GDP Analysis- Be a Part in the Success Story of India

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Data Source: https://data.gov.in/

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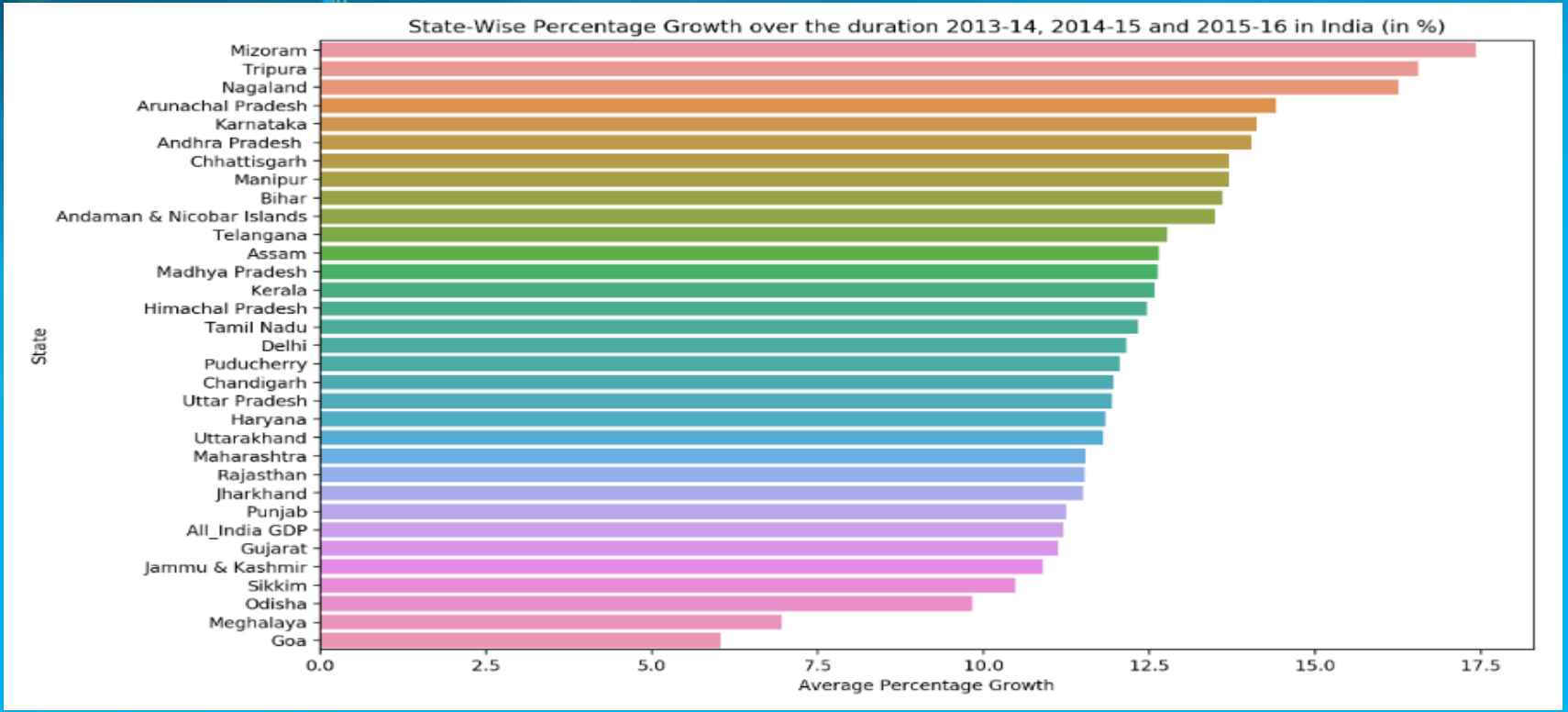
Background

- NITI Aayog (National Institution for Transforming India) is a policy think tank of the Government of India which provides strategic inputs to the central and the state governments to achieve various development goals.
- NITI Aayog was established to replace the Planning Commission of India which used to follow a top-down model for policy making, i.e. it typically designed policies at the central level (such as the various 5-year plans).
- Since different states are in different phases of development, the recommendations here will be specific to the states as well to the centre.
- This project aims at helping the CMs of states to focus on areas which will foster economic development for their respective states.
- Since the most common measure of economic development is the GDP, we will analyse the GDP of the various states of India and suggest ways to improve it.

Average growth rates across Indian states



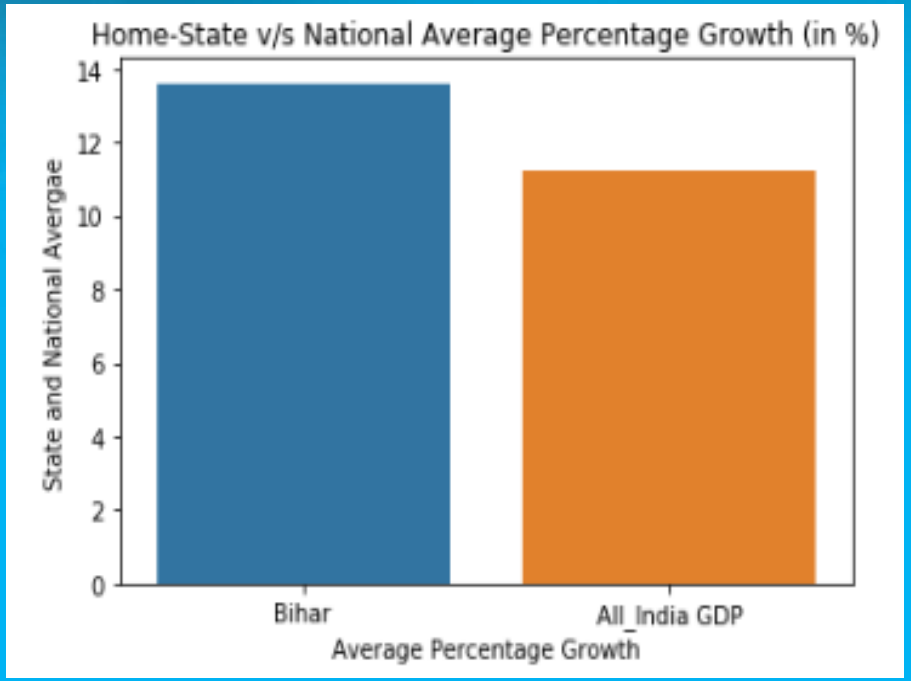
Average growth rates analysis

- As evident from above visual representation below states have been struggling in the growth over the duration 2013-14, 2014-15 and 2015-16 and their average Growth Percentage is lower than national growth average :
    1. Goa
    2. Meghalaya
    3. Odisha
    4. Sikkim
    5. Jammu Kashmir

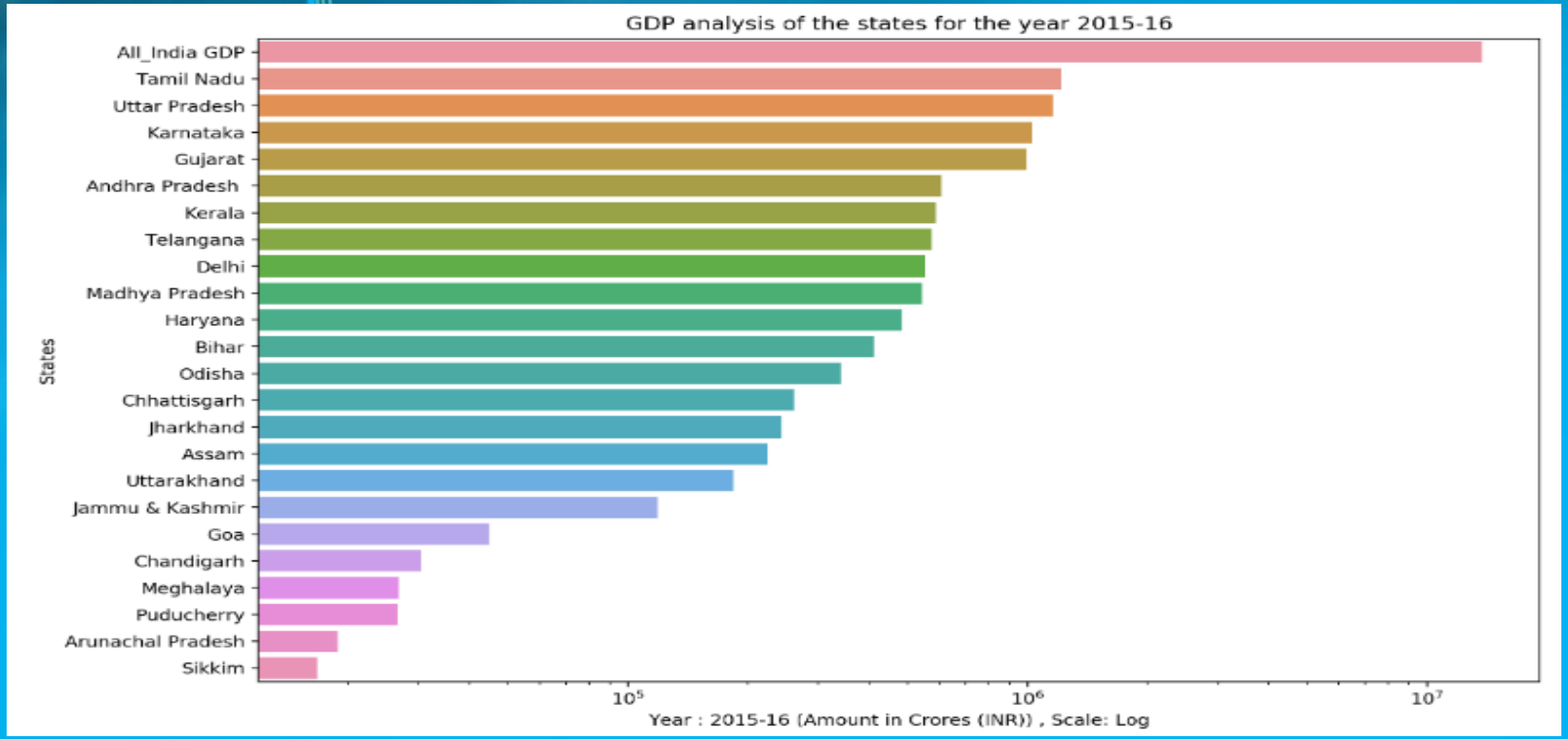
- On the contrary below states have been growing consistently fast and they are on top of the list in Development for this time interval :
    1. Mizoram
    2. Tripura
    3. Nagaland
    4. Arunachal Pradesh
    5. Karnataka

Home State Growth Rate Comparison with National Rate

- The average growth rate of author's home state stands(Bihar) at 13.60 percentage which is 2 percent more than the National average
- Bihar stands as 8th fastest growing state in the country in the time duration of 2013-14, 2014-15 and 2015-16.



GDP Analysis of states

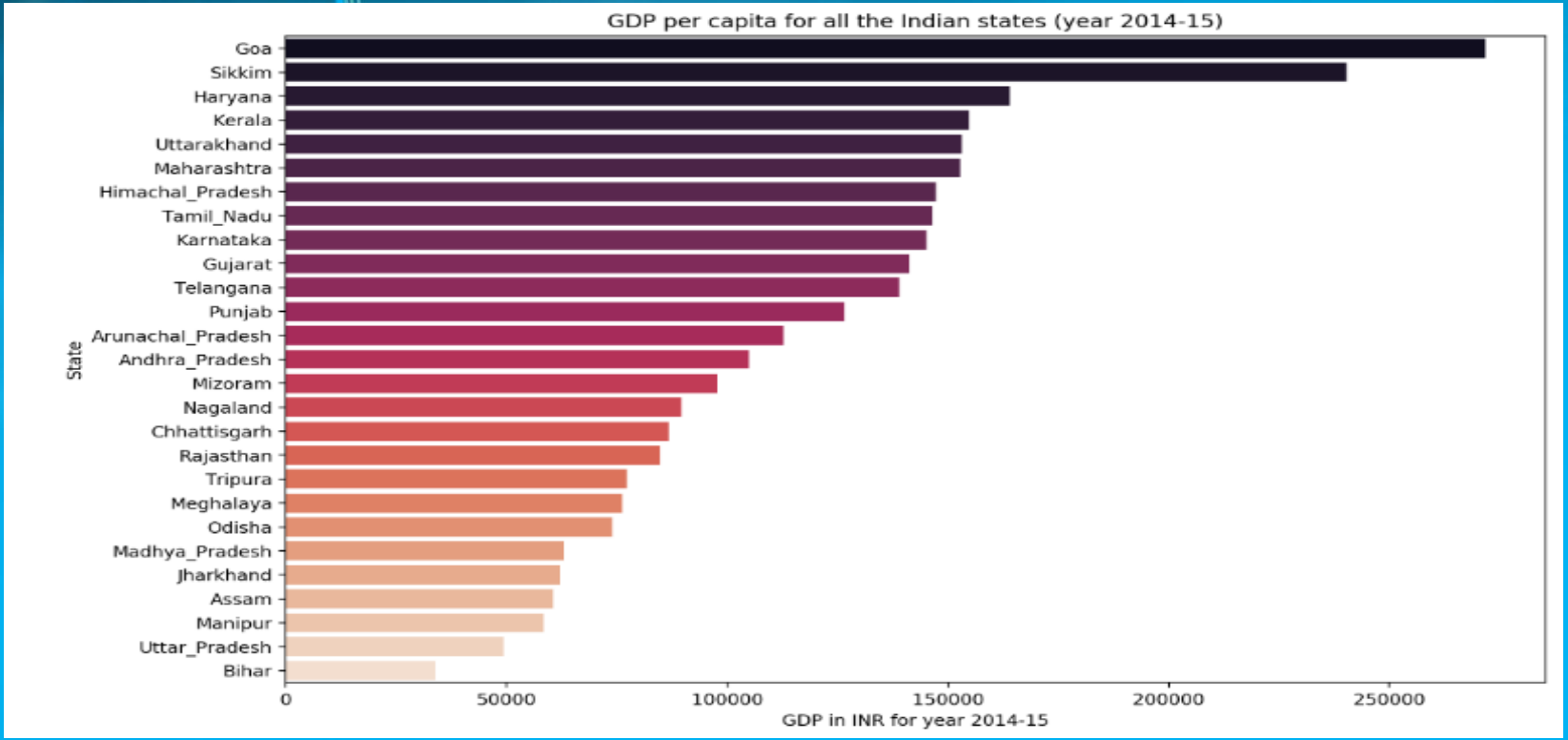


GDP Analysis of states for year 2015-2016

- Top 5 GDP States for the year 2015-16:
  1. Tamil Nadu
  2. Uttar Pradesh
  3. Karnataka
  4. Gujarat
  5. Andhra Pradesh

- Bottom 5 States for the year 2015-16:
  1. Sikkim
  2. Arunachal Pradesh
  3. Puducherry
  4. Meghalaya
  5. Chandigarh

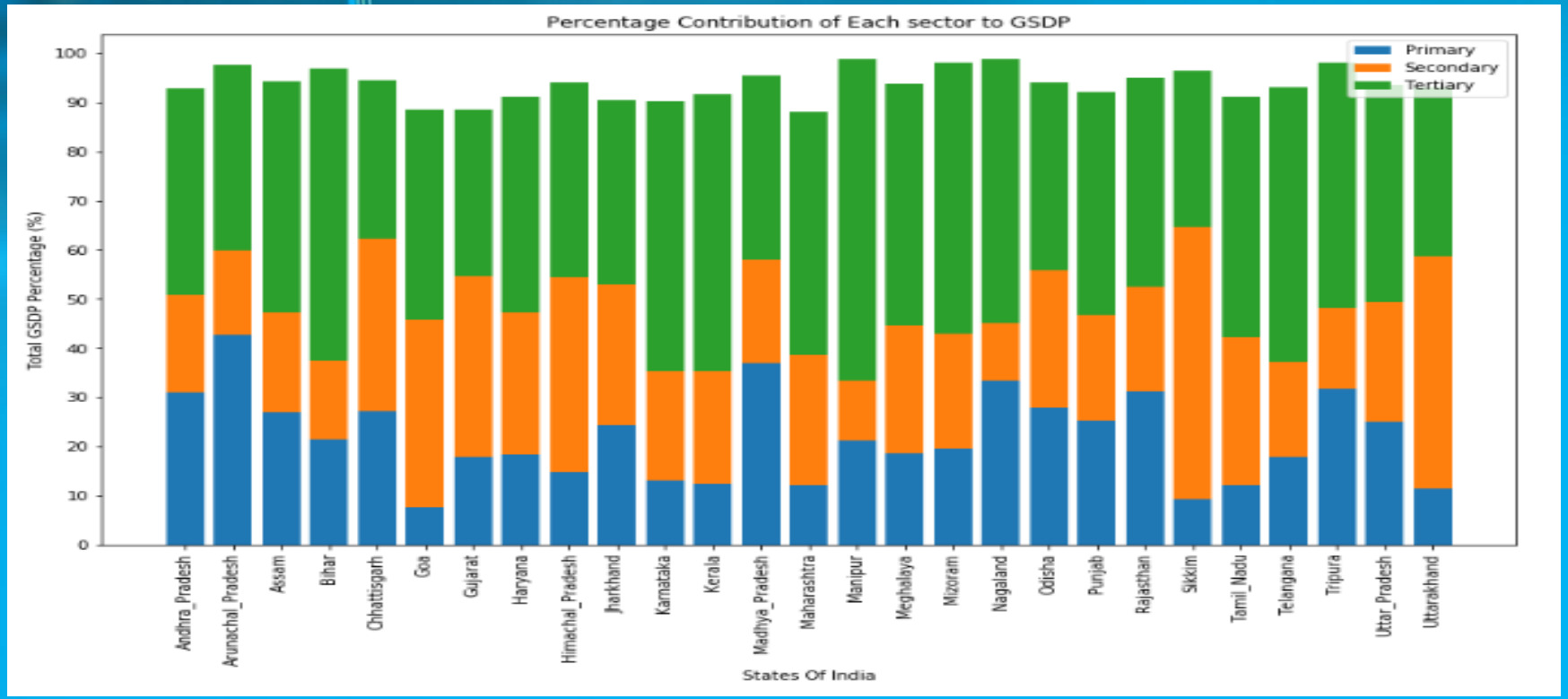
GDP Per Capita For Indian States



GDP Per Capita Analysis

- The top-5 states based on GDP per capita:
  1.Goa
  2.Sikkim
  3.Haryana
  4.Kerala
  5.Uttarakhand
- The bottom-5 states based on GDP per capita:
  1.Bihar
  2. Uttar Pradesh
  3. Manipur
  4. Assam
  5.Jharkhand
- Ratio of highest per capita GDP to the lowest per capita GDP is around 8 in the country.

Contribution of Primary, Secondary and Tertiary sectors to total GDP for all the states



Sectors and Sub-sectors analysis w.r.t to per capita GDP:

- For further analysis of GDP we will Categorise the states into four categories based on GDP per capita (C1, C2, C3, C4 - C1 would have the highest per capita GDP, C4 the lowest).
- The quantile values used here are (0.20,0.5, 0.85, 1), i.e. the states lying between the 85th and the 100th percentile are in C1, those between 50th and 85th percentile are in C2 and so on.
- Categorisation into four categories will simplify the subsequent analysis, since comparing data of all the states would become quite exhaustive

Sectors and Sub-sectors analysis w.r.t to per capita GDP:

- Top sub-sectors for category C1 which contributes to approx. 80% of the GSDP of this category:

Real estate, ownership of dwelling & professional services %	14.46
Agriculture, forestry and fishing %	14.12
Trade, repair, hotels and restaurants %	13.73
Manufacturing %	13.50
Construction %	11.05
Other services %	7.91
Financial services %	3.86

- Top sub-sectors for category C2 which contributes to approx. 80% of the GSDP of this category:

Manufacturing %	18.62
Real estate, ownership of dwelling & professional services %	15.71
Agriculture, forestry and fishing %	12.83
Trade, repair, hotels and restaurants %	10.44
Construction %	6.93
Financial services %	6.19
Other services %	6.18

Sectors and Sub-sectors analysis w.r.t to per capita GDP:

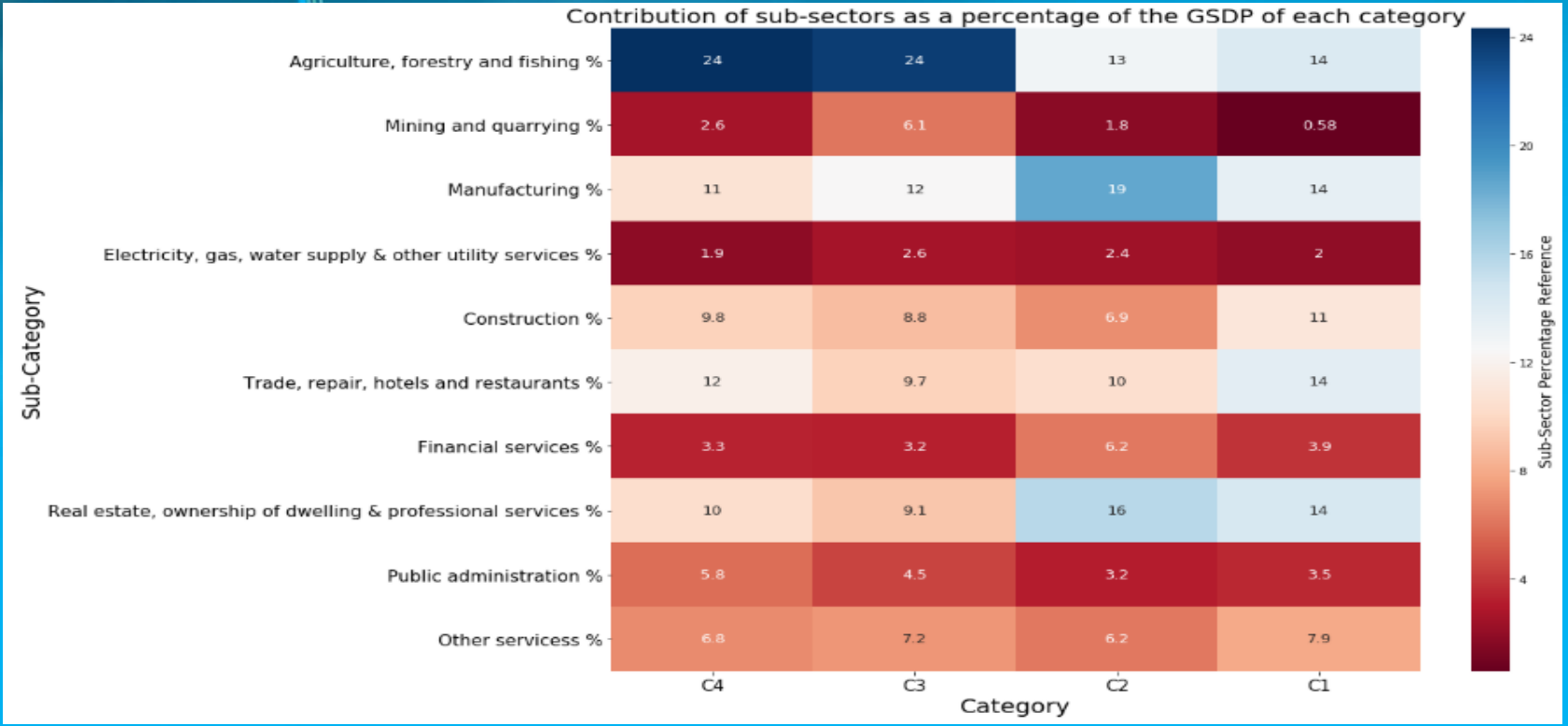
- Top sub-sectors for category C3 which contributes to approx. 80% of the GSDP of this category:

Agriculture, forestry and fishing %	23.73
Manufacturing %	12.38
Trade, repair, hotels and restaurants %	9.69
Real estate, ownership of dwelling & professional services %	9.12
Construction %	8.83
Other services %	7.20
Mining and quarrying %	6.09

- Top sub-sectors for category C4 which contributes to approx. 80% of the GSDP of this category:

Agriculture, forestry and fishing %	24.32
Trade, repair, hotels and restaurants %	11.78
Manufacturing %	10.71
Real estate, ownership of dwelling & professional services %	10.37
Construction %	9.76
Other services %	6.80
Public administration %	5.78

Contribution of the sub-sectors as a percentage of the GSDP of each category



Insights from GDP, sectors and categorical distribution of states:

- How does the GDP distribution of the top states (C1) differ from the others?

i) The GDP of top states falling under category C1 does not heavily depend on the Agriculture, forestry and fishing sub-sectors i.e. primary sectors whereas it is not the cases with GDP of states under category C2, C3 and C4.

ii) Real estate, ownership of dwelling & professional services sub-sectors is the top contributor to the GSDP of C1 category states whereas this sub-sector is in the rank 2 for C2 and 4 for C3,C4 category states.

iii) The top 4 sub-sectors(namely Real estate, ownership of dwelling & professional services, Agriculture, forestry and fishing, Trade, repair, hotels and restaurants and Manufacturing) almost equally contributes(14%) to approximately 2/3rd of the states GDP for top states under C1 category whereas the distribution of these sub-sectors varies across the states of the remaining categories C2, C3 and C4.

iv) We could clearly see that comparing to C1 average GSDP other categories average are Approximately 2 times larger or equal (C3) and 3 times of (C4, C2) category.

- Which sub-sectors seem to be correlated with high GDP?

i) For most of the states the sub-sectors like Manufacturing, Real estate, ownership of dwelling & professional services, Trade, repair, hotels and restaurants and Construction falling under the under the Secondary and Tertiary sectors looks to be major contributor for higher GDP.

(as evident from the heatmap Percentage contribution of sectors as a percentage of total GDP)

ii) Adding to the above we have an exception that the sub-sector Agriculture, forestry and fishing which is although a part of primary sector is also a considerable contributor to the states GDP with minimum of 13 and up to 24 percent contribution towards GSDP of states under various state categories C1, C2, C3 and C4.

Insights from GDP, sectors and categorical distribution of states:

- Which sub-sectors do the various categories need to focus on?

i) States under all the category have less than 5 percent contribution from the sub-sector Electricity, gas, water supply & other utility services offered by government. Government should focus on generating more revenue from this sub-sector by inclusion of more citizens under these services, offering new utility services and improving quality of existing utility services offered.

ii) Also, the contribution of Financial services sub-sector to GSDP is limited to 6.2 % across all states categories. Hence, government should introduce financial service at larger extents to smaller cities, towns and villages through government owned banks and financial institutions. At the same time, government should ease out the credit related financial services for Small and Medium Enterprises, farmers etc.

iii) The states under the less developed categories C3 and C4 should focus on shifting the distribution of GDP towards the secondary and tertiary sectors i.e. towards the construction, manufacturing, professional and other services industries etc (as evident from the heatmap of sectors v/s GDP)

iv) States under category C1,C2 should still continue to maintain if not increase the focus on Agriculture, forestry and fishing as when the states under less developing categories C3 and C4 might focus to improve the GDP through secondary and tertiary sectors in the future. Hence, this should not create any scarcity of agricultural products and yields

- Which sub-sectors government can ignore even though its not doing good?

Even though **Mining and quarrying** sub-sector is not doing good across the categories C1, C2, C3 and C4, we still can afford to overlook them up to much extent because Mining and quarrying is part of Primary Sector and its observed that in order to achieve higher GDP, we have to shift our focus on Secondary and Tertiary Sectors. Adding to the same there are many disadvantages of Mining and Querying as they need high wage cost and they are labour intensive with limited productivity and non-renewable sources are depleting at an alarming rate.

Moreover, they lead to destruction of habitats for the wildlife, causes noise, water and air pollution and posses danger to workers engaged.

Hence, instead of focussing on this sector government should focus on the harnessing the renewable energy and alternative materials as we need to "balance the effects with the demand here".

Recommendation to states for each category

1) Recommendation for C1 Category:

i) Bigger states like Haryana and Kerala should focus on Agriculture, forestry and fishing to increase the contribution towards state's GSDP which will eventually contribute to India's GDP. They already have land resource which can be used for increasing revenue through Crops and Livestock. State like Goa, Kerala of have sea-facing state boundary which they can also use to increase the income through focussing on Fishing and aquaculture. This is essential as the states under lower categories will continue to grow towards Secondary and Tertiary sector for development, the balance should be maintained for the demands of agricultural and allies by-products.

ii) Its not surprising to see smaller states like Goa and Sikkim to be on top category because of their GDP contribution is majorly from Tertiary and Secondary sectors. Also its important to note that the population in these states are on the lower side. They should continue to maintain the same to be on the top list.

2) Recommendation for C2 Category:

i) Around 33% of total states falls under this category, these states should strive to come in the best category C1. Despite being large states, the population is not on higher side , hence they contribution is better in per capita GDP.

ii) There are no smaller states in this category and these states are best in the categories in terms of various sub-sectors like Real estate, ownership of dwelling & professional services, Manufacturing, and Financial Services etc. which clearly indicates these states are developing at good pace. They should continue to focus on these areas.

iii)Despite being good in other categories, this category is lowest in terms of construction and public administration sub-category. This might be because the development is focussed around the capital and bigger cities. Government should focus on developing smaller cities and towns to get into C1 category.

Recommendation to states for each category

3) Recommendation for C3 Category:

i) Smaller North eastern states like Meghalaya, Nagaland, Mizoram and Tripura as well as bigger states like Odisha, Rajasthan, etc. are in this category which is appreciable for the smaller states as their contribution with the per capita GDP.

ii) The quarter of the GSDP of these states under C3 and C4 category are dependent on the Agriculture, forestry and fishing which is a high number and government should focus on moving from primary sector to secondary and tertiary further.

iii) The GDP contribution through tertiary sector is higher than primary sector for most of these states under category C3. These states should now focus to move dependency from primary to secondary sector.

4) Recommendation for C4 Category:

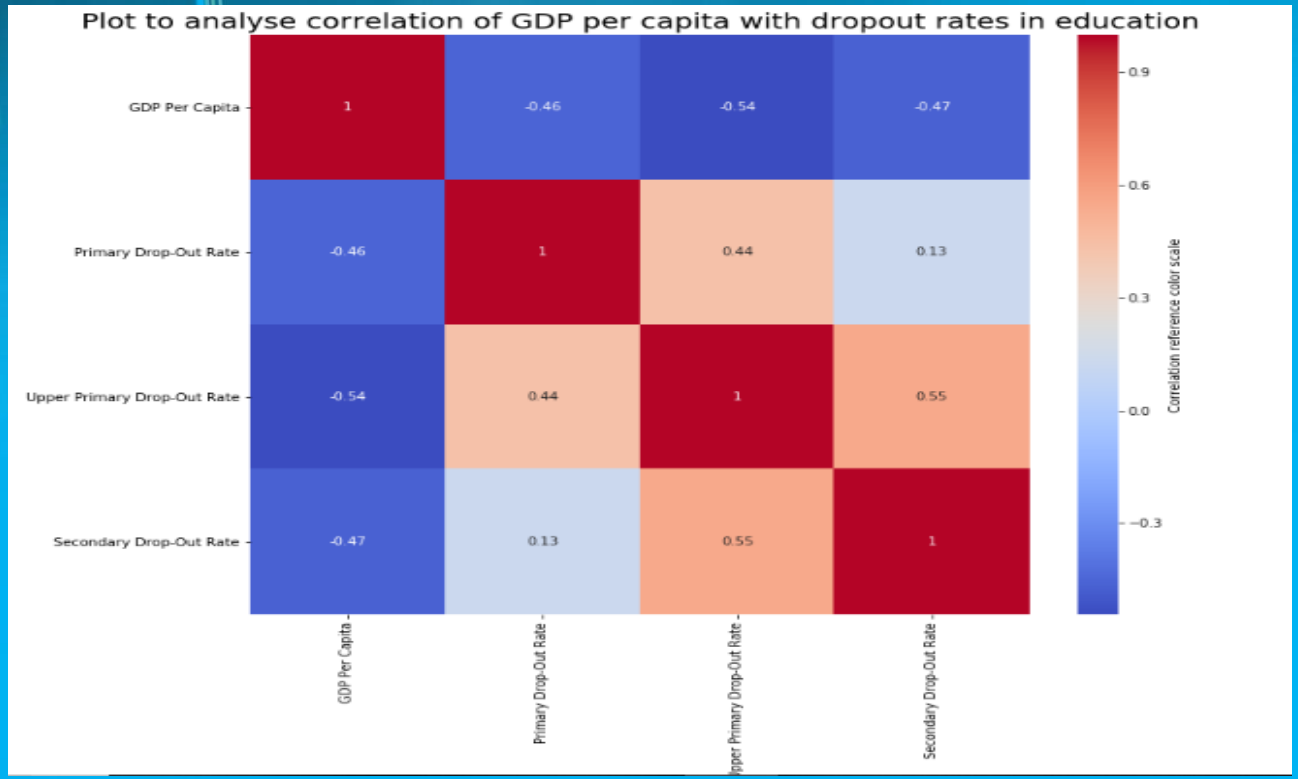
i) Majority of states under the C4 category have higher density of population like Bihar, Uttar Pradesh etc hence if these states create skilled human resource, this can help these states to generate revenue through secondary and tertiary sectors which is not currently the case. These states should also focus on population control, education and training of its inhabitants.

ii)The GDP per capita of these C4 states are in bottom 10 due to higher population and dependency on primary sector and these states should focus on moving towards secondary and tertiary sectors for accelerated development and increase in per capita GDP and overall GDP.

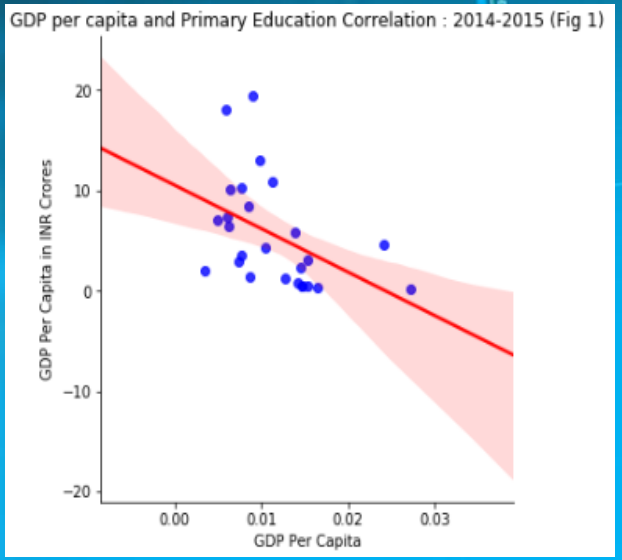
iii)In general there are less contribution from sub-sub-sectors like Air transport and Storage which indicates that these states lacks these infrastructure at the larger extent which are catalyst for the development.

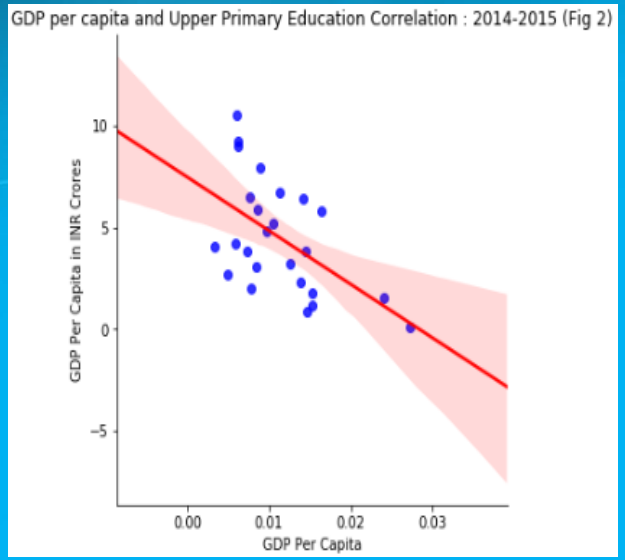
iv)There are 4 states under this category out of all the states in India which is lower number but all these states should focus to move out of this category.

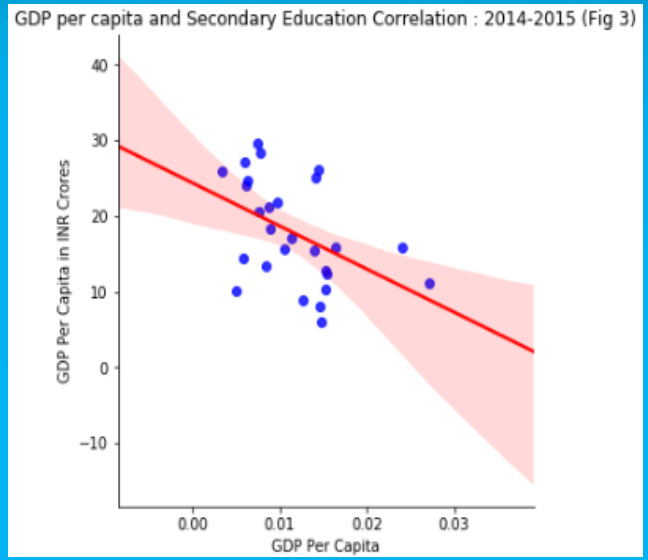
Analysing correlation of GDP per capita with dropout rates at different levels of education



Analysing correlation of GDP per capita with dropout rates at different levels of education







Key insights from Dropout and Per Capita GDP correlation

1. There is no perfect direct linear relationship of the dropouts and GDP per capital for the year 2014-15 considering all three education levels(primary, upper primary and secondary education)
2. There is weak negative correlation between GDP and various education level dropouts up to much extent. This means if drop outs are less at educational institutions, GDP are better and vice-versa.
3. Here, Correlation represents the probability of variation in one variable(GDP) based on variation in another variable(Drop-outs). But here we have to consider the fact that "Correlation is not and cannot be taken to imply causation". Even if there is a very strong association between the two variables we cannot assume that one causes the other.
4. We can find many outliers state through the lmplot graph which affects the correlation and degree of linearity like Goa, Sikkim, Arunachal Pradesh etc. They further affects the negative correlation at all education levels for drop-outs

vs GDP.

5. The dropout rates are lowest for Upper Primary level followed by Primary and dropouts at Secondary level is 3-4 times high compared to primary and upper-primary dropouts. The higher percentage of secondary dropouts factors like there are many socio and educational factors exists for the same. So though per capita GDP is one of the major factor but it is not only factor for higher drop-outs.

Hypothesis for the observations from the correlation data

1. Top GDP states like Goa, Sikkim, Kerala, Uttarakhand's GDP depends on the job sectors/sub-sectors which needs less skilled/educated human resource like tourism, trade, hotels, professional services, Manufacturing etc hence even though the drop-outs are more these states manage to be on top of per capita GDP.

2. Considering the lmplots above, In general, there is a steady increase in GDP per capita by the decrease in dropout rate.

3. If we observe the Fig 3 lmpolt for secondary dropouts, we can observe that regression line is similar to the Fig 1 & 2for Primary and Upper-Primary but here y scale is twice more than remaining two. This suggests that the increase in per capita GDP is 50% lesser due to the decrease in dropout rate of Secondary education students, comparing to the primary and upper-primary students.


THANK YOU!!