

Bharat Herald



Ad-hoc Report

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Dim_city	all cities in Bharat Herald's operational scope. Used to link other fact tables, classify cities by tier, and perform location-based segmentation.
Dim_Ad_Category	Normalizes inconsistent ad category entries from fact_ad_revenue. Also maps categories to sector groups and brand examples to enrich ad analysis.
Fact_print_sales	Captures monthly print performance of Bharat Herald across cities. Tracks how many copies were printed, sold, and finally circulated—essential for evaluating print demand and operational efficiency.
Fact_Ad_Revenue	Tracks quarterly ad revenues by city and category. Useful for analyzing ad market trends, city-level engagement by advertisers, and category-level ad investments over time.
Fact_digital_pilot	Details Bharat Herald's short-lived digital pilot during 2021. Helps evaluate the feasibility, cost, and impact of digital transformation efforts.
Fact_city_readiness	Provides dynamic, time-based readiness scores for each city using three factors—literacy rate, smartphone penetration, and internet penetration. Important for modeling digital adoption potential across regions.

Table- 1

```
1 • CREATE DATABASE if not exists bharat_herald;
2 • USE bharat_herald;
3
4 • CREATE TABLE dim_ad_category (
5     ad_category_id VARCHAR(20) PRIMARY KEY,
6     standard_ad_category VARCHAR(100),
7     category_group VARCHAR(100),
8     example_brands TEXT
9 );
10
11 # Data imported now to check table
12 • select * from dim_ad_category;
13
```

Result Grid | Filter Rows: _____ | Edit: | Export/Import: | Wrap Cell Content:

ad_category_id	standard_ad_category	category_group	example_brands
A001	Government	Public Sector	LIC, SBI
A002	FMCG	Commercial Brands	HUL, Britannia
A003	Real Estate	Private Sector	DLF, Lodha
A004	Automobile	Commercial Brands	Tata Motors, Maruti
NULL	NULL	NULL	NULL

Table- 2

```
15 • CREATE TABLE dim_city (
16     city_id VARCHAR(20) PRIMARY KEY,
17     city VARCHAR(100),
18     state VARCHAR(100),
19     tier VARCHAR(50)
20 );
21
22 # Data imported now to check table
23 • select * from dim_city;
24
```

Result Grid | Filter Rows: _____ | Edit: | Export/Import: | Wrap Cell Content:

	city_id	city	state	tier
▶	C001	lucknow	Uttar Pradesh	Tier 2
	C002	Delhi	DELHI	Tier 1
	C003	bhopal	Madhya Pradesh	Tier 2
	C004	Patna	BIHAR	Tier 2
	C005	jaipur	Rajasthan	Tier 2
	C006	Mumbai	MAHARASHTRA	Tier 1
	C007	ranchi	JHARKHAND	Tier 3
	C008	kanpur	UTTAR PRADESH	Tier 2
	C009	Ahmedabad	GUJARAT	Tier 1
	C010	Varanasi	Uttar Pradesh	Tier 2
*	NULL	NULL	NULL	NULL

Transformation | Cleaning

While importing the **fact_ad_revenue** data I noticed the quarter column contains many unequal format like : **Q1-2022, 2020-Q1, 4TH OF QTR 2024**. SO, I made them uniform so that data look equal, cleaner and easy to extract.

Same way, **currency column** contains currency type **USD, EUR, IN RUPEE** which I made them to “INR” to make data standardise.

Same way, The **State and Language column** in the **fact_print_sales** table is not properly formatted, so I standardized the first letter of each state & Language column to ensure consistency.

CityID column contains two format

1. C-010
2. C-10

So, I have done C-10 to C-010

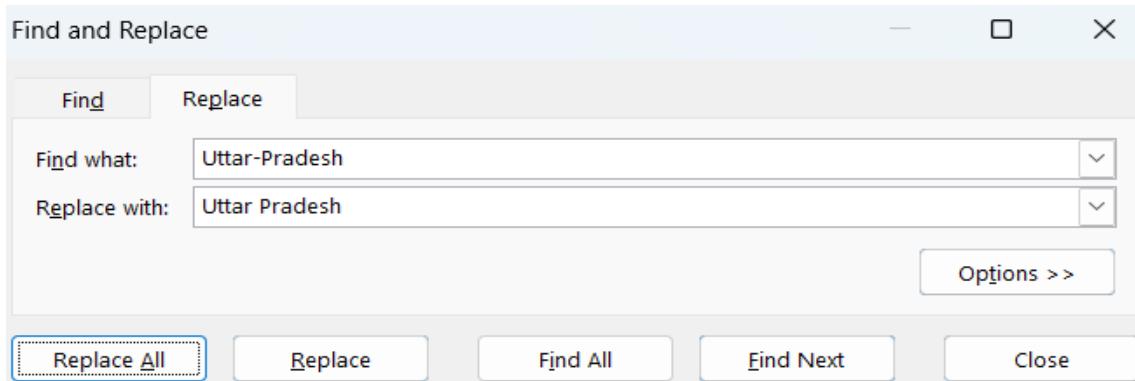
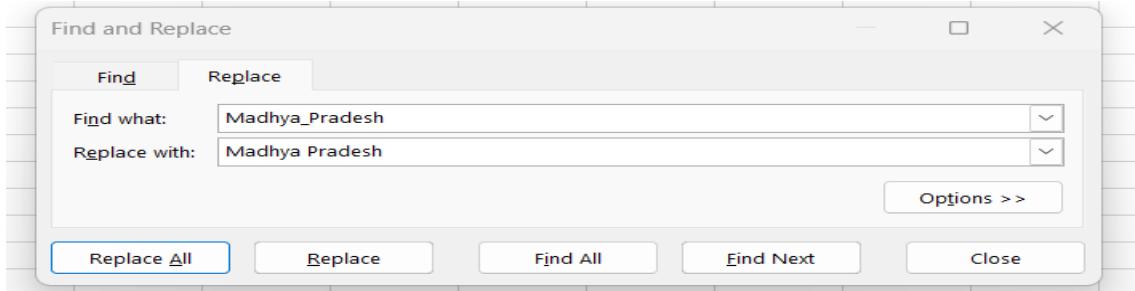
Edition_Id contains ED1010 and ED110 so I validate those from Fact_ad_revenue where no such ED110 EXISTS THEN I MADE THEM REPLACE WITH ED1010

State	Language
Rajasthan	Rajasthan
Rajasthan	Rajasthan
Uttar pradesh	Uttar Pradesh
Madhya_Pradesh	Madhya_Pradesh
Jharkhand	Jharkhand
Uttar pradesh	Uttar Prades
Uttar pradesh	Uttar Prades
Madhya_Pradesh	Madhya_Pradesh
Rajasthan	Rajasthan
maharashtra	Maharashtra
Uttar-Prades	Uttar-Prades
Jharkhand	Jharkhand
Uttar pradesh	Uttar Prades
Delhi	Delhi
maharashtra	Maharashtra
Rajasthan	Rajasthan
Delhi	Delhi
gujarat	Gujarat
bihar	Bihar
Madhya_Pradesh	Madhya_Pradesh
Jharkhand	Jharkhand
maharashtra	Maharashtra
Uttar pradesh	Uttar Prades
Uttar-Prades	Uttar-Prades
Jharkhand	Jharkhand
Rajasthan	Rajasthan

The Month column in the fact_print_sales table is not properly formatted, so I standardized Dates May-23 to 2023-05(yyyy-mm)

May-23	2023 - 05
Mar-19	2019 - 03
Jul-23	2023 - 07
Jul-23	2023 - 07
Oct-20	2020 - 10
Jun-24	2024 - 06
Apr-24	2024 - 04
Feb-19	2019 - 02
May-19	2019 - 05
Jul-21	2021 - 07
Nov-23	2023 - 11
May-20	2020 - 05

The Copies Sold column in the fact_print_sales table is not properly formatted, so I standardized column by removing 1,488725 → 488725.



Copies Sol
1,488725
1,407058
1,492394
1,480926
1,400587
1,439256
1,460138
1,398343
1,472940

Table- 3

```
25 • CREATE TABLE fact_ad_revenue (
26     edition_id VARCHAR(10),
27     ad_category VARCHAR(10),
28     quarter VARCHAR(10),
29     ad_revenue DECIMAL(15,2),
30     currency VARCHAR(5)
31 );
32
33 • select * from fact_ad_revenue;
34
35 • CREATE TABLE fact print sales (
```

Result Grid | Filter Rows: Export: Wrap Cell Content: Fetch rows:

	edition_id	ad_category	quarter	ad_revenue	currency
▶	ED1005	A001	Q2-2023	22613.69	INR
	ED1005	A002	Q1-2019	39366.88	INR
	ED1001	A003	Q3-2023	3709860.00	INR
	ED1003	A002	Q3-2023	40969.55	INR
	ED1007	A003	Q4-2020	51779.40	INR
	ED1001	A001	Q2-2024	4790190.00	INR
	ED1001	A003	Q2-2024	4571581.00	INR
	ED1003	A002	Q1-2019	2719829.00	INR
	ED1005	A002	Q2-2019	3071973.00	INR
	ED1006	A001	Q3-2021	1555116.00	INR

Table- 4

```
35 • CREATE TABLE fact_print_sales (
36     edition_id VARCHAR(10),
37     city_id VARCHAR(10),
38     language VARCHAR(10),
39     state VARCHAR(20),
40     month char(10),
41     copies_sold INT,
42     copies_returned INT,
43     net_circulation INT
44 );
45 • select * from fact print sales;
```

Result Grid | Filter Rows: Export: Wrap Cell Content: Fetch rows:

	edition_id	city_id	language	state	month	copies_sold	copies_returned	net_circulation
▶	ED1005	C005	Hindi	Rajasthan	2023 - 05	404389	13510	390879
	ED1005	C005	Hindi	Rajasthan	2019 - 03	492943	25024	467919
	ED1001	C001	Hindi	Uttar Pradesh	2023 - 07	168893	12285	156608
	ED1003	C003	Hindi	Madhya Pradesh	2023 - 07	216540	10117	206423
	ED1007	C007	Hindi	Jharkhand	2020 - 10	234563	13048	221515
	ED1001	C001	Hindi	Uttar Pradesh	2024 - 06	149986	6387	143599
	ED1001	C001	Hindi	Uttar Pradesh	2024 - 04	155269	9394	145875
	ED1003	C003	Hindi	Madhya Pradesh	2019 - 02	274749	13327	261422
	ED1005	C005	Hindi	Rajasthan	2019 - 05	498423	30933	467490
	ED1006	C006	English	Maharashtra	2021 - 07	377357	17925	359432

Table- 5

```

CREATE TABLE fact_digital_pilot (
    dp_id INT PRIMARY KEY, -- surrogate ID from your file
    city_id VARCHAR(20),
    platform VARCHAR(100),
    launch_mon CHAR(10), -- YYYY-MM format
    ad_category VARCHAR(20),
    dev_cost int,
    marketing_cost int,
    users_reach INT,
    downloads_or_access INT,
    avg_bounce_rate DECIMAL(5,2),
    cumulative_feedback_from_customers TEXT
);
select * from fact_digital_pilot;

```

	dp_id	city_id	platform	launch_mon	ad_cate	dev_cost	marketing_cost	users_reach	download:	avg_bound	cumulative_feedback_from_
▶	0	C001	PDF WhatsApp Push	2021-01	A001	236570	66060	23509	16319	52.55	Mixed feedback: some usabil
	1	C002	PDF WhatsApp Push	2021-02	A001	156865	99122	19472	17017	82.53	Mixed feedback: some usabil
	2	C003	PDF WhatsApp Push	2021-03	A001	242728	46087	8471	2891	68.06	Mixed feedback: some usabil
	3	C004	PDF WhatsApp Push	2021-04	A001	147695	78868	46796	15640	66.17	Mixed feedback: some usabil
	4	C005	PDF WhatsApp Push	2021-05	A001	325906	135644	16805	3231	76.90	The site takes too long to lo
	5	C006	PDF WhatsApp Push	2021-06	A001	248972	53225	35268	16551	45.74	Mixed feedback: some usabil
	6	C007	PDF WhatsApp Push	2021-07	A001	197235	36643	13329	6091	83.01	Mixed feedback: some usabil
	7	C008	PDF WhatsApp Push	2021-08	A001	188777	66727	39865	17866	76.14	Mixed feedback: some usabil
	8	C009	PDF WhatsApp Push	2021-09	A001	99033	41005	33272	28073	43.38	Mixed feedback: some usabil
	9	C010	PDF WhatsApp Push	2021-10	A001	221877	95697	47845	21517	75.39	Mixed feedback: some usabil
	10	C001	PDF WhatsApp Push	2021-11	A001	246923	46029	11397	5278	67.18	Mixed feedback: some usabil
	11	C002	PDF WhatsApp Push	2021-12	A001	106832	44226	37373	28240	44.09	Mixed feedback: some usabil
	12	C003	E-paper Mobile Web	2021-01	A003	195725	93646	40525	23092	62.92	Mixed feedback: some usabil
	13	C004	E-paper Mobile Web	2021-02	A002	225016	88602	20570	22651	64.72	Mixed feedback: some usabil

Table- 6

```
62 • CREATE TABLE fact_city_readiness (
63     CR_id TINYINT,
64     city_id VARCHAR(20),
65     quarter VARCHAR(10),
66     literacy_rate DECIMAL(5,2),
67     smartphone_penetration DECIMAL(5,2),
68     internet_penetration DECIMAL(5,2)
69 );
70 • SELECT * FROM fact_city_readiness;
71
```

Result Grid						
	CR_id	city_id	quarter	literacy_rate	smartphone_penetration	internet_penetration
▶	0	C001	Q1-2019	89.16	75.76	56.53
1	C001	Q2-2019	88.76	76.45	55.97	
2	C001	Q3-2019	88.83	75.32	56.52	
3	C001	Q4-2019	89.25	75.83	56.94	
4	C001	Q1-2020	89.13	75.03	56.45	
5	C001	Q2-2020	89.06	76.56	56.44	
6	C001	Q3-2020	89.10	74.44	55.70	
7	C001	Q4-2020	89.17	76.92	55.74	

Business Request - 1

```

    /*
    Generate a report showing the top 3 months (2019-2024) where any city recorded the sharpest month-over-month decline in net_circulation.
    column to show
        1- city_name
        2- month (YYYY-MM)
        3- net_circulation
    */

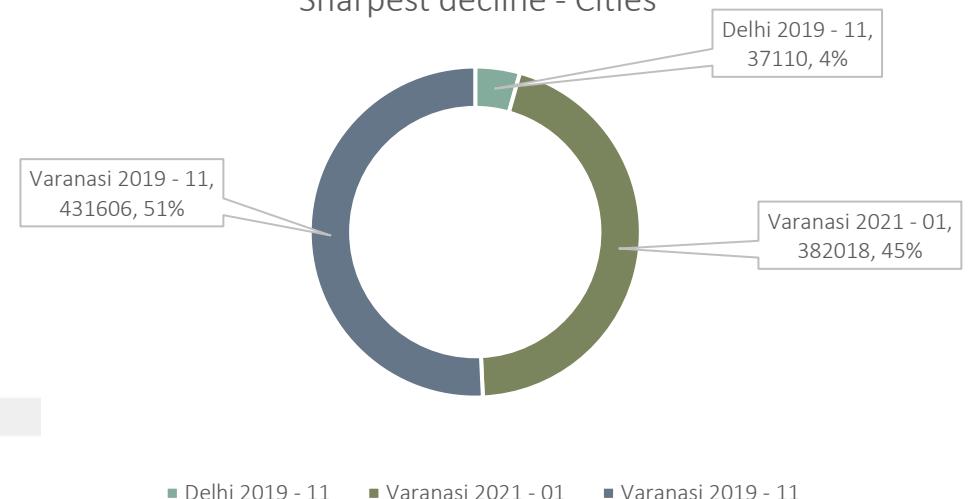
```

```

With CTE1 as (
select
    dc.city_id,dc.city as city_name, fs.month,fs.net_circulation,
    lag(net_circulation) over (partition by dc.city_id order by fs.MONTH) as prev_month_circulation
from fact_print_sales fs inner join dim_city dc
on fs.city_id = dc.city_id
)
select city_name, month,net_circulation,prev_month_circulation,(net_circulation - prev_month_circulation) as MOM_change
from CTE1
WHERE prev_month_circulation IS NOT NULL
ORDER BY MOM_change, MONTH
LIMIT 3

```

Sharpest decline - Cities



	City_name	month	net_circulation	prev_month_circulation	MOM_change
▶	Delhi	2019 - 11	37110	345453	-308343
	Varanasi	2021 - 01	382018	441825	-59807
	Varanasi	2019 - 11	431606	487255	-55649

Business Request – 2

```

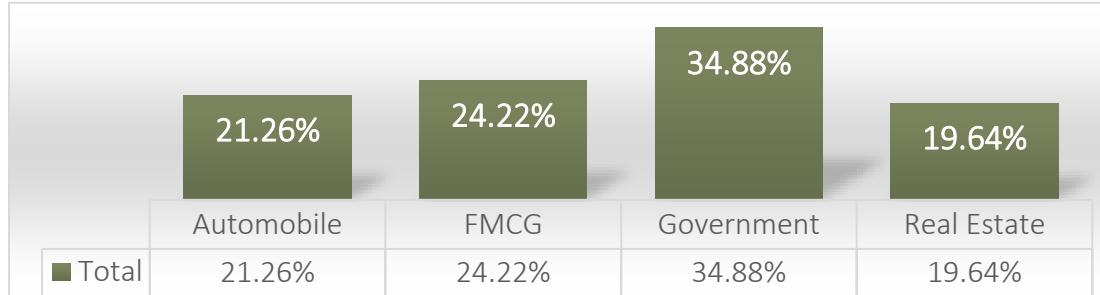
/*
Yearly Revenue Concentration by Category
Identify ad categories that contributed > 50% of total yearly ad revenue.
Fields:
year
category_name
category_revenue
total_revenue_year
pct_of_year_total
*/
explain analyze
with cte1 as (
select
    dac.standard_ad_category as category_name,
    substring_index(far.quarter,'-',1) as Year,
    SUM(far.ad_revenue) AS category_revenue
    from dim_ad_category dac join fact_ad_revenue far
    on dac.ad_category_id = far.ad_category
    group by dac.standard_ad_category, substring_index(far.quarter,'-',1)
),
cte2 as (
select
    Year,
    sum(category_revenue) as total_revenue_across_category_yearly
    from cte1
    group by year
)
select
    c1.year,
    c1.category_name,
    c1.category_revenue,c2.total_revenue_across_category_yearly,
    concat(round((category_revenue/total_revenue_across_category_yearly *100),2), '%') as pct_of_year_total
from cte1 c1 join cte2 c2
on c1.year = c2.year
where concat(round((category_revenue/total_revenue_across_category_yearly *100),2), '%') > 0.5
order by c1.year    pct_of_year_total desc

```

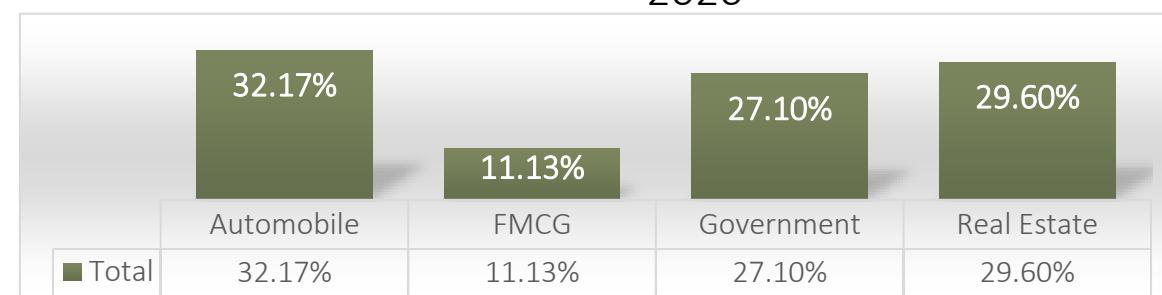


year	category_name	category_revenue	total_revenue_across_category_yearly	pct_of_year_total
2019	Government	95749870.56	274509739.53	34.88%
2019	FMCG	66495346.37	274509739.53	24.22%
2019	Automobile	58348531.21	274509739.53	21.26%
2019	Real Estate	53915991.39	274509739.53	19.64%
2020	Automobile	78758032.84	244790119.65	32.17%
2020	Real Estate	72449274.97	244790119.65	29.60%
2020	Government	66326873.27	244790119.65	27.10%
2020	FMCG	27255938.57	244790119.65	11.13%
2021	Real Estate	93108133.52	237583602.17	39.19%
2021	Government	54276277.83	237583602.17	22.85%
2021	FMCG	48909510.87	237583602.17	20.59%
2021	Automobile	41289679.95	237583602.17	17.38%
2022	Real Estate	89636756.93	283248028.66	31.65%
2022	Government	88567640.92	283248028.66	31.27%

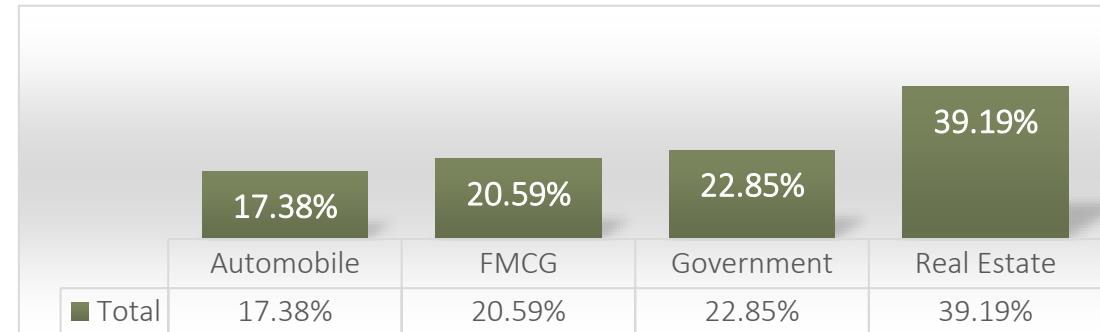
2019



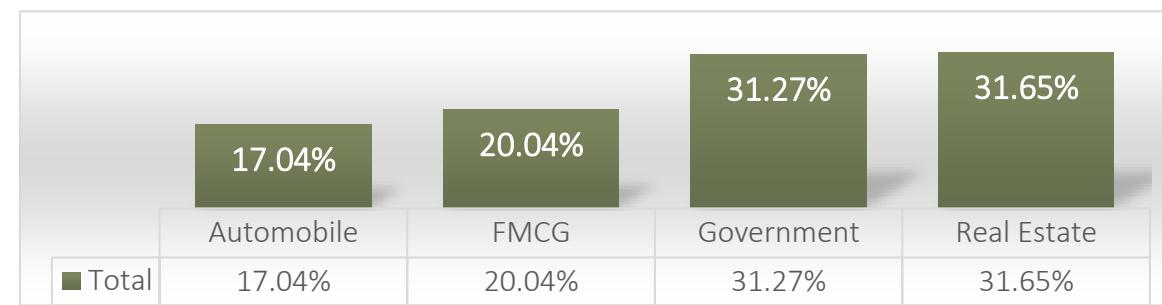
2020



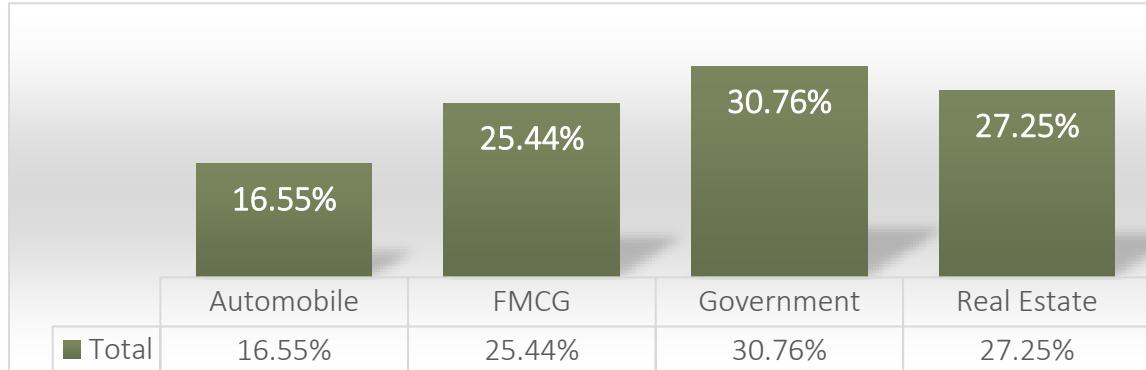
2021



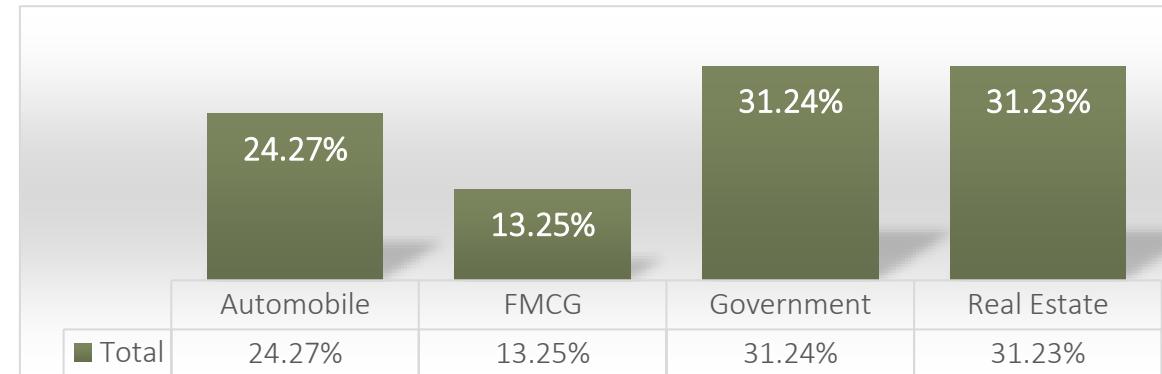
2022



2023



2024



Key Insights

Revenue Distribution

- No single category ever exceeded 50% of yearly revenue
- Government and Real Estate are typically the largest contributors
- Revenue is relatively well-distributed across categories
- FMCG shows declining trend in recent years

Yearly Patterns

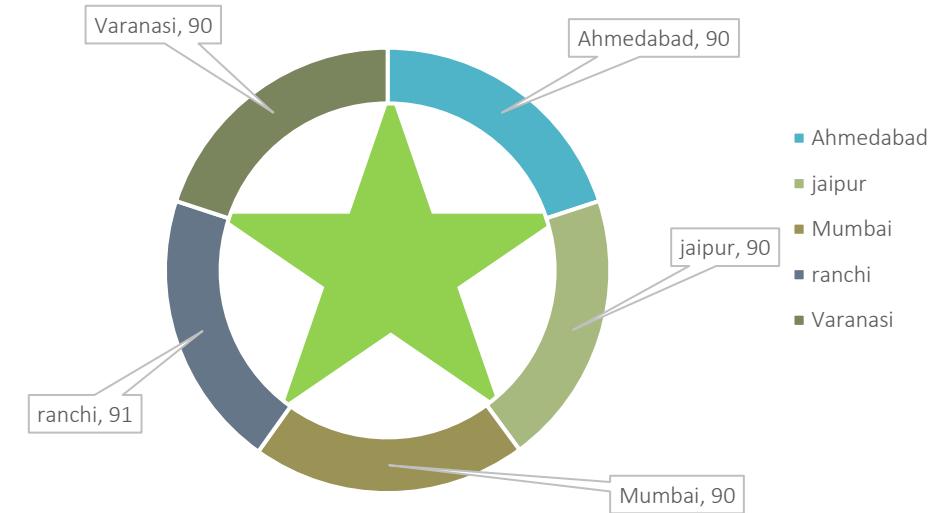
- 2021: Real Estate dominated (39.19%)
- 2020: Most balanced distribution
- 2019: Government had highest share (34.88%)
- Total revenue fluctuates between \$237M-\$283M

category_name	year	Percentage
Automobile	2019	21.26%
	2020	32.17%
	2021	17.38%
	2022	17.04%
	2023	16.55%
	2024	24.27%
FMCG	2019	24.22%
	2020	11.13%
	2021	20.59%
	2022	20.04%
	2023	25.44%
	2024	13.25%
Government	2019	34.88%
	2020	27.10%
	2021	22.85%
	2022	31.27%
	2023	30.76%
	2024	31.24%
Real Estate	2019	19.64%
	2020	29.60%
	2021	39.19%
	2022	31.65%
	2023	27.25%

Business Request – 3

```
/*
For 2024, rank cities by print efficiency = net_circulation / copies_printed. Return top 5
city_name|copies_printed_2024|net_circulation_2024| efficiency_ratio = net_circulation_2024 / copies_printed_2024 | efficiency_rank_2024
*/
```

```
with cte1 as (
select
    dc.city as city_name,
    sum(fps.copies_sold+fps.copies_returned) as copies_printed_2024,
    sum(fps.net_circulation) as net_circulation_2024
from fact_print_sales fps join dim_city dc
on fps.city_id = dc.city_id
where substring_index(month, '-', 1) = 2024
group by dc.city
),
cte2 as (
select city_name, round((net_circulation_2024/copies_printed_2024),2)*100 as efficiency_ratio
from cte1
)
select c1.city_name,c1.copies_printed_2024,c1.net_circulation_2024,c2.efficiency_ratio,
row_number() over(order by c2.efficiency_ratio desc) Ranking
from cte1 c1 join cte2 c2 on c1.city_name = c2.city_name
order by c2.efficiency_ratio desc
limit 5;
```



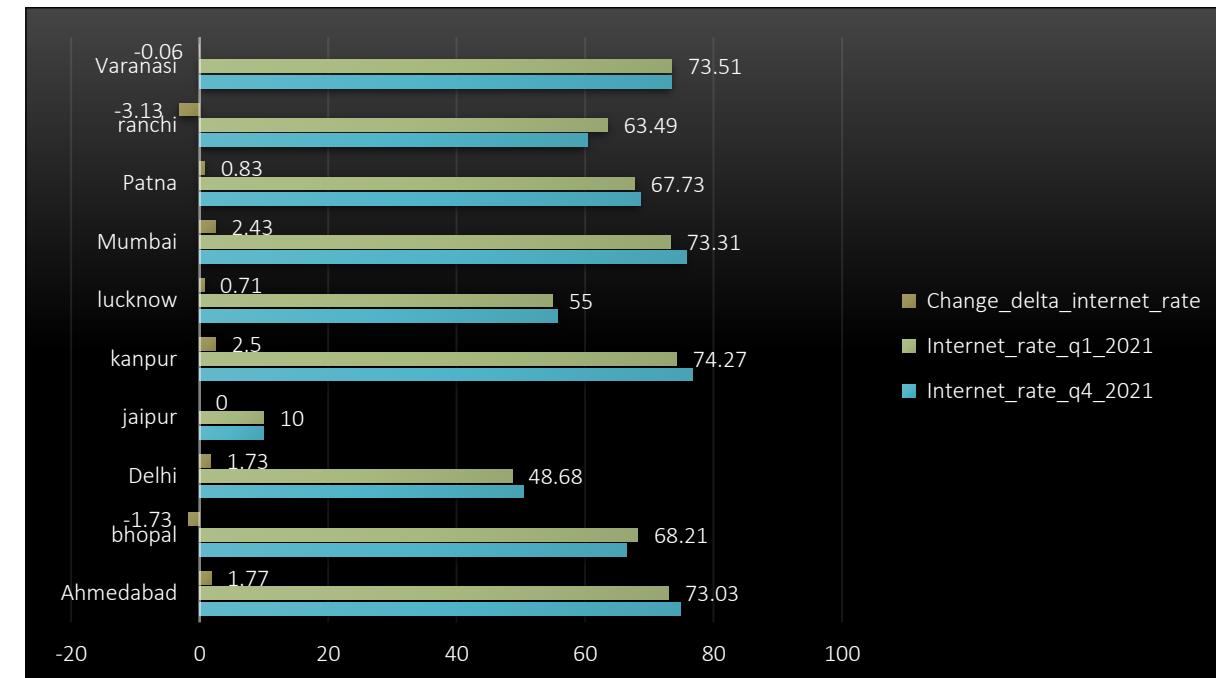
	city_name	copies_printed_2024	net_circulation_2024	efficiency_ratio	Ranking
▶	ranchi	2309444	2092062	91.00	1
	Mumbai	3982371	3569229	90.00	2
	Ahmedabad	3046823	2746691	90.00	3
	Varanasi	4591555	4123611	90.00	4
	jaipur	4594153	4128641	90.00	5

Business Request - 4

```

162 /*
163 Business Request - 4 : Internet Readiness Growth (2021)
164 For each city, compute the change in internet penetration from Q1-2021 to Q4-2021 and identify the city with the highest improvement.
165 Fields:
166 city_name
167 internet_rate_q1_2021
168 internet_rate_q4_2021
169 delta_internet_rate = internet_rate_q4_2021 - internet_rate_q1_2021
170 */
171 • with CTE1 as (
172     SELECT CITY_id, city as city_name from dim_city
173 ),
174     CTE2 as (
175         select city_id, internet_penetration AS internet_rate_q1_2021 from fact_city_readiness
176         where quarter = 'Q1-2021'
177     ),
178     CTE3 AS (
179         select city_id, internet_penetration AS internet_rate_q4_2021 from fact_city_readiness
180         where quarter = 'Q4-2021'
181     )
182     SELECT
183         C1.city_name,C2.city_id,C2.internet_rate_q1_2021,C3.internet_rate_q4_2021,
184             (C3.internet_rate_q4_2021 - C2.internet_rate_q1_2021) as Change_delta_internet_rate
185     FROM CTE1 C1 JOIN CTE2 C2 ON C1.CITY_ID = C2.CITY_ID
186     JOIN CTE3 C3 ON C3.CITY_ID = C2.CITY_ID
187     order by change_delta_internet_rate desc;
188

```



city_name	city_id	internet_rate_q1_2021	internet_rate_q4_2021	Change_delta_internet_rate
kanpur	C008	74.27	76.77	2.50
Mumbai	C006	73.31	75.74	2.43
Ahmedabad	C009	73.03	74.80	1.77
Delhi	C002	48.68	50.41	1.73
Patna	C004	67.73	68.56	0.83
lucknow	C001	55.00	55.71	0.71
jaipur	C005	10.00	10.00	0.00
Varanasi	C010	73.51	73.45	-0.06
bhopal	C003	68.21	66.48	-1.73
ranchi	C007	63.49	60.36	-3.13

Business Request - 5

```
• WITH CTE1 AS (
    SELECT
        LEFT(month,4) AS year,
        edition_id,
        city_id,
        SUM(net_circulation) AS total_yearly_net_circulation
    FROM fact_print_sales
    GROUP BY LEFT(month,4), edition_id, city_id
),
CTE2 AS (
    SELECT
        RIGHT(quarter,4) AS year,
        edition_id,
        SUM(ad_revenue) AS total_yearly_ad_revenue
    FROM fact_ad_revenue
    GROUP BY RIGHT(quarter,4), edition_id
),
CTE3 AS (
    SELECT city_id, city AS city_name
    FROM dim_city
),
CTE4 AS (
    SELECT
        C1.year,
        C1.city_id,
        C3.city_name,
        C1.total_yearly_net_circulation,
        C2.total_yearly_ad_revenue,
        LAG(C1.total_yearly_net_circulation) OVER (PARTITION BY C1.city_id ORDER BY C1.year) AS prev_circulation,
        LAG(C2.total_yearly_ad_revenue) OVER (PARTITION BY C1.city_id ORDER BY C1.year) AS prev_revenue
    FROM CTE1 C1
    JOIN CTE2 C2
    ON C1.edition_id = C2.edition_id
    AND C1.year = C2.year
    JOIN CTE3 C3 ON C1.city_id = C3.city_id
)
```

/*
Business Request - 5: Consistent Multi-Year Decline (2019-2024)
Find cities where both net_circulation and ad_revenue decreased every year from 2019 through 2024 (strictly decreasing sequences).
Fields:
city_name
year
yearly_net_circulation
yearly_ad_revenue
is_declining_print (Yes/No per city over 2019-2024)
is_declining_ad_revenue (Yes/No)
is_declining_both (Yes/No)
*/

```
CTE5 AS (
    SELECT
        city_name,
        year,
        coalesce (lead(year,1) over (partition by city_name order by year), 'dec-2024') as Next,
        total_yearly_net_circulation,
        total_yearly_ad_revenue,
        CASE WHEN (total_yearly_net_circulation - prev_circulation) < 0
            THEN 'Yes' ELSE 'No' END AS is_declining_print,
        CASE WHEN (total_yearly_ad_revenue - prev_revenue) < 0
            THEN 'Yes' ELSE 'No' END AS is_declining_ad_revenue,
        CASE WHEN (total_yearly_net_circulation - prev_circulation) < 0
            AND (total_yearly_ad_revenue - prev_revenue) < 0
            THEN 'Yes' ELSE 'No' END AS is_declining_both
    FROM CTE4
    GROUP BY city_name,year,total_yearly_net_circulation,total_yearly_ad_revenue
)
select * ,
case when total_yearly_net_circulation > lead(total_yearly_net_circulation,1) over (partition by city_name order by year,Next) then "Strictly Decreasing"
else "Not Decreasing" end as FLAG_AS_PER_net_circulation,
    case when total_yearly_ad_revenue > lead(total_yearly_ad_revenue,1) over (partition by city_name order by year,Next) then "Strictly Decreasing"
else "Not Decreasing" end as FLAG_AS_PER_ad_revenue
from CTE5
ORDER BY city_name;
```

No city is there where net circulation and ad revenue both are declining together consecutive year. However, at least one year in every city breaks the chain.

city_name	year	Next	total_yearly_net	total_yearly_ad	is_declinin	is_decl	is_declar	FLAG_AS_PER_net_circulation	FLAG_AS_PER_ad_revenue
Ahmedabad	2019	2020	3624541	25619234.75	No	No	No	Strictly Decreasing	Not Decreasing
Ahmedabad	2020	2021	3455134	31199554.49	Yes	No	No	Strictly Decreasing	Strictly Decreasing
Ahmedabad	2021	2022	3314195	20937060.54	Yes	Yes	Yes	Strictly Decreasing	Not Decreasing
Ahmedabad	2022	2023	3109889	35509197.25	Yes	No	No	Strictly Decreasing	Strictly Decreasing
Ahmedabad	2023	2024	2905303	22583276.90	Yes	Yes	Yes	Strictly Decreasing	Not Decreasing
Ahmedabad	2024	dec-2024	2746691	31273343.52	Yes	No	No	Not Decreasing	Not Decreasing

bhopal	2019	2020	3268206	30403670.43	No	No	No	Strictly Decreasing	Strictly Decreasing
bhopal	2020	2021	3047725	24121502.93	Yes	Yes	Yes	Strictly Decreasing	Not Decreasing
bhopal	2021	2022	2925205	25913638.30	Yes	No	No	Strictly Decreasing	Not Decreasing
bhopal	2022	2023	2731598	39653239.51	Yes	No	No	Strictly Decreasing	Strictly Decreasing
bhopal	2023	2024	2578581	28977698.57	Yes	Yes	Yes	Strictly Decreasing	Strictly Decreasing
bhopal	2024	dec-2024	2418567	27379979.81	Yes	Yes	Yes	Not Decreasing	Not Decreasing
Delhi	2019	2020	4020358	28502769.64	No	No	No	Not Decreasing	Strictly Decreasing

Result Grid | Filter Rows: Export: Wrap Cell Content:

city_name	year	Next	total_yearly_net	total_yearly_ad	is_declinin	is_decl	is_declar	FLAG_AS_PER_net_circulation	FLAG_AS_PER_ad_revenue
Delhi	2019	2020	4020358	28502769.64	No	No	No	Not Decreasing	Strictly Decreasing
Delhi	2020	2021	4157369	24100809.79	No	Yes	No	Strictly Decreasing	Not Decreasing
Delhi	2021	2022	3904669	26637772.69	Yes	No	No	Strictly Decreasing	Not Decreasing
Delhi	2022	2023	3706456	42596542.00	Yes	No	No	Strictly Decreasing	Strictly Decreasing
Delhi	2023	2024	3446969	27501131.46	Yes	Yes	Yes	Strictly Decreasing	Strictly Decreasing
Delhi	2024	dec-2024	3252010	18538219.97	Yes	Yes	Yes	Not Decreasing	Not Decreasing
jaipur	2019	2020	5589285	20281820.94	No	No	No	Strictly Decreasing	Strictly Decreasing
jaipur	2020	2021	5215347	14106570.42	Yes	Yes	Yes	Strictly Decreasing	Not Decreasing
jaipur	2021	2022	4939028	27248604.44	Yes	No	No	Strictly Decreasing	Strictly Decreasing
jaipur	2022	2023	4726524	13825738.22	Yes	Yes	Yes	Strictly Decreasing	Not Decreasing
jaipur	2023	2024	4433929	30194618.60	Yes	No	No	Strictly Decreasing	Not Decreasing
jaipur	2024	dec-2024	4128641	30746320.98	Yes	No	No	Not Decreasing	Not Decreasing
kannur	2019	2020	4345778	27534156.03	No	No	No	Strictly Decreasing	Strictly Decreasing

city_name	year	Next	total_yearly_net	total_yearly_ad	is_declinin	is_decl	is_declar	FLAG_AS_PER_net_circulation	FLAG_AS_PER_ad_revenue
kanpur	2019	2020	4345778	27534156.03	No	No	No	Strictly Decreasing	Strictly Decreasing
kanpur	2020	2021	4163238	17809468.68	Yes	Yes	Yes	Strictly Decreasing	Not Decreasing
kanpur	2021	2022	3907796	27785446.57	Yes	No	No	Strictly Decreasing	Not Decreasing
kanpur	2022	2023	3674652	30227933.42	Yes	No	No	Strictly Decreasing	Strictly Decreasing
kanpur	2023	2024	3417618	22856486.86	Yes	Yes	Yes	Strictly Decreasing	Not Decreasing
kanpur	2024	dec-2024	3250179	25354007.43	Yes	No	No	Not Decreasing	Not Decreasing
lucknow	2019	2020	2336155	30479127.62	No	No	No	Strictly Decreasing	Not Decreasing
lucknow	2020	2021	2234098	32820036.00	Yes	No	No	Strictly Decreasing	Strictly Decreasing
lucknow	2021	2022	2115877	25126061.87	Yes	Yes	Yes	Strictly Decreasing	Strictly Decreasing
lucknow	2022	2023	2003659	22260763.51	Yes	Yes	Yes	Strictly Decreasing	Not Decreasing
lucknow	2023	2024	1880340	29998011.05	Yes	No	No	Strictly Decreasing	Strictly Decreasing
lucknow	2024	dec-2024	1763256	28466843.76	Yes	Yes	Yes	Not Decreasing	Not Decreasing
Mumbai	2019	2020	4742773	30481001.25	No	No	No	Strictly Decreasing	Strictly Decreasing

city_name	year	Next	total_yearly_net	total_yearly_ad	is_declinin	is_decl	is_declar	FLAG_AS_PER_net_circulation	FLAG_AS_PER_ad_revenue
Mumbai	2019	2020	4742773	30481001.25	No	No	No	Strictly Decreasing	Strictly Decreasing
Mumbai	2020	2021	4560074	22805480.45	Yes	Yes	Yes	Strictly Decreasing	Strictly Decreasing
Mumbai	2021	2022	4289158	14673222.42	Yes	Yes	Yes	Strictly Decreasing	Not Decreasing
Mumbai	2022	2023	4007558	26387420.61	Yes	No	No	Strictly Decreasing	Not Decreasing
Mumbai	2023	2024	3792254	29632406.53	Yes	No	No	Strictly Decreasing	Strictly Decreasing
Mumbai	2024	dec-2024	3569229	25214496.62	Yes	Yes	Yes	Not Decreasing	Not Decreasing
Patna	2019	2020	3020231	40350836.00	No	No	No	Strictly Decreasing	Strictly Decreasing
Patna	2020	2021	2835608	25682377.72	Yes	Yes	Yes	Strictly Decreasing	Not Decreasing
Patna	2021	2022	2705571	29326550.84	Yes	No	No	Strictly Decreasing	Strictly Decreasing
Patna	2022	2023	2537303	26581697.41	Yes	Yes	Yes	Strictly Decreasing	Not Decreasing
Patna	2023	2024	2402387	31024463.18	Yes	No	No	Strictly Decreasing	Not Decreasing
Patna	2024	dec-2024	2252819	39043987.27	Yes	No	No	Not Decreasing	Not Decreasing
ranchi	2019	2020	2775705	27305110.76	No	No	No	Strictly Decreasing	Not Decreasing

	city_name	year	Next	total_yearly_net	total_yearly_ad	is_declinin	is_decl	is_deadir	FLAG_AS_PER_net_circulation	FLAG_AS_PER_ad_revenue
	ranchi	2019	2020	2775795	27305110.76	No	No	No	Strictly Decreasing	Not Decreasing
	ranchi	2020	2021	2698673	27841399.93	Yes	No	No	Strictly Decreasing	Strictly Decreasing
	ranchi	2021	2022	2570361	21943188.33	Yes	Yes	Yes	Strictly Decreasing	Not Decreasing
	ranchi	2022	2023	2362394	26080739.99	Yes	No	No	Strictly Decreasing	Strictly Decreasing
	ranchi	2023	2024	2240743	23686314.49	Yes	Yes	Yes	Strictly Decreasing	Not Decreasing
	ranchi	2024	dec-2024	2092062	28082439.57	Yes	No	No	Not Decreasing	Not Decreasing
	Varanasi	2019	2020	5531144	13552012.11	No	No	No	Strictly Decreasing	Not Decreasing
	Varanasi	2020	2021	5199575	24302919.24	Yes	No	No	Strictly Decreasing	Strictly Decreasing
	Varanasi	2021	2022	4816364	17992056.17	Yes	Yes	Yes	Strictly Decreasing	Not Decreasing
	Varanasi	2022	2023	4662785	20124756.74	Yes	No	No	Strictly Decreasing	Not Decreasing
	Varanasi	2023	2024	4463159	30678484.83	Yes	No	No	Strictly Decreasing	Strictly Decreasing
	Varanasi	2024	dec-2024	4123611	28437344.27	Yes	Yes	Yes	Not Decreasing	Not Decreasing

Business Request – 6 : 2021 Readiness vs Pilot Engagement Outlier

In 2021, identify the city with the highest digital readiness score but among the bottom 3 in digital pilot engagement.

`readiness_score = AVG(smartphone_rate, internet_rate, literacy_rate)`

“Bottom 3 engagement” uses the chosen engagement metric provided (e.g., `engagement_rate`, `active_users`, or `sessions`).

Fields:

- `city_name`
- `readiness_score_2021`
- `engagement_metric_2021`
- `readiness_rank_desc`
- `engagement_rank_asc`
- `is_outlier` (Yes/No)

```
) WITH CTE1 AS (
    SELECT
        city_id,
        ROUND(AVG( literacy_rate + smartphone_penetration + internet_penetration) / 3 ), 2) AS readiness_score_2021
    FROM fact_city_readiness
    WHERE RIGHT(quarter,4) = '2021'
    GROUP BY city_id
),
cte2 as (
    SELECT
        dc.city_id,
        dc.city AS city_name,
        c1.readiness_score_2021
    FROM CTE1 c1
    JOIN dim_city dc ON c1.city_id = dc.city_id
),
cte3 as (
    select
        city_id,
        round( sum(downloads_or_access * (1-COALESCE(avg_bounce_rate,0)/100)) / COALESCE(sum(users_reach),0) *100,2)as engagement_metric_2021
    from fact_digital_pilot
    where left(launch_mon,4) = 2021
    group by city_id
),
cte4 as (
    select
        c1.city_id,
        c2.city_name,
        c1.readiness_score_2021,
        c3.engagement_metric_2021,
        dense_rank () over(order by c3.engagement_metric_2021 asc) as Engagement_Rank,
        dense_rank () over(order by c1.readiness_score_2021 desc) as Readiness_Rank
    from cte1 c1 join cte3 c3 using(city_id)
    join cte2 c2 using(city_id)
)
```

```

select *,
case when Readiness_Rank = 1 and Engagement_Rank <=3 then 'yes' else 'No' end as is_outlier
from cte4
order by city_id, city_name

```

city_id	city_name	readiness_score_2021	engagement_metric_2021	Engagement_Rank	Readiness_Rank	is_outlier
C001	lucknow	73.20	23.76	8	4	No
C002	Delhi	56.08	25.85	9	9	No
C003	bhopal	73.21	23.42	7	3	No
C004	Patna	70.77	18.06	5	6	No
C005	jaipur	54.95	15.87	4	10	No
C006	Mumbai	68.33	19.95	6	8	No
C007	ranchi	68.64	9.23	1	7	No
C008	kanpur	75.23	10.32	2	1	yes
C009	Ahmedabad	72.39	27.01	10	5	No
C010	Varanasi	73.89	15.36	3	2	No

Kanpur (city_id = C008) is marked Yes. Readiness Rank = 1 (highest readiness).Engagement Rank = 2 (in bottom 3).