



AGRICULTURE (INDIA)

DATA ANALYSIS

Low Level Design

Abstract

This project explores India's agricultural growth over five decades, focusing on key metrics such as fertilizer consumption, agricultural productivity, livestock production, and food production. The analysis highlights significant trends and growth patterns, identifying periods of rapid development and subsequent slowdowns.

By leveraging Power BI, the project creates interactive dashboards that visualize historical insights and annual growth rates, offering a comprehensive understanding of India's agricultural progress. These insights are designed to assist policymakers and stakeholders in addressing challenges related to productivity, sustainability, and resource allocation in the agricultural sector.

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1 Introduction

- **Purpose:** The dashboard provides insights into India's agricultural performance between 1961 and 2022, focusing on fertilizer consumption, food production, livestock production, and agricultural value added per worker. By visualizing these trends, stakeholders can:
 - Identify long-term patterns.
 - Understand annual growth rates.
 - Aid policy formulation for agricultural development.
- **Scope:** The dashboard is intended for policymakers, agricultural economists, and analysts. It covers:
 - Historical trends and annual growth rates.
 - Yearly KPIs using cards for instant metrics display.
 - Year-over-year growth using matrix tables.

2 General Description

- **Problem Statement:**

The growth patterns of four key agricultural parameters in India: fertilizer consumption, agricultural value added per worker, livestock production, and food production. The goal is to calculate and visualize two key metrics: **average annual growth rate** and **year-over-year growth** for each parameter. The project seeks to create an interactive Power BI dashboard that presents these growth patterns, highlighting both long-term trends and annual variations. The insights will help stakeholders understand how these metrics have evolved over time, providing valuable information for decision-making and policy development in the agricultural sector.

- **Tools Used:**

- **Power BI:** Visualization and reporting.
- **SQL/Excel:** Data pre-processing and storage.

3 Low-Level Design Details

3.1 Data Sources

- **Details:**
 - **Dataset downloaded from the url:**
<https://api.worldbank.org/v2/en/country/IND?downloadformat=csv>
 - **Agricultural Productivity:**
 - Agriculture, forestry, and fishing, value added per worker (constant 2015 US\$) - (1991-2022)
 - **Fertilizer Usage:**
 - Fertilizer consumption (kilograms per hectare of arable land) - (1961-2022)
 - **Indices** (Base Year: 2014-2016 = 100):
 - Food Production Index
 - Livestock Production Index
- **Connection Method:**
 - Power BI Import Mode for faster report refresh.

[illegible]

Data transpose from columns to rows to make required Indicator Names as Column Names and New Column Year

	A	B	C	D	E
1	Year	Agriculture, forestry, and fishing, value added per worker (constant 2015 US\$)- NV.AGR.EMPL.KD	Fertilizer consumption (kilograms per hectare of arable land)- AG.CON.FERT.ZS	Food production index (2014-2016 = 100)- AG.PRD.FOOD.XD	Livestock production index (2014-2016 = 100)- AG.PRD.LVSK.XD
32	1991	946.21	78	49.3	36.37
33	1992	988.66	74.7	51.15	37.31
34	1993	1001.12	76.18	52.45	38.04
35	1994	1027.72	83.46	54.15	39.48
36	1995	993.96	85.7	55.49	41.68
37	1996	1065.59	89.04	57.47	43.22
38	1997	1012.6	100.17	59.21	44.56
39	1998	1052.63	104.07	60.23	46.33
40	1999	1060.14	112.17	63.12	48.46
41	2000	1037.05	103.79	62.7	49.8
42	2001	1106.97	108.18	64.69	51.86
43	2002	1041.36	100.33	59.89	53.02
44	2003	1150.53	105.18	65.77	54.25
45	2004	1169.82	115.27	64.81	56.82
46	2005	1244.32	127.61	68.2	59.27
47	2006	1258.84	136.4	71.67	62.06
48	2007	1309.21	142.84	77.75	66.15
49	2008	1283.66	153.35	79.25	68.38

Now save this file to import into Power Bi.

3.3 Data Transformation

- Clean data using **Power Query**:
 - Handle missing years (exclusion).
 - Normalize data to align with indices (e.g., percentage scale).

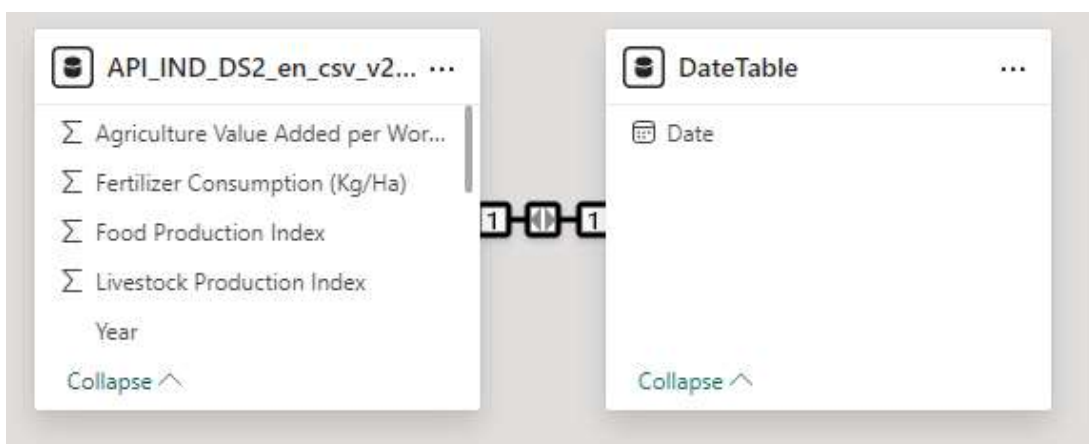
	Year	1.2 Agriculture Value Added per Worker	1.2 Fertilizer Consumption (Kg/Ha)	1.2 Food Production Index	1.2 Livestock Production Index
	Valid 100% Error 0% Empty 0%	Valid 52% Error 0% Empty 48%	Valid 98% Error 0% Empty 2%	Valid 100% Error 0% Empty 0%	Valid 100% Error 0% Empty 0%
1	01-01-1961	null	2.17	22.43	15.87
2	01-01-1962	null	2.89	22.13	15.97
3	01-01-1963	null	3.45	22.62	16.02
4	01-01-1964	null	4.9	23.16	15.99
5	01-01-1965	null	4.96	22.11	16.05
6	01-01-1966	null	6.94	21.99	16.24

3.4 Data Modelling

- **Fact Table:**
 - Columns: Year, Fertilizer, Value Added, Food Index, Livestock Index.

Year	Agriculture Value Added per Worker	Fertilizer Consumption (Kg/Ha)	Food Production Index	Livestock Production Index
1994	\$1,028	83.5	54	39
1995	\$994	85.7	55	42
1996	\$1,066	89.0	57	43
1997	\$1,013	100.2	59	45
1998	\$1,053	104.1	60	46
1999	\$1,060	112.2	63	48
2000	\$1,037	103.8	63	50
2001	\$1,107	108.2	65	52
2002	\$1,041	100.3	60	53

- **Dimension Table:**
 - Time Dimension: DataTable
- **Relationships:**
 - One-to-one (Year is the primary key).



3.5 DAX Calculations for New Measures

3.4.1. Creation of Date Table for reference:

DateTable =

```
CALENDAR(
    MIN(API_IND_DS2_en_csv_v2_846[Year]), MAX(API_IND_DS2_en_csv_v2_846[Year])
)
```

3.4.2. Year over Year Agricultural Value Added per Worker Growth % Calculation:

YoY_AVAPW =

```
IF(
    ISBLANK(
        SUM(API_IND_DS2_en_csv_v2_846[Agriculture Value Added per Worker])
    ),
    "Data N.A.",
    DIVIDE(
        SUM(API_IND_DS2_en_csv_v2_846[Agriculture Value Added per Worker]) -
        CALCULATE(
            SUM(API_IND_DS2_en_csv_v2_846[Agriculture Value Added per
Worker]),
            PREVIOUSYEAR(API_IND_DS2_en_csv_v2_846[Year])
        ),
        CALCULATE(
            SUM(API_IND_DS2_en_csv_v2_846[Agriculture Value Added per
Worker]),
            PREVIOUSYEAR(API_IND_DS2_en_csv_v2_846[Year])
        ),
        0
    )
)
```

)

)

3.4.3. Year over Year Fertilizer Consumption (Kg/Ha) Growth % Calculation:

```
YoY_FPI =
DIVIDE(
    SUM(API_IND_DS2_en_csv_v2_846 [Fertilizer Consumption (Kg/Ha)]) -
    CALCULATE(
        SUM(API_IND_DS2_en_csv_v2_846 [Fertilizer Consumption (Kg/Ha)]),
        PREVIOUSYEAR(API_IND_DS2_en_csv_v2_846[Year])
    ),
    CALCULATE(
        SUM(API_IND_DS2_en_csv_v2_846 [Fertilizer Consumption (Kg/Ha)]),
        PREVIOUSYEAR(API_IND_DS2_en_csv_v2_846[Year])
    ),
    0
)
```

3.4.4. Year over Year Food Production Index Growth % Calculation:

```
YoY_FPI =
DIVIDE(
    SUM(API_IND_DS2_en_csv_v2_846[Food Production Index]) -
    CALCULATE(
        SUM(API_IND_DS2_en_csv_v2_846[Food Production Index]),
        PREVIOUSYEAR(API_IND_DS2_en_csv_v2_846[Year])
    )
)
```

```

    ),
    CALCULATE(
        SUM(API_IND_DS2_en_csv_v2_846[Food Production Index]),
        PREVIOUSYEAR(API_IND_DS2_en_csv_v2_846[Year])
    ),
    0
)

```

3.4.5. Year over Year Livestock Production Index Growth % Calculation:

YoY_LPI =

```

DIVIDE(
    SUM(API_IND_DS2_en_csv_v2_846[Livestock Production Index]) -
    CALCULATE(
        SUM(API_IND_DS2_en_csv_v2_846[Livestock Production Index]),
        PREVIOUSYEAR(API_IND_DS2_en_csv_v2_846[Year])
    ),
    CALCULATE(
        SUM(API_IND_DS2_en_csv_v2_846[Livestock Production Index]),
        PREVIOUSYEAR(API_IND_DS2_en_csv_v2_846[Year])
    ),
    0
)

```

3.4.6. Annual Average Growth Rate Agricultural Value Added per Worker Growth %

Calculation:

```

AAGR (AVAPW) =
AVERAGEX(
    KEEPFILTERS(VALUE('API_IND_DS2_en_csv_v2_846'[Year])),
    CALCULATE([YoY_AVAPW])
) + 0

```

3.4.7. Annual Average Growth Rate Fertilizer Consumption (Kg/Ha) Growth %

Calculation:

```

AAGR (FC) =
AVERAGEX(
    KEEPFILTERS(VALUE('API_IND_DS2_en_csv_v2_846'[Year])),
    CALCULATE([YoY_FC])
) + 0

```

3.4.8. Annual Average Growth Rate Food Production Index Growth % Calculation:

```

AAGR (FPI) =
AVERAGEX(
    KEEPFILTERS(VALUE('API_IND_DS2_en_csv_v2_846'[Year])),
    CALCULATE([YoY_FPI])
) + 0

```

3.4.9. Annual Average Growth Rate Livestock Production Index Growth % Calculation:

```

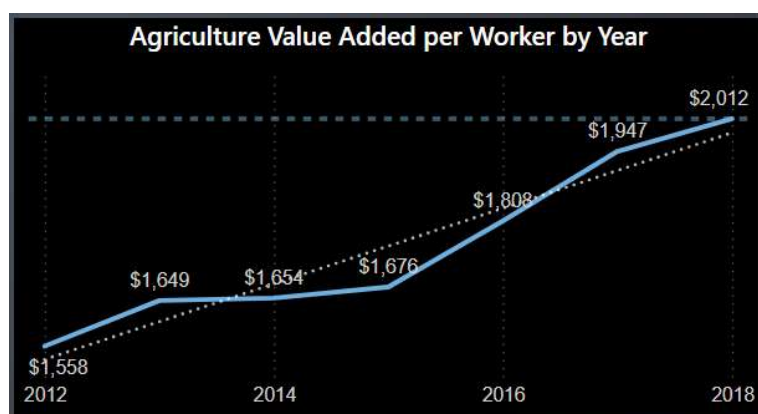
AAGR (LPI) =
AVERAGEX(
    KEEPFILTERS(VALUE('API_IND_DS2_en_csv_v2_846'[Year])),
    CALCULATE([YoY_LPI])
) + 0

```

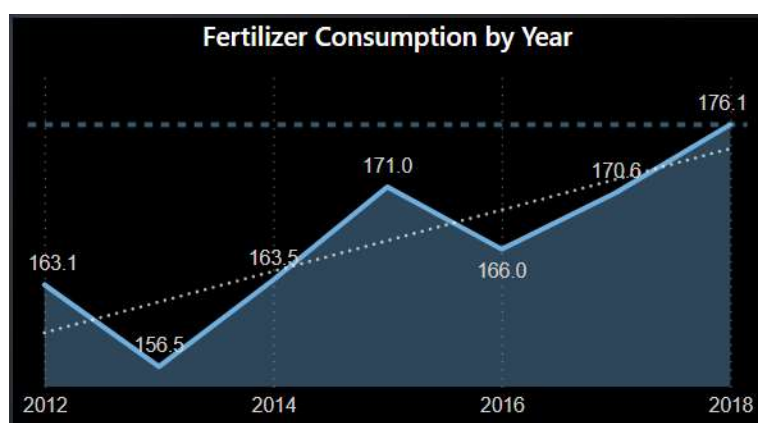
4 Visuals

4.1 Line Graphs:

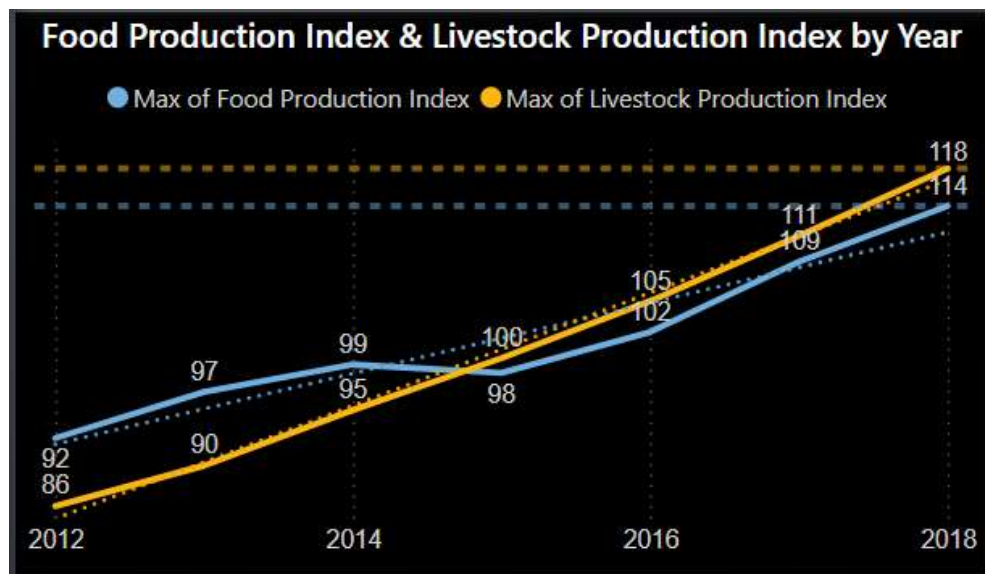
4.1.1. Trend for Agriculture Value Added per Worker



4.1.2. Trend for Fertilizer Consumption



4.1.3. Trend for Food Production Index and Livestock Production Index



4.2 Matrix:

4.2.1. Year-over-year growth percentage chart with conditional formatting.

Year-on-Year Growth Chart						
Year	YoY_AVAPW		YoY_FC		YoY_FPI	
2012	▲	4.8%	◆	-9.8%	▲	◆ 3.9%
2013	●	5.8%	▲	-4.1%	●	◆ 4.4%
2014	◆	0.3%	●	4.5%	▲	● 5.8%
2015	◆	1.3%	●	4.6%	◆	▲ 5.2%
2016	●	7.9%	▲	-2.9%	▲	● 5.4%
2017	●	7.7%	●	2.8%	●	● 5.8%
2018	▲	3.3%	●	3.2%	●	● 5.7%

4.3 Cards:

4.3.1. Display KPIs prominently.



4.4 Slicer:

4.4.1. Slider for Period selection of Year

