AGRICULTURE (INDIA) DATA ANALYSIS

Architectural 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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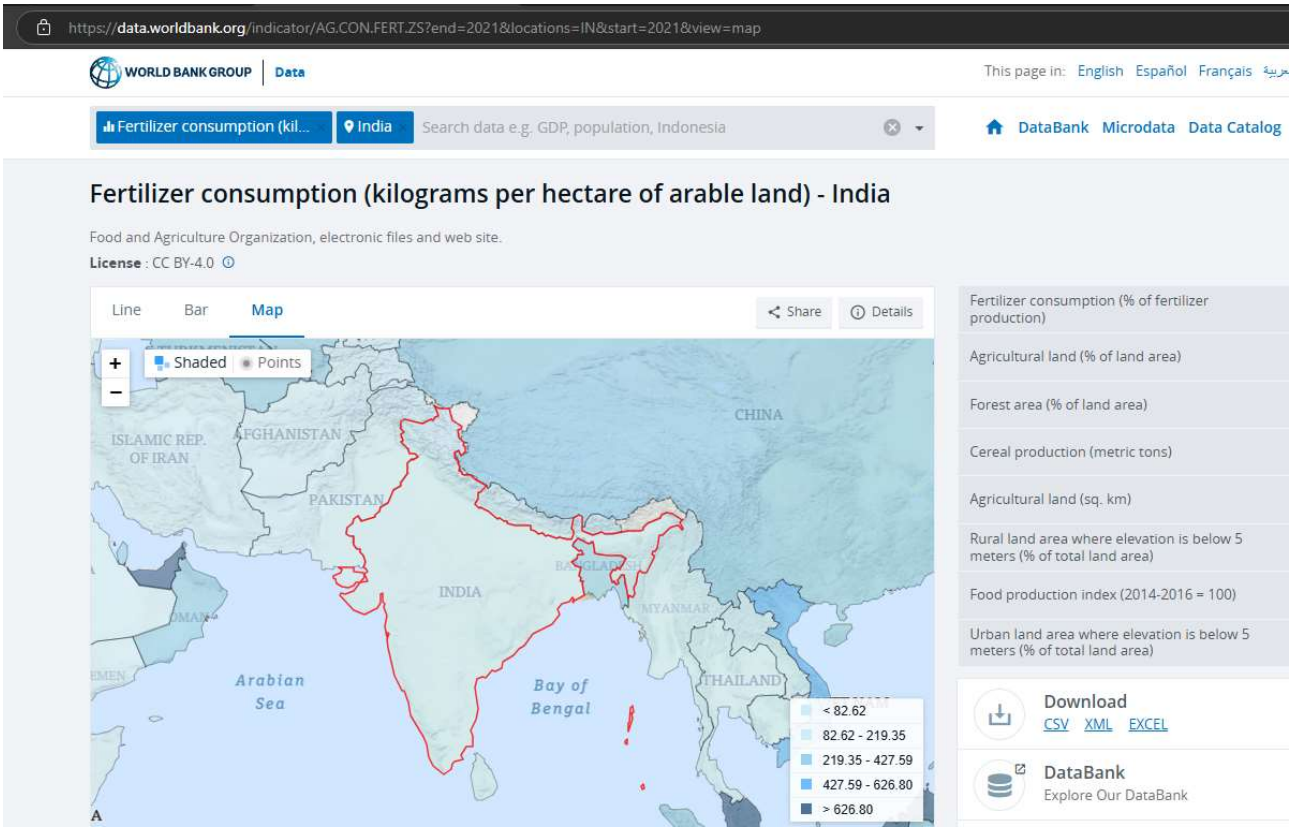
Document Version Control

Date	Version	Description	Author
26-Nov-2024	1.0	Initial version of the Arch. Design Doc	Shivam Kushwaha

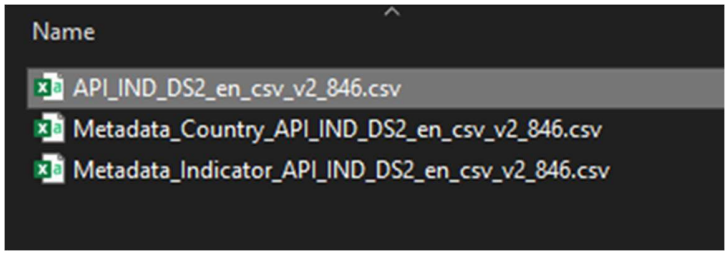
1. Architectural Design Details

1.1. Functional Architecture:

- **Data Sources**:



- Dataset: https://api.worldbank.org/v2/en/country/IND?downloadformat=csv



- Yearly indices for Food Production and Livestock production - (1961-2022)
- Agriculture, forestry, and fishing, value added per worker (constant 2015 US$) - (1991-2022)

- Fertilizer consumption (kilograms per hectare of arable land) - (1961-2022)

- **Flow**:
  - Data → Transformation (Excel & Power Query) → Modelling (Power BI) → Visualization.
  - Downloaded data from CSV file.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Data Source	World Development Indicators													
2															
3	Last Updated I	13-11-2024													
4															
5	Country Name	Country Code	Indicator Name	Indicator Code	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
6	India	IND	Intentional homicides, male (per 100,00	VC.IHR.PSRC.MA.P5											
7	India	IND	Internally displaced persons, new displa	VC.IDP.NWCV											
8	India	IND	Voice and Accountability: Percentile Rar	VA.PER.RNK.LOWER											
9	India	IND	Travel services (% of commercial service	TX.VAL.TRVL.ZS.WT											
10	India	IND	Commercial service exports (current US$	TX.VAL.SERV.CD.WT											
11	India	IND	Merchandise exports by the reporting e	TX.VAL.MRCH.WL.CD	1313500000	1382400000	1.39E+09	1.58E+09	1.69E+09	1.65E+09	1.6E+09	1.61E+09	1.75E+09	1.83E+09	2.02E+09
12	India	IND	Merchandise exports to low- and middle	TX.VAL.MRCH.R4.ZS	3.98934145	3.949652778	4.073701	3.774662	3.753621	5.292159	4.889334	4.484864	4.377682	5.441518	6.346987
13	India	IND	Merchandise exports to low- and middle	TX.VAL.MRCH.OR.ZS	14.6402741	14.63396991	14.22916	11.79344	11.58598	12.26764	11.44804	10.75121	11.02718	12.55777	14.92508
14	India	IND	Ores and metals exports (% of merchanc	TX.VAL.MMTL.ZS.UN			6.763693	7.902005	8.726659	8.935387	10.19462	9.957807	10.7509	10.91784	11.92384
15	India	IND	Fuel exports (% of merchandise exports	TX.VAL.FUEL.ZS.UN			0.978182	1.016113	1.353887	1.193327	1.170544	0.835057	0.902341	0.777187	0.834098
16	India	IND	Export volume index (2015 = 100)	TX.QTY.MRCH.XD.WD											
17	India	IND	Transport services (% of commercial ser	TM.VAL.TRAN.ZS.WT											
18	India	IND	Merchandise imports from low- and mic	TM.VAL.MRCH.WR.ZS	2.24948875	1.739484028	2.604708	1.935378	1.878922	2.592953	1.057949	1.421836	1.447669	1.87653	1.426927
19	India	IND	Merchandise imports from low- and mic	TM.VAL.MRCH.R5.ZS	2.24948875	1.739484028	2.604708	1.935378	1.878922	2.592953	1.057949	1.421836	1.447669	1.87653	1.426927
20	India	IND	Merchandise imports from low- and mic	TM.VAL.MRCH.R1.ZS	2.82297502	1.436768626	1.557632	1.070198	1.367855	2.506401	5.403229	2.514405	2.699922	3.379739	1.041413
21	India	IND	Merchandise imports from economies ir	TM.VAL.MRCH.AL.ZS	5.2547346	4.843446437	4.543094	4.366902	3.878096	3.299794	3.441081	4.272993	5.044906	4.009187	5.889715
22	India	IND	ICT goods imports (% total goods import	TM.VAL.ICTG.ZS.UN											
23	India	IND	Import unit value index (2015 = 100)	TM.UVI.MRCH.XD.WD											
24	India	IND	Tariff rate, most favored nation, simple	TM.TAX.TCOM.SM.FN.ZS											
25	India	IND	Binding coverage, primary products (%)	TM.TAX.TCOM.BC.ZS											
26	India	IND	Tariff rate, most favored nation, simple	TM.TAX.MRCH.SM.FN.ZS											
27	India	IND	Binding coverage, all products (%)	TM.TAX.MRCH.BC.ZS											
28	India	IND	Tariff rate, most favored nation, simple	TM.TAX.MANF.SM.FN.ZS											
29	India	IND	Binding coverage, manufactured produc	TM.TAX.MANF.BC.ZS											

- Transformation into useful data.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Data Source	World Development Indicators												
2														
3	Last Updated I	13-11-2024												
4														
5	Country Na	Country Co	Indicator Name	Indicator Code	19	19	19	19	19	19	19	19	19	19
386	India	IND	Agriculture, forestry, and fishing, value a	NV.AGR.EMPL.KD										
885	India	IND	Food production index (2014-2016 = 100)	AG.PRD.FOOD.XD		22.43	22.13	22.62	23.16	22.11	21.99	23.35	24.78	25.56
1147	India	IND	Livestock production index (2014-2016 =	AG.PRD.LVSK.XD		15.87	15.97	16.02	15.99	16.05	16.24	16.53	17.28	17.59
1404	India	IND	Fertilizer consumption (kilograms per ha	AG.CON.FERT.ZS		2.171289937	2.885769	3.453991	4.901986	4.959043	6.939908	9.631994	10.99963	12.38936
1502														
1503														
1504														
1505														
1506														
1507														
1508														
1509														
1510														
1511														

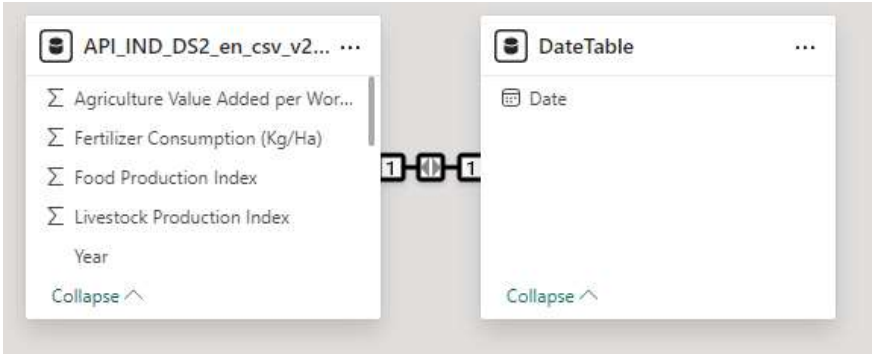
- Data transpose from columns to rows to make required Indicator Names as Column Names and New Column Year
- Data Prepared for Power Bi import.

	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

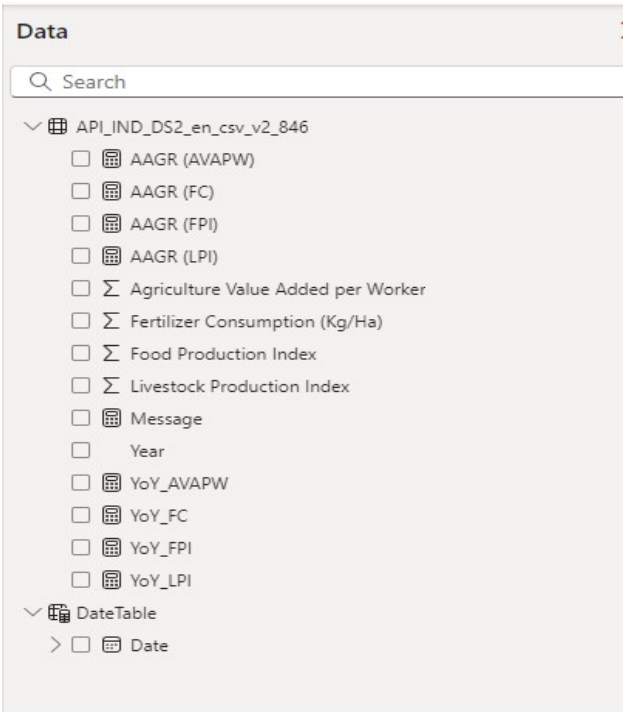
- Data imported into Power Bi, Data type corrected

	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

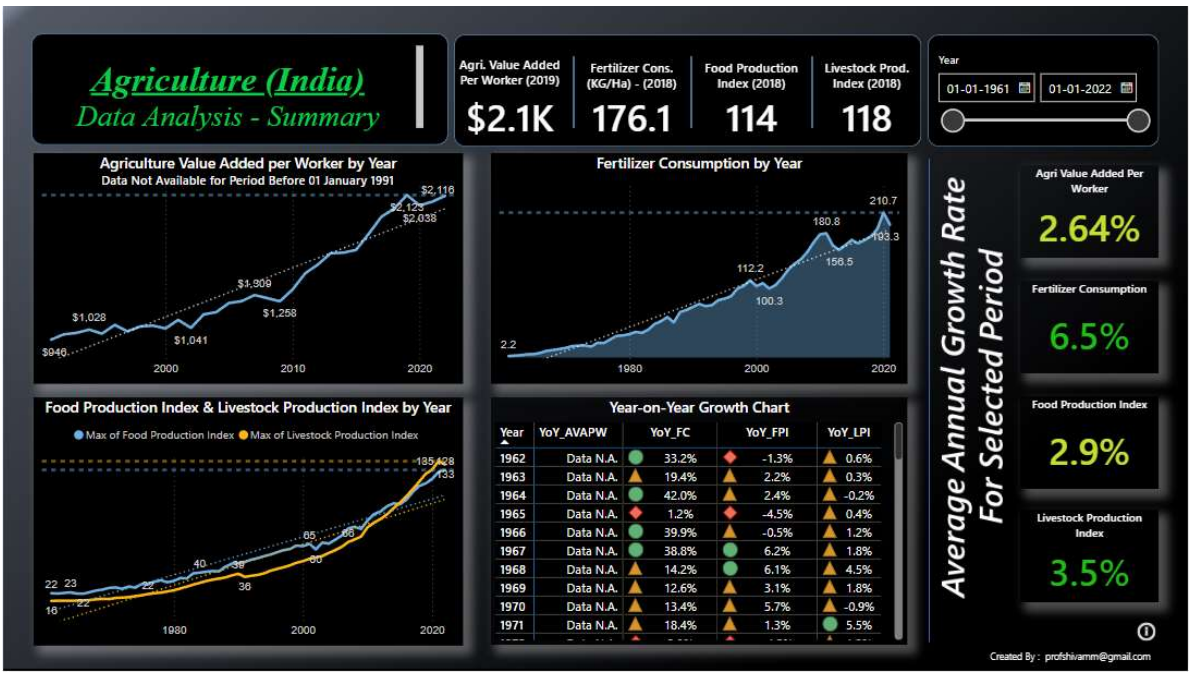
- Data Model Architecture



- Data Tables, Column and Measure Architecture



- **Outputs**:
  - KPI cards.
  - Line graphs for trends.
  - Growth matrix.
  - Time slicers for custom date range analysis.



- **Optimization Techniques**:
    - Aggregate data before visualization to minimize processing load.
    - Optimize slicers and filters to improve dashboard responsiveness.