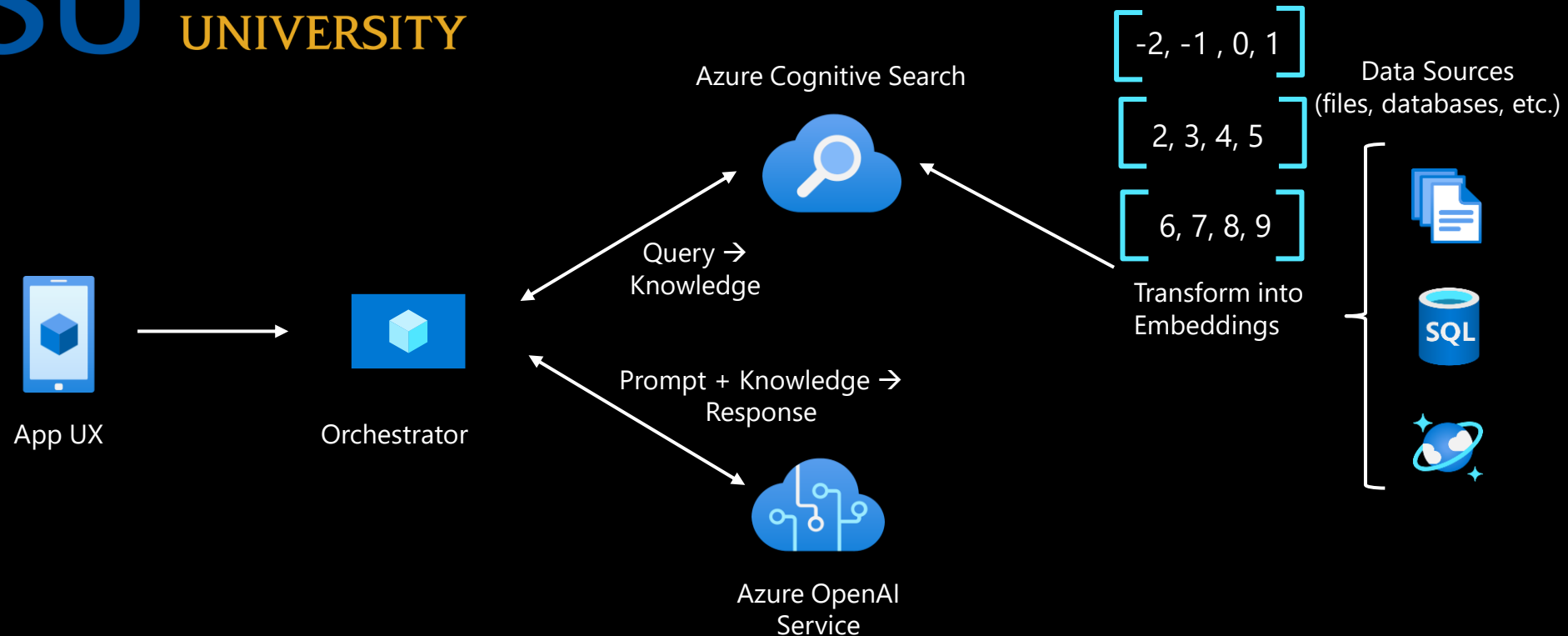
The Mosaic Company aims to minimize its environmental impact and enhance its resource efficiency throughout its operations. Some of the company's environmental goals and achievements for 2022 are:

- Reducing greenhouse gas (GHG) emissions intensity by 20% from the 2015 baseline.
- Reducing freshwater use intensity by 10% from the 2015 baseline.
- Increasing the use of renewable energy sources to 25% of the total energy consumption.
- Implementing the 4R Nutrient Stewardship framework to optimize fertilizer application and reduce nutrient losses.
- Restoring and conserving biodiversity and ecosystem services in the areas where the company operates.

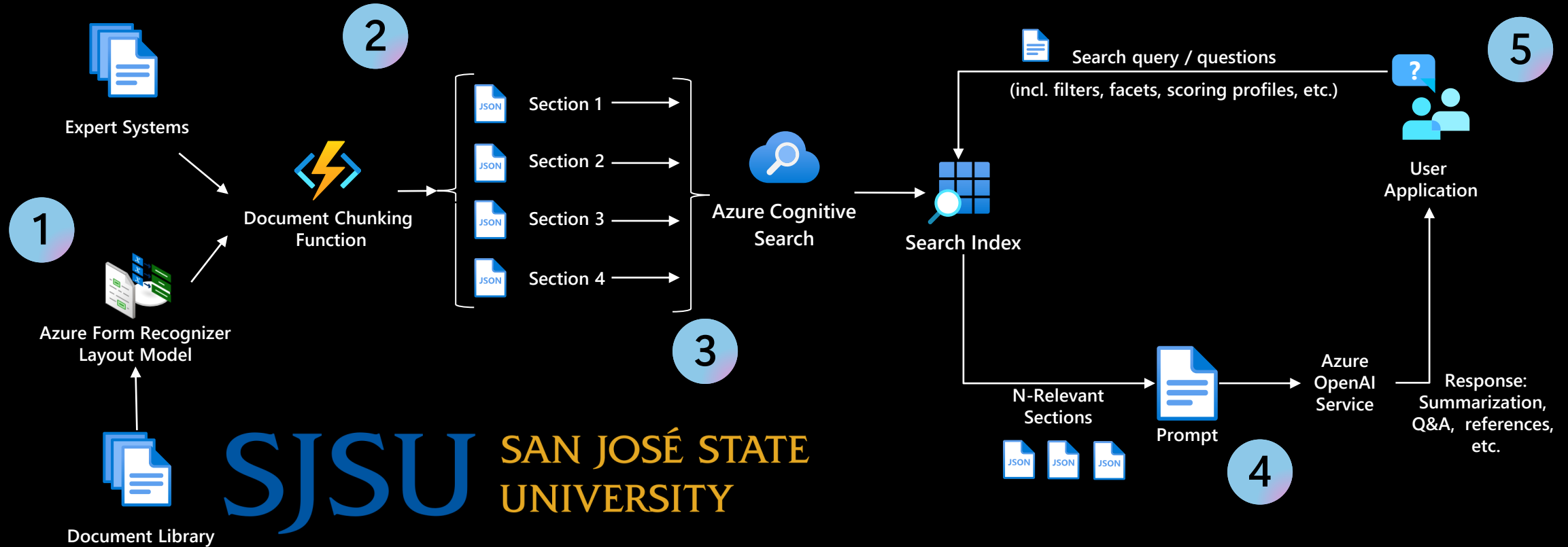
The Mosaic Company is a leader in sustainability, delivering value to its customers, shareholders, employees, communities and the environment. The company's sustainability measures for 2022 reflect its vision of helping the world grow the food it needs while protecting and restoring the planet.

# Retrieval Augmented Generation

Grounding for intelligent applications



# Anatomy of RAG Components



## 1. Data Ingestion

Different data formats and system of records

## 2. Chunking

What is the best chunking strategy suits?

## 3. Indexing

Shall I use Vectors, Semantic or traditional approach?

## 4. Prompting

Tools, techniques and strategies of prompting

## 5. User Interface

How to surface data?



### Prompts

- List major Food insecurity reason in 2023
- Explain malnutrition in war zones
- Explain increase prices impact on food security
- List major Mosaic Influencers in 2023
- Compare Food Security issues in Mosaic and Food Security Document

Economic and Social Sustainability of Marginalized and Highly Vulnerable communities

List major Food insecurity reason in 2023 from within the context of State of Food Security and Nutrition in the World 2023 report.

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Explain malnutrition in war zones from within the context of State of Food Security and Nutrition in the World 2023

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Type a new question (e.g. does my plan cover annual eye exams?)

Producer Price Index by Commodity: Chemicals and Allied Products: Phosphoric Acid, 52-54 Percent APA, Superphosphates and Other Phosphate Fertilizer Materials (WPU0652026A)



Compare to generate Food Security analysis (Market Research and State of Food Security)

	Mosaic	Food Security
Food Security Measures		
Climate Change		
Wars and Political Uncertainties		



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