

# ANALYSIS OF THE GDP GROWTH USING SQL



HI, MY NAME IS HARSHAL AND "I CONDUCTED GDP ANALYSIS USING SQL TO DERIVE KEY INSIGHTS AND TRENDS."



1. Data Cleaning & EDA: Ensured no null values in columns by performing exploratory data analysis and data cleaning.
2. Average Unemployment Rate (2022): Calculated the average unemployment rate across all cities for the year 2022.
3. Top 5 Cities (Patents Growth): Identified the top 5 cities with the highest growth rate in patents per million inhabitants between two specific years.
4. Unemployment Rate Comparison: Compared the average unemployment rate across all cities to the youth unemployment rate for each year.
5. R&D Expenditure Analysis: Retrieved cities with R&D expenditure above a certain threshold in a specific year (eco\_productivity).
6. ICT Sector Employment: Listed cities where the ICT sector employs more than 10% of the total workforce.
7. Sector Contribution to GDP: Determined the contribution of each sector to the total GDP for each city.
8. SME Employment Growth: Found cities with the largest increase in SME employment between two specific years.
9. R&D and GDP Correlation: Analyzed the correlation between R&D expenditure and GDP growth.
10. GDP and Unemployment Correlation: Correlated GDP growth with unemployment rates.

```
select * from eco_productivity;
```

city	Year	rd_expenditure	patents_per_million	unemployment_rate	youth_unemployment_rate	sme_employment	toursim_sector_emp	ict_sector_emp
Ahmedabad	2019	1.06	3.4	5.6	11.8	38.5	5	20.7
Ahmedabad	2020	1.93	2.1	6.6	10.4	19.5	4	6.8
Ahmedabad	2021	1.6	6.6	5.8	8.9	16.7	5	13.4
Ahmedabad	2022	1.4	6.3	6.2	10.7	33.5	8	22.6
Ahmedabad	2023	0.73	2.9	7.8	10.5	29.4	7	23.9
Ahmedabad	2024	0.73	5.1	5.5	9.4	36	9	14.3
Bengaluru	2019	0.59	6	7.8	8.5	18.5	9	17.3
Bengaluru	2020	1.8	4.6	7.6	10.7	34.9	6	8.3
Bengaluru	2021	1.4	4.4	4.8	10.1	20	6	24.8
Bengaluru	2022	1.56	2.8	4.3	11.1	19.1	6	9.6

```
select * from sector_income;
```

city	year	gdp_billion	agriculture	industry	services	technology
Ahmedabad	2019	187.2	15.7	32.1	40.9	20.6
Ahmedabad	2020	211.5	11.6	37.8	49.3	19.6
Ahmedabad	2021	247.9	12.9	31.4	48.5	11.8
Ahmedabad	2022	71.8	5.3	36.7	45.6	31.8
Ahmedabad	2023	294.7	17	29.2	45.6	13
Bengaluru	2019	210	7.2	38.9	40.4	20.4
Bengaluru	2020	116.1	16.6	29.1	41.4	10.5
Bengaluru	2021	204.4	14.2	32.3	48.9	27
Bengaluru	2022	139.9	11.6	34	31.2	26.7
Bengaluru	2023	217.7	8.2	22.6	36.3	19.1

# 1. Calculate the Average Unemployment Rate Across All Cities for a Year 2022

```
select city, `year`, avg(unemployment_rate) as avg_unemployment_rate  
from eco_productivity  
where `year` = 2023  
group by city, `year`;
```

city	year	avg_unemployment_rate
Ahmedabad	2023	7.8
Bengaluru	2023	4.4
Mumbai	2023	7.4
Hyderabad	2023	6.5
Chennai	2023	7
Kolkata	2023	5.4
Delhi	2023	4.4
Pune	2023	5.6
Surat	2023	7.8
Jaipur	2023	6.7



## 2. Identify the Top 5 Cities with the Highest Patents per Million Inhabitants Growth Rate Between Two Specific Years

```
select city,
Round((max(patents_per_million) - min(patents_per_million)) / min(patents_per_million) * 100,2)
as patents_growth_rate
from eco_productivity
where `year` in (2019,2024)
group by city
order by patents_growth_rate desc
limit 5;
```

city	patents_growth_rate
Faridabad	283.33
Ranchi	147.37
Srinagar	134.48
Meerut	126.32
Aurangabad	105.88

### 3. Compare the Average Unemployment Rate Across All Cities to the Youth Unemployment Rate for Each Year.

```
select `year`,  
round(avg(unemployment_rate),2) as avg_unemployment_rate,  
round(avg(youth_unemployment_rate),2) as avg_youth_unemployment_rate  
from eco_productivity  
group by `year`;
```

year	avg_unemployment_rate	avg_youth_unemployment_rate
2019	6.39	9.89
2020	6.42	10.06
2021	5.89	9.79
2022	6.33	10.02
2023	5.82	9.27
2024	6.1	9.86

#### 4. Retrieve Cities with R&D Expenditure Above a Certain Threshold in a Specific Year

`eco\_productivity`.

```
select * from eco_productivity;
```

```
select city, rd_expenditure
```

```
from eco_productivity
```

```
where rd_expenditure > 1.05 and year = 2023;
```

city	rd_expenditure
Chennai	1.39
Kolkata	1.95
Surat	1.91
Kanpur	1.66
Nagpur	1.66
Bhopal	1.83
Patna	1.66
Ludhiana	1.12
Agra	1.89
Nashik	1.84

## 5. List Cities Where the ICT Sector Employs More Than 10% of the Total Workforce

```
SELECT
    city,
    (ict_sector_emp) / (ict_sector_emp + sme_employment + toursim_sector_emp) * 100 AS ict_sector_employment
FROM
    eco_productivity
WHERE
    (ict_sector_emp) / (ict_sector_emp + sme_employment + toursim_sector_emp) * 100 > 10;
```

-- 4. Calculate the Compound Annual Growth Rate (CAGR) of GDP for Each City

```
select city,
(pow(max(gdp_billion) / min(gdp_billion),1.0 / (max(`Year`) - min(`Year`))) -1) * 100 as cagr
from sector_income
group by city;
```

city	cagr
Ahmedabad	42.335726667097106
Bengaluru	17.01904576572424
Mumbai	34.56299518920345
Delhi	21.33216705380132
Hyderabad	11.60264750788642
Kolkata	8.511456174800426
Chennai	31.8326929636606
Pune	22.22003220154143
Jaipur	45.28277149510534
Lucknow	26.233472367995248

## 6. Determine the Contribution of Each Sector to the Total GDP for Each City

```

SELECT
    city,
    `year`,
    ROUND(SUM(agriculture) / SUM(gdp_billion) * 100,
          3) AS agriculture_percentage,
    ROUND(SUM(industry) / SUM(gdp_billion) * 100,
          3) AS industry_percentage,
    ROUND(SUM(services) / SUM(gdp_billion) * 100,
          3) AS services_percentage,
    ROUND(SUM(technology) / SUM(gdp_billion) * 100,
          3) AS technology_percentage
FROM
    sector_income
GROUP BY city , `year`
LIMIT 0 , 1000;
  
```

1588	B	ABIO	5500	36.36
4145	S	BRIT5	3600	36
100	S	EC069	10	6

city	year	agriculture_percentage	industry_percentage	services_percentage	technology_percentage
Ahmedabad	2019	8.387	17.147	21.848	11.004
Ahmedabad	2020	5.485	17.872	23.31	9.267
Ahmedabad	2021	5.204	12.666	19.564	4.76
Ahmedabad	2022	7.382	51.114	63.51	44.29
Ahmedabad	2023	5.769	9.908	15.473	4.411
Bengaluru	2019	3.429	18.524	19.238	9.714
Bengaluru	2020	14.298	25.065	35.659	9.044
Bengaluru	2021	6.947	15.802	23.924	13.209
Bengaluru	2022	8.292	24.303	22.302	19.085
Bengaluru	2023	3.767	10.381	16.674	8.774



## 7. Find Cities with the Largest Increase in SME Employment Between Two Specific Years

```
SELECT
    city,
    ROUND(MAX(sme_employment) - MIN(sme_employment),
        2) AS sme_emp_increase
FROM
    eco_productivity
WHERE
    year IN (2021 , 2024)
GROUP BY city
ORDER BY sme_emp_increase DESC
LIMIT 5;
```

city	sme_emp_increase
Pune	21.1
Bhopal	20.6
Srinagar	19.8
Ahmedabad	19.3
Lucknow	16.4



## 8. Analyze the Correlation Between R&D Expenditure and GDP Growth

```
select a.city,a.year,a.rd_expenditure,b.gdp_billion,
(b.gdp_billion- lag(b.gdp_billion) over(partition by a.city order by a.year)) /
lag(b.gdp_billion) over(partition by a.city order by a.year) * 100 as gdp_growth
from eco_productivity a
join sector_income b
on a.city =b.city and a.year = b.year
where rd_expenditure is not null and b.gdp_billion is not null;
```

city	year	rd_expenditure	gdp_billion	gdp_growth
Ahmedabad	2019	1.06	187.2	NULL
Ahmedabad	2020	1.93	211.5	12.980769230769237
Ahmedabad	2021	1.6	247.9	17.210401891252957
Ahmedabad	2022	1.4	71.8	-71.0367083501412
Ahmedabad	2023	0.73	294.7	310.44568245125345
Amritsar	2019	1.45	124.1	NULL
Amritsar	2020	1.3	108.4	-12.651087832393223
Amritsar	2021	0.64	118.1	8.948339483394822
Amritsar	2022	1.75	93	-21.253175275190515
Amritsar	2023	0.98	175.6	88.81720430107526

## 9. Calculate the Year-on-Year Growth in GDP for Each City

```
SELECT
    s1.city,
    s1.year,
    s1.gdp_billion AS current_gdp,
    s2.gdp_billion AS previous_gdp,
    ((s1.gdp_billion - s2.gdp_billion) / s2.gdp_billion) * 100 AS growth_gdp_perc
FROM
    sector_income s1
        JOIN
    sector_income s2 ON s1.city = s2.city
        AND s1.year = s2.year + 1
ORDER BY s1.city , s1.year;
```

city	year	current_gdp	previous_gdp	growth_gdp_perc
Ahmedabad	2020	211.5	187.2	12.980769230769237
Ahmedabad	2021	247.9	211.5	17.210401891252957
Ahmedabad	2022	71.8	247.9	-71.0367083501412
Ahmedabad	2023	294.7	71.8	310.44568245125345
Aizawl	2020	90.1	125	-27.920000000000005
Aizawl	2021	111.8	90.1	24.08435072142065
Aizawl	2022	235	111.8	110.19677996422183
Aizawl	2023	299.5	235	27.4468085106383
Amaravati	2020	169.4	93.7	80.7897545357524
Amaravati	2021	164.1	169.4	-3.1286894923258624

## 10. Correlate GDP Growth with Unemployment Rates

SELECT

```
s.city,  
s.year,  
s.gdp_billion,  
e.unemployment_rate,  
e.youth_unemployment_rate,  
(e.unemployment_rate + e.youth_unemployment_rate) / 2 AS total_unemployment_rate
```

FROM

```
sector_income s
```

JOIN

```
eco_productivity e ON s.city = e.city AND s.year = e.year
```

ORDER BY s.city , s.year;

city	year	gdp_billion	unemployment_rate	youth_unemployment_rate	total_unemployment_rate
Ahmedabad	2019	187.2	5.6	11.8	8.7
Ahmedabad	2020	211.5	6.6	10.4	8.5
Ahmedabad	2021	247.9	5.8	8.9	7.35
Ahmedabad	2022	71.8	6.2	10.7	8.45
Ahmedabad	2023	294.7	7.8	10.5	9.15
Amritsar	2019	124.1	7.9	9.3	8.600000000000001
Amritsar	2020	108.4	7.4	8.5	7.95
Amritsar	2021	118.1	7.4	8.3	7.850000000000005
Amritsar	2022	93	5.9	12	8.95
Amritsar	2023	175.6	5.7	9.3	7.5



Thank you



city  
All

# Report of Gross domestic product(GDP)

Sum Of GDP

24.91K

Sum of industry 4.41K

Unemployment Rate

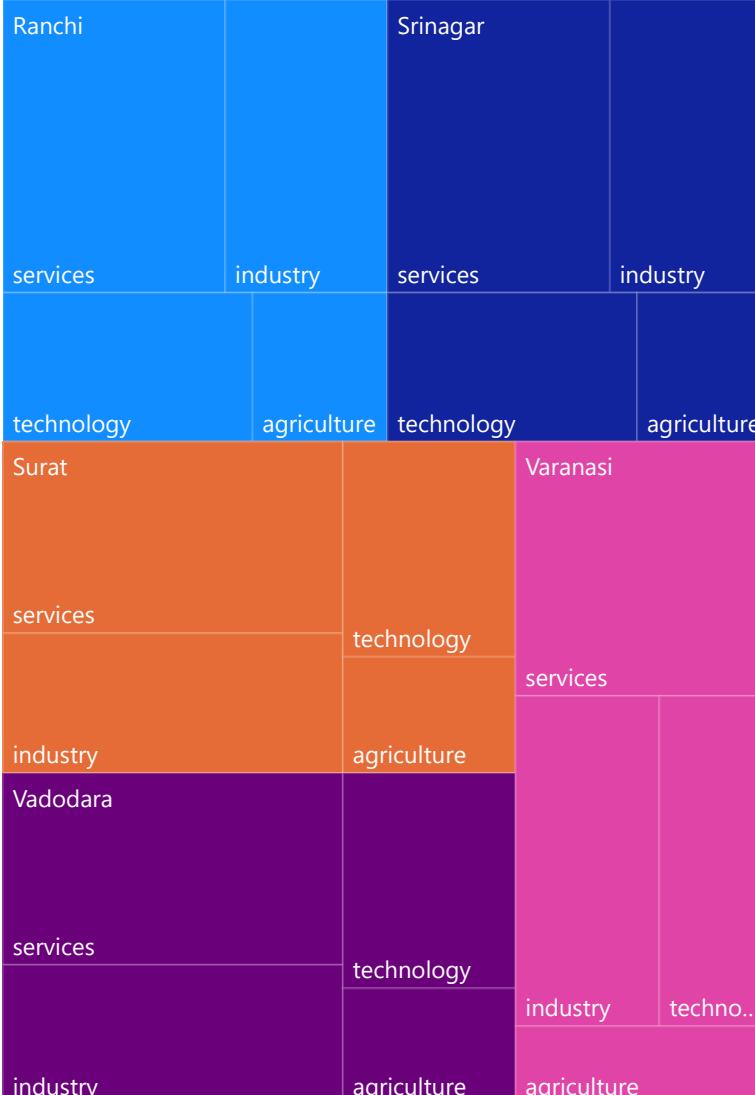
1.11K

Sum of sme\_employment 4.90K

Youth Unemployment

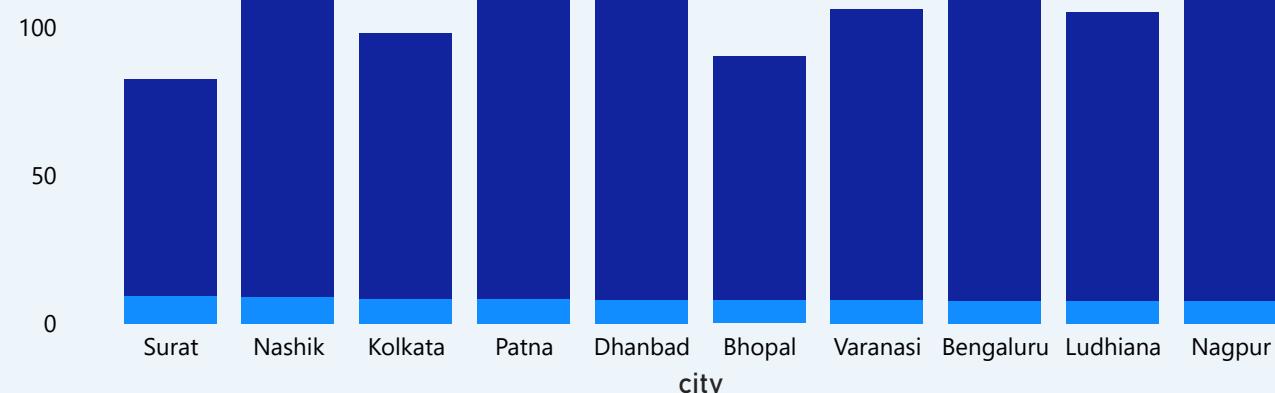
1.77K

## Unemployment vs Sector Employment

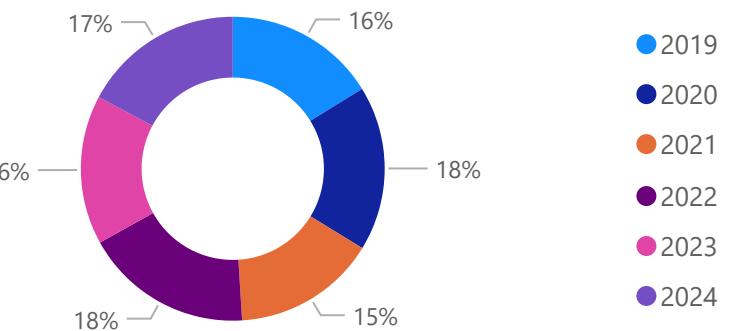


## R&D Expenditure vs Technology Sector Employment

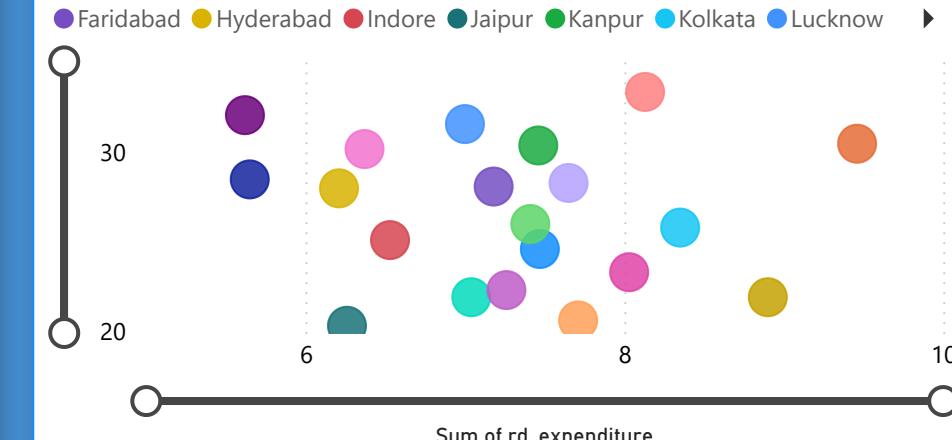
● Sum of rd\_expenditure ● Sum of ict\_sector\_emp



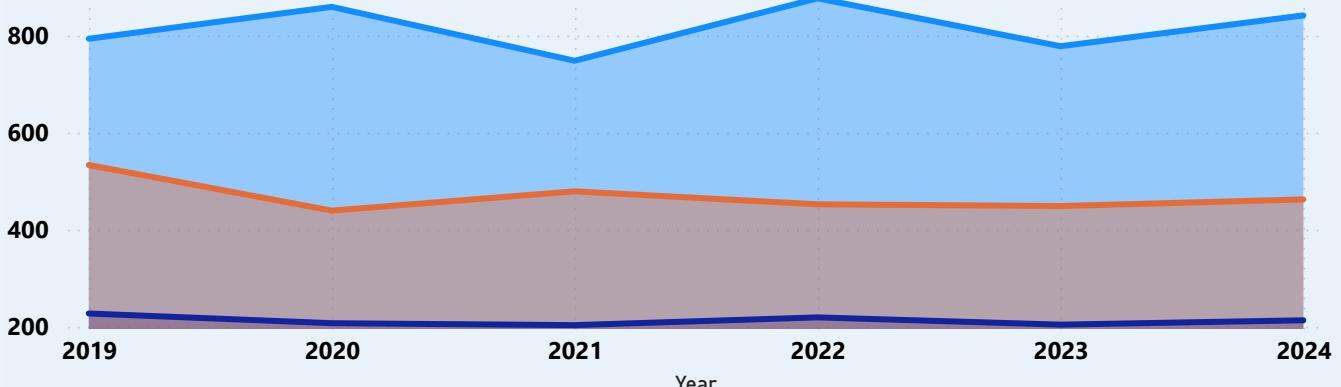
## Sum of SME Employment by Year



## R&D Expenditure vs Technology Sector Employment



## Sector Employment Trends Over Time



## GDP Breakdown by Sector

