Estimation of Regional Economic Accounts at the City Level:

Studying the Case of City GDP for Thane

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Abstract

Urban transformation programs in India like the Smart Cities Mission demonstrate the volition to solve urban challenges. Parameters like the city-level Ease of Living Index and Swachh Survekshan have recently been introduced to demonstrate best practices and infuse competition among the cities. However, the most important economic measure and the yardstick of income known as the Gross Domestic Product (GDP) at the city-level is missing from the literature and the policy discourse in India and non-Organization of Economic Cooperation and Development (OECD) countries. Having over one-third of the total population that contributes to over half of the GDP of India, cities need proper planning and execution for their comprehensive economic development. For this, it becomes essential to explore approaches to estimate GDP at the city level in India.

This study reviews the literature on regional economic analysis for cities in the context of non-OECD countries and India. It follows the methodology adopted in the National Accounts Statistics and uses official data from National Accounts, Central Statistics Office, National Sample Surveys, Directorate of Economics and Statistics, Census of India, Reserve Bank of India and others, for computation. It compares and validates the various methods using the real-time and dynamic MIS data including information from budget, banks and taxes.

Further, a review of existing methodologies for estimating city-level GDP have been carried out to devise an estimation procedure for the GDP of Thane City using possible methods. This paper discusses key observations of the estimation, detail a way forward for the measurement of city-level GDP in India by examining the scope for replicability for other cities and recommend collection and maintenance of specific data to institutionalise this calculation. This paper draws attention to the gaps in the availability, regularity, granularity and credibility of data systems and make a clarion call for a reliable, comprehensive and multi-dimensional statistical architecture in India.

1. Background, Review of Literature and Motivation

Rapidly expanding urbanization around the world has brought a renewed focus on the cities. This has received detailed attention from the United Nations when it launched the Sustainable Development Goals (SDGs) in 2015. It was further reiterated by the United Nations Conference on Housing and Sustainable Urban Development, 2016 (Habitat III), Smart Cities, World Urban Campaign. Closely aligned with SDG 11 (sustainable cities and communities), India, being a signatory to the SDGs, launched its Smart Cities Mission in 2015 and urban transformation programs like *Atal Mission for Rejuvenation and Urban Transformation* (AMRUT), *Pradhan Mantri Awas Yojana-* Urban (PMAY-U), *National Urban Livelihoods Mission* (NULM) and *Swachh Bharat Mission* (Urban) (SBM-U). To instil competitiveness among cities, measures like the ranking of select cities in the *Swachh Survekshan* and *Ease of Living Index* prepared by the Ministry of Housing and Urban Affairs (MoHUA) have also been undertaken. While each of these programs for the cities is important and demonstrates the volition to solve the urban challenges, there has been no such initiative that captures the city-level economic parameters nor the methodologies that could be adopted in this process. The most important economic measure of GDP or income is missing from the literature. Gross Domestic Product (GDP) is one of the most important and standard economic measure which quantifies the value of production of goods and services in any geographical region in a year.

In contrast, the member states of the Organization of Economic Cooperation and Development (OECD) have a dedicated database of regional economic measures and generate the Gross Domestic Product (GDP) for Metropolitan areas other than federal states, by industries. Some global organizations like PWC (2008), McKinsey (2010) and Brookings (2014) have ranked cities across the world based on their economic strength. Their methodology rests on the OECD data and extrapolate the available reliable estimates for the cities in the non-OECD countries. But it must be pointed out that even the above studies do not account for the GDP measurements at the city levels. Given the above background that evidences an embossed gap in the economic methods pursued for cities, it becomes pertinent to explore approaches to estimate the economic measures at the city level. There are inputs that some estimations of city-level GDP have been done for Indian cities such as Mumbai, Ahmedabad and Kolkata, however, the information pertaining to the same is not available in public domain.

This paper thoroughly reviews the literature and databases on regional economic analysis for cities especially in the context of Non-OECD countries and India. It is primarily built upon the papers "Calculating city-level GDP in India: An assessment of methodologies and an evaluation of feasibility" (The Economist Intelligence Unit, 2018) and "Consultation Paper on City GDP measurement Framework" (Ministry of Housing and Urban Affairs, 2019) *[referred to as "Consultation Paper" henceforth].*

Based on the review of literature, consultations, and discussions, the study explores and formulates feasible methods for estimating city-level GDP in India and Thane. It also suggests other alternative and innovative methods which capture industry-wise activities across the primary, secondary and tertiary sectors. Economic profile, spatial mapping of amenities and economic participation in Thane also forms a component of this study. This research study exercise supports the ongoing focus on the urban and regional economic growth and strengthen the evidence-based growth in India and Non-OECD countries. In particular, the objectives of the study are to assess various methods and databases for estimating GDP at the city level and measuring the GDP of Thane city and analysing the results in recent years and to suggest a way forward.

2. Database and Methodology

2.1 Database

In order to explore methods of statistical measurement for estimating city-level GDP in India in general and for Thane city in particular, this research study has been based on a review of secondary official databases. Data sources utilised in this study are given below (Table 1).

Table 1: Data Sources

	Name of the Report	Year Published	Study Year	Organisation/Person
1	Economic Characteristics of Unincorporated Non-Agricultural Enterprises (excluding Construction) in India: NSS 67th Round, July 2010-June 2011	2012	2010-11	National Sample Survey Office, Ministry of Statistics and Programme Implementation
2	A Report on Unincorporated Non-Agricultural Enterprises (Excluding Construction) Based on Data Collected in State Sample: 67th Round of National Sample Survey (July 2010 - June 2011) Vol. I	2013	2010-11	Directorate of Economics and Statistics, Planning Department, Government of Maharashtra
3	Employment and Unemployment Situation in India: NSS 68th Round, July 2011-June 2012	2014	2011-12	National Sample Survey Office, Ministry of Statistics and Programme Implementation
4	Census of India (Houselisting and Population, Housing)		2011	Office of the Registrar General of India and Census Commissioner, Ministry of Home Affairs
5	District Census Handbook Thane: Village and Town Directory	2014	2011	Directorate of Census Operations, Maharashtra
6	District Census Handbook Thane: Village and Townwise Primary Census Abstract	2014	2011	Directorate of Census Operations, Maharashtra
7	A Report On 'Employment and Unemployment Situation' Based On Data Collected in State Sample Of 68th Round Of National Sample Survey (July 2011 – June 2012) Volume I	2014	2011-12	Directorate of Economics and Statistics, Planning Department, Government of Maharashtra
8	A Report on Unincorporated Non-Agricultural Enterprises (Excluding Construction) Based on Data Collected in Central, State and Pooled Samples of 67th Round of National Sample Survey	2016	2010-11	Directorate of Economics and Statistics, Planning Department, Government of Maharashtra
9	Employment and Unemployment Situation in Cities and Towns in India: NSS 68th Round, July 2011-June 2012	2016	2011-12	National Sample Survey Office, Ministry of Statistics and Programme Implementation
10	Report on Sixth Economic Census Maharashtra State	2016	2013-14	Directorate of Economics and Statistics, Planning Department, Government of Maharashtra
11	Report on Pooling of Central and State Sample Data: 68th Round of NSS Employment and Unemployment	2017	2011-12	Directorate of Economics and Statistics, Planning Department, Government of Maharashtra
12	Economic Survey of Maharashtra 2018-19	2019	2018-19	Directorate of Economics and Statistics, Planning Department, Government of Maharashtra

Apart from the above datasets, for estimating the rural and urban income at the state level, additional datasets are required as suggested by the National Accounts Statistics for their methodology at the national level, in the document National Accounts Statistics: Sources and Methods 2012, CSO, MoSPI, GoI (Chapter 31 Estimation of Rural and Urban Income, 2004-05) (Annexe Table 1).

2.2 Methodology

This paper attempts to build an economic profile of Thane city from the data sources listed above, along with spatial mapping at ward level of the Thane city.

The various methods of estimation of Gross City Domestic Product (GCDP) are:

1. Apportioning based on population
2. Apportioning based on sectoral employment
3. Using Gross Value Added Per Worker (GVAPW) and Number of Workers by NIC Categories
4. Urban Maharashtra (UM) + Labour Input (LI) Method
5. Thane City (TC) + LI Method

The first three methods are simple estimations based upon available aggregated data and quick calculations. However, this study focuses on granular level unit record data from NSS and other official information. Therefore, it broadly utilises methods 4 and 5, i.e., the method also proposed by the Consultation Paper, with minor additional elements. The steps for this method are detailed below:

Step 1: Listing Maharashtra Gross State Domestic Product (GSDP) by Compilation Categories (See Table 2)

Step 2: Estimating Rural and Urban GSDP for Maharashtra

Method 1: LI Method (using NSS ES 2010-11[2] and NSS EUS 2011-12[3])

This method for splitting GSDP into rural and urban components is proposed by Consultation Paper.It utilises ES 2010-11 for obtaining GVAPW and EUS 2011-12 for obtaining the estimated number of workers (EW), by compilation categories, for both Rural and Urban sectors. For each sector, the GVA by compilation categories is computed by multiplying GVAPW and Estimated Workers for the respective category. The percentage shares of Urban GVA in Total (Rural + Urban) GVA are then obtained. These shares are applied on compilation category-wise GSDP to obtain Estimated Urban Maharashtra GDP by Compilation Categories.

Method 2: CSO NAS Method for estimating Rural and Urban National Income replicated at the State level

The Central Statistics Office (CSO) has adopted an allocation procedure in which economic activity-wise net value added (NVA) is allocated between rural and urban

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[2] National Sample Survey 67th Round Enterprise Survey 2010-11

[3] National Sample Survey 68th Round Employment and Unemployment Survey 2011-12

using certain indicators available with a rural/urban break-up for each economic activity. The indicators include results from various surveys, the labour input method, and administrative records which provide a rural/urban breakup of the indicators.

Our endeavour is to replicate this national-level methodology at the state-level, to obtain a rural/urban breakup of the Maharashtra GSDP. The computation using this approach is yet to be carried out, as we seek clarifications regarding the methodology and explore rural/urban data availability at the state level.

Step 3: Listing Urban Maharashtra GSDP by Compilation Categories

Step 4: Calculating GVAPW (using ES 2010-11) and Estimated Workers (using EUS 2011-12) by Compilation Categories, for Urban Maharashtra and Thane City

Step 5:

- By LI method, calculating Urban Maharashtra Gross Value Added (GVA) from Urban Maharashtra GVAPW and Urban Maharashtra Estimated Workers, and,
- Calculating Thane City GVA from
  - Urban Maharashtra GVAPW and Thane City Estimated Workers (UM Method)
  - Thane City GVAPW and Thane City Estimated Workers (TC Method)

Step 6: Calculating the share of Thane City GVA in Urban Maharashtra GVA by Compilation Categories and applying the shares to Estimated Urban Maharashtra GSDP, to obtain Estimated Thane City Gross City Domestic Product (GCDP) by Compilation Categories

Step 7: Summing Estimated Thane City GCDP by Compilation Categories from Step 6 to get overall Thane City GCDP

This study estimates Thane GCDP for the years 2011-12 to 2017-18, using UM+LI Method.

Note:

- While the TC+LI Method captures Thane city's spatial economic differential, it suffers from the issue of inadequate compilation category-wise samples. To address this, it is recommended to use pooled (State + Central) samples. We are in the process of obtaining this data from the Directorate of Economics and Statistics (DES), Maharashtra.
- To establish a concordance between the CSO classification of economic activities used in GSDP, and the NIC codes used in National Sample Surveys, we have formulated certain compilation categories for computation (Table 2).

Table 2: Compilation categories for estimation of Thane GCDP and their corresponding NIC-2008 Sections

S.No.	Compilation Category	NIC-2008 Sections
1	Agriculture, Forestry & Fishing	A
2	Mining & Quarrying	B
3	Manufacturing	C
4	Construction	F

| 5	Electricity, Water, Gas	D + E
6	Railways, Transport, Storage	H
7	Communication	J
8	Trade, Hotels, Restaurants	G + I
9	Banking & Insurance	K
10	Real estate	L
11	Public administration	O
12	Other Services	M + N + P + Q + R + S + T + U

2.3 Limitations and Scope for Replicability

- One of the most important limitations of this exercise will be the availability of adequate (sample) and periodic data. However, the NSS rounds take cities with more than 1 million population as per Census 2001 in any district as a separate stratum and for these cities, estimates can be generated. For other cities, as they fall into general urban stratum, it will be tough to compute and estimate their figures. The availability of periodic data is another challenge (NSS data which are useful here often comes once in five years), coupled with the constraints of comparability and consistency with NAS estimates.

- Another limitation of this method (UM Method) will be the assumption of equal GVAPW for any given economic sector across the state (by rural and urban sector). The differences of spatial productivity across cities can be captured and apportioned by having some assumptions and index, however, it might not explain the actual scenario by each economic sector.

- To tackle issues due to inadequate sample size, pooled sample data needs to be procured and utilised.

- The CSO NAS methodology for estimating rural and urban income at the national level needs to be replicated at the state level, for which a white paper on the methodology should be released by CSO.

- The method suggested here has a lot of scope for replicability for other cities (million-plus cities as per Census 2001) as the estimates of rural and urban income are calculated based upon the standard method suggested by NAS and the share of urban GVA of a city to the total urban GVA (using labour input method) is applied to estimated urban GSDP. This will ensure comparability and consistency.

3. Summary of Findings

3.1 About Thane: An Economic Profile

This section gives an insight into the demographic, spatial and socio-economic context of Thane city, which is a part of Mumbai Metropolitan Region of the Maharashtra State. The city had a population of around 1.8 million in 2011. In most of the parameters of development, Thane city fares at the list of top cities among 4302 cities in India. Table 3 highlights some key demographic details of Thane from Census 2011. Figure 1 describes the trend of the decadal growth rate of population of Thane.

Figure 1: Decadal Growth Rate of Population for Thane City, 1971-1981 to 2021-2031
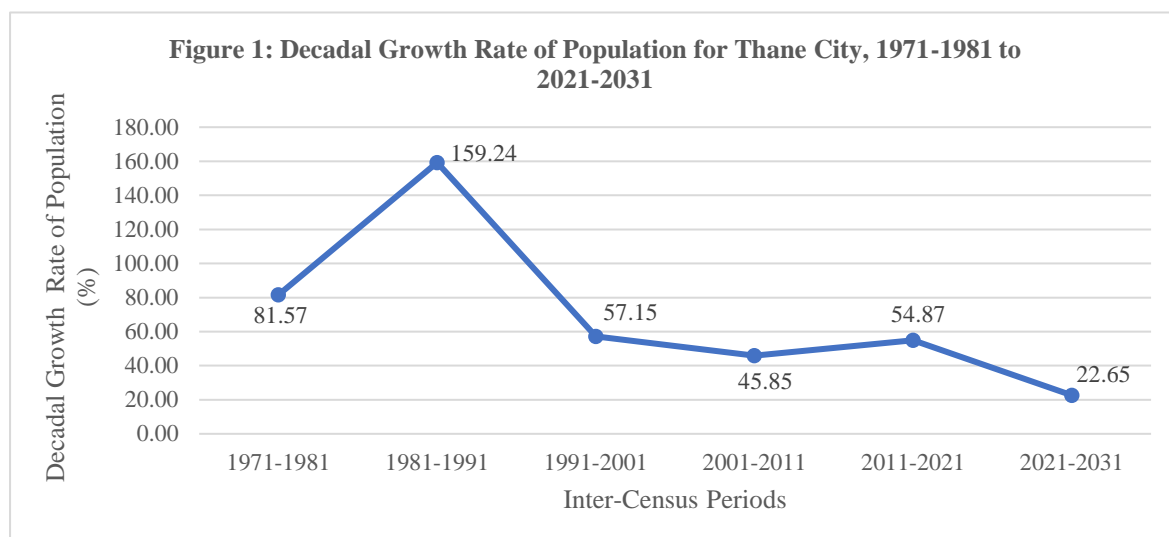
Source: Computed by authors from Thane Local Economic Development Plan

Figure 2: Thane as a Key Economic Node for MMRDA[4]
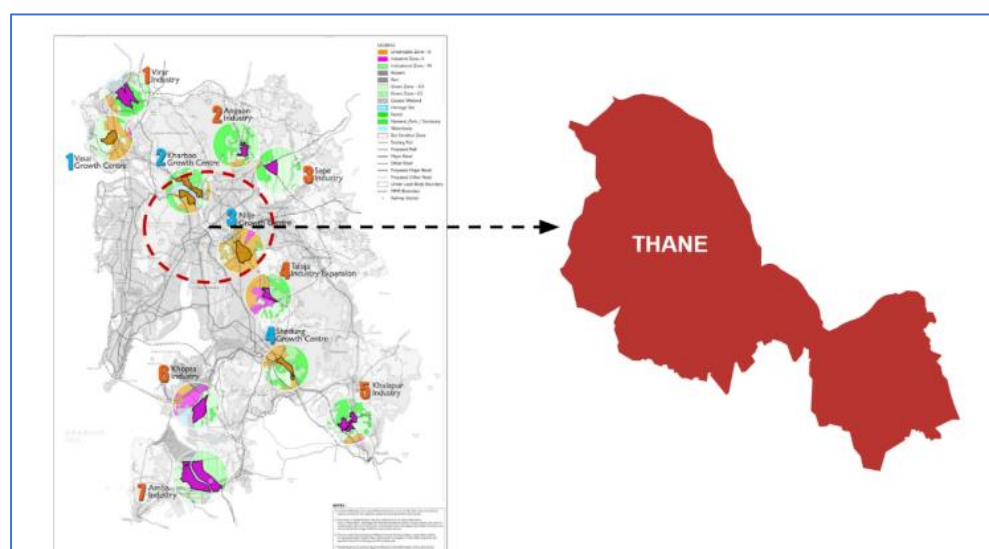
Source: Thane Local Economic Development Plan

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[4] Mumbai Metropolitan Region Development Authority

Table 3: Demographic details of Thane City, 2011

Population	18.4 lakhs
Decadal Growth Rate of Population (2001-2011)	45.86%
Area	128 km^2
Population Density	14361
Scheduled Caste Population %	6.84
Scheduled Tribe Population %	2.32
Literacy Rate	89.41
Sex Ratio	888
Child Sex Ratio	908
Source: Census 2011	

Table 4: Percentage Share of Establishments by Broad Industry Division, 2013-14

Broad Industry Division	Maharashtra	Urban Maharashtra	Thane District	Thane City
Primary	26.0	2.5	2.2	0.8
Secondary	17.0	22.0	24.3	20.5
Tertiary	57.0	75.5	73.5	79.7
Total	100	100	100	100
Number (in lakhs)	61.37	28.43	4.39	0.74
Source: 6th Economic Census * includes Mumbai City + Mumbai Suburban				

Table 5: Estimated Number and Percentage of Persons Working, Unemployed and Not In Labour Force (ages 15 years and above) by Sex for Thane City, 2011-12

	Male		Female		Persons	
Category	**Number**	**Percentage**	**Number**	**Percentage**	**Number**	**Percentage**
Workers	4.93	70.8	1.52	22.9	6.45	47.4
Unemployed	0.24	3.4	0.08	1.2	0.32	2.3
Not in Labour Force	1.80	25.8	5.05	75.9	6.84	50.3
Total	**6.96**	**100.0**	**6.64**	**100.0**	**13.61**	**100.0**
WPR (per 1000)		**708**		**229**		**474**
Source: NSS Employment and Unemployment Survey, 2011-12. Namubers are in Lakhs.						

Table 6: Percentage Shares of GVA by Compilation Categories, 2010-11

| Compilation Category	Urban Maharashtra	Thane District	Thane City
Manufacturing	25.7	48.7	12.6
Electricity, Water, Gas*	-	-	-
Railways, Transport, Storage	5.6	5.3	10.4
Communication	0.6	0.7	0.4
Trade, Hotels, Restaurants	44.3	31.3	48.5
Banking & Insurance	1.0	0.8	1.0
Real estate	0.8	0.5	0.4
Other Services	21.9	12.7	26.7
Total	100.0	100.0	100.0
Total GVA (in ₹ crore)	63849.7	15225.7	5042.8

Table 4 provides the shares of broad industry divisions in Thane city establishments, with figures for Maharashtra, Urban Maharashtra and Thane District, for comparison. As expectected, Thane city has about 80 percent share of tertiary sector. Table 5 focuses on the workforce and unemployment figures for Thane city, by sex, for the age group of 15 years and above. Finally, Table 6 gives an idea of the output from Thane enterprises, for sectors covered in NSS 2010-11. Figures for Urban Maharashtra and Thane District are given as well.

Figures 3, 4, 5 and 6 stem from the spatial mapping component of the study. All four figures have been prepared by the research team using Thane city ward-wise data from Census 2011.
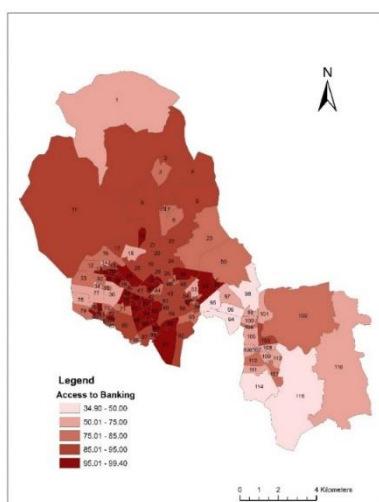
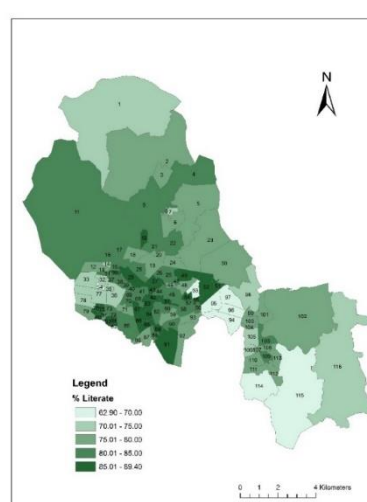**Figure 3: Ward-wise Female WPR, Thane, 2011**
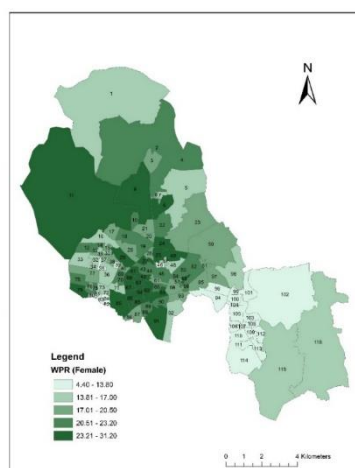
Figure 4: Ward-wise Male WPR, Thane, 2011
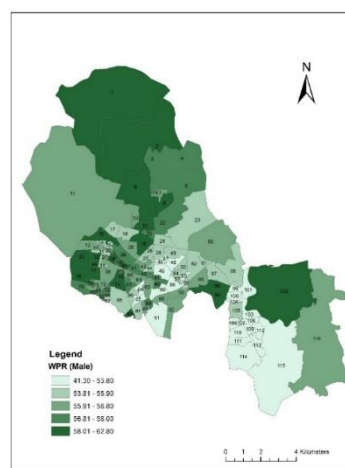
Figure 5: Ward-wise Access to Banking, Thane, 2011

Figure 6: Ward-wise Literacy Rate, Thane, 2011

3.2 Review of Methods for calculating City GDP

3.2.1 Simple Methods

There are some simple methods (for estimating GDP at the city level). The summary of outputs from applying these methods on data[5] from ES 2010-11, Census 2011, Maharashtra GSDP 2011-12 and EUS 2011-12 are given below (Table 6).

Table 6: Summary of Outputs from Simple Methods of estimating city-level GDP, 2011-12

Method		Thane City GDP
1. Apportioning using City Population[6]	Using State Population and State Domestic Product	₹ 18,851 Crore
	Using District Population and District Domestic Product	₹ 26,903 Crore
2. Apportioning Using Sectoral Employment[7]	Assuming distinct Worker Population Ratios for City and State	₹ 30,873 Crore
	Assuming equal Worker Population Ratio for City and State	₹ 36,118 Crore
3. Using Gross Value Added Per Worker and No. of Workers by NIC Compilation Categories[8]		₹ 6718 Crore

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[5] Thane City Population = 1.84 million (2011 Census); Thane District Population = 11.1 million; Maharashtra Population = 114.2 million (2011 Census); Maharashtra GSDP = ₹ 11.70 lakh crores (2011/12 CSO)

[6] $City\ GDP = \frac{City\ Population}{State\ (District) Population} \times Gross\ State\ (District) Domestic\ Product$

[7] $City\ GDP = \sum_{i=1}^{n} \frac{CW_i}{SW_i} \times GSDP_i$

Where, CW_i = Number of workers in the ith economic sector in the city, for n sectors
SW_i = Number of workers in the ith economic sector in the state, for n sectors
$GSDP_i$ = Contribution of ith economic sector in GSDP

[8] $City\ GDP = \sum_{i=1}^{n} GVAPW_i \times W_i$

Where, $GVAPW_i$ = Urban State Gross Value Added Per Worker in i^{th} Compilation Category of NIC
W_i = Number of city workers in i^{th} Compilation Category of NIC
For n such Compilation Categories

3.2.2 UM+LI and TC+LI methods

Table 7: Summary of GDP values obtained for Thane City, Thane District, Urban Maharashtra, and Maharashtra State, 2011-12

Region	Gross Domestic Product 2011-12 (in ₹ crore)	Notes
Maharashtra[#]	1170120	
Urban Maharashtra[^] *(LI Method)*	694533	59.3% of Maharashtra GSDP
Urban Maharashtra[^] *(CSO NAS Method)*	To be computed	-
Thane District[+]	158190	13.5% of Maharashtra GDP
Thane City[^] *(UM Method + LI Method)*	26037.8	3.1% of Estimated UM GDP
Thane City[^] *(UM Method + CSO NAS Method)*	To be computed	-
Thane City[^] *(TC Method + LI Method)*	22927.9	2.8% of Estimated UM GDP
Thane City[^] *(TC Method + CSO NAS Method)*	To be computed	-
[#] From Economic Survey of Maharashtra 2014-15 [+] From District Domestic Product of Maharashtra 2004-05 to 2013-14 [^] Computed by authors		

3.2.3 CSO NAS Methodology for estimating Rural and Urban Income

The last year for which economic activity-wise rural/urban breakup of value added is available is 2011-12 (year of base change). We are trying to communicate with CSO to try and replicate this methodology at the state level, for a refined approach to GCDP estimation. However, we have not been able to reach a resolution and further seek to attempt the same.

3.3 Measurement and Analysis of Thane GCDP 2011-12 to 2017-18

As discussed in earlier sections, the TC+LI method at present is hindered by issues of inadequate sample sizes. Hence, this study utilises the UM+LI method for measuring and analysing Thane GCDP for the years 2011-12 to 2017-18. The data used for computation in this section is obtained from the Economic Survey of Maharashtra 2018-19 from the Directorate of Economics and Statistics, Maharashtra.
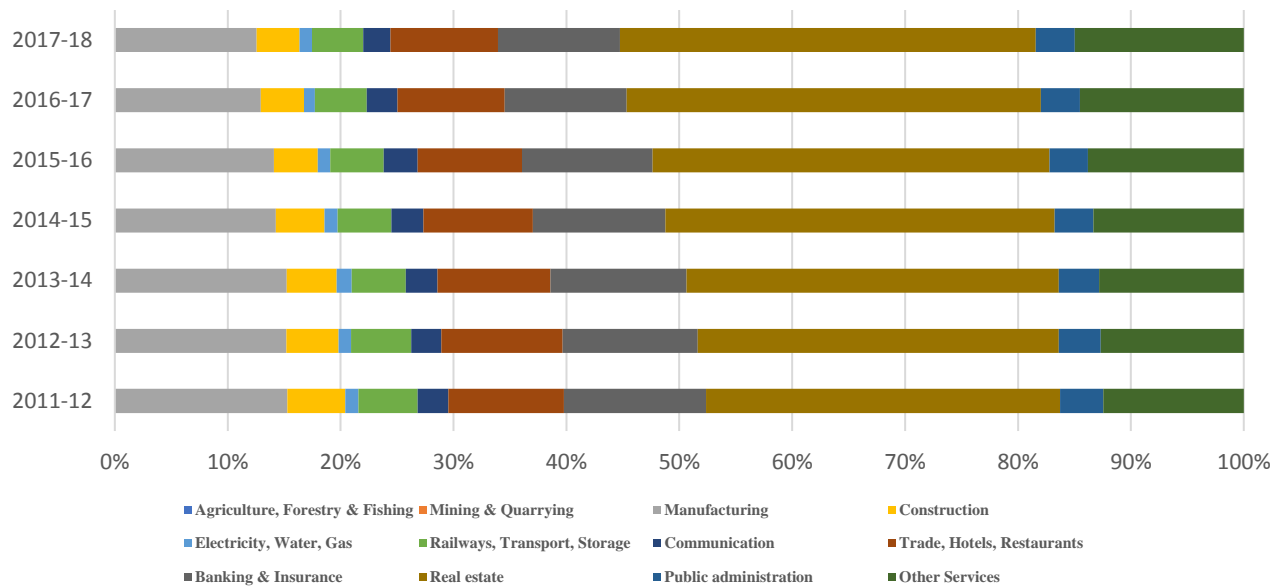
Table 8: Estimated Thane City GVA by Compilation Categories, using UM + LI Method (₹ crore)

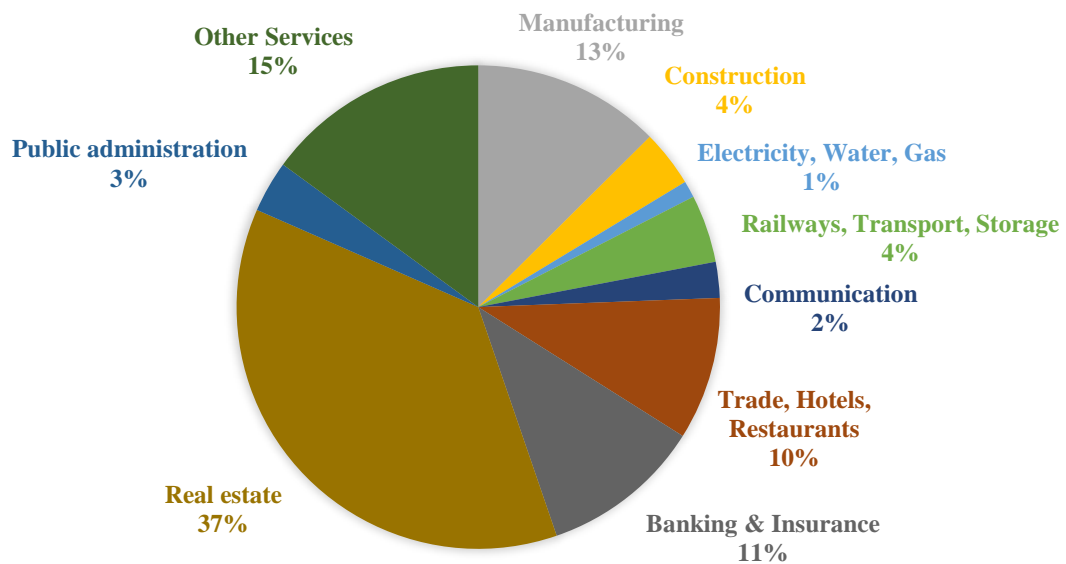| Compilation Category	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Agriculture, Forestry & Fishing	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mining & Quarrying	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manufacturing	4568.5	5237.0	6020.7	6350.2	6924.6	7001.7	7630.8
Construction	1528.7	1593.4	1756.2	1919.7	1905.6	2063.4	2302.6
Electricity, Water, Gas	350.8	382.8	527.7	512.0	541.3	518.3	677.4
Railways, Transport, Storage	1566.2	1831.5	1897.7	2121.4	2318.5	2481.4	2756.8
Communication	812.1	920.4	1110.5	1261.9	1484.0	1478.2	1459.6
Trade, Hotels, Restaurants	3063.6	3707.1	3954.9	4314.3	4531.0	5143.9	5806.8
Banking & Insurance	3759.2	4118.2	4776.6	5234.4	5686.1	5844.3	6555.9
Real estate	9373.2	11026.6	13053.4	15341.7	17266.8	19841.0	22389.8
Public administration	1149.1	1275.6	1410.0	1523.6	1670.3	1870.2	2097.8
Other Services	3716.7	4369.0	5069.9	5933.8	6778.1	7859.1	9096.0
Total	**29888.1**	**34461.6**	**39577.6**	**44512.9**	**49106.4**	**54101.5**	**60773.5**
% of Maharashtra GSVA	*2.61*	*2.66*	*2.69*	*2.80*	*2.85*	*2.85*	*2.89*
% of estimated Urban Maharashtra GSVA	*3.65*	*3.69*	*3.73*	*3.80*	*3.83*	*3.91*	*3.92*
Note: The compilation categories used in this calculation would require clarification from the DES regarding sub-categorisation, for final confirmation.							

Table 9: Estimated Percentage Shares of Compilation Categories in Thane City GVA (using UM + LI method), 2017-18

Compilation Category	GVA (₹ crore)	% Share
Agriculture, Forestry & Fishing	0.0	0.0
Mining & Quarrying	0.0	0.0
Manufacturing	7630.8	12.6
Construction	2302.6	3.8
Electricity, Water, Gas	677.4	1.1
Railways, Transport, Storage	2756.8	4.5
Communication	1459.6	2.4
Trade, Hotels, Restaurants	5806.8	9.6
Banking & Insurance	6555.9	10.8
Real estate	22389.8	36.8
Public administration	2097.8	3.5
Other Services	9096.0	15.0
Total	**60773.5**	**100.0**
% of Maharashtra GSVA	2.89	
% of estimated Urban Maharashtra GSVA	3.92	

* The estimates may be lower due to inadequate sample size for Thane City, for instance, for Electricity, Water and Gas, there are no entries. They can be recomputed using pooled sample data.
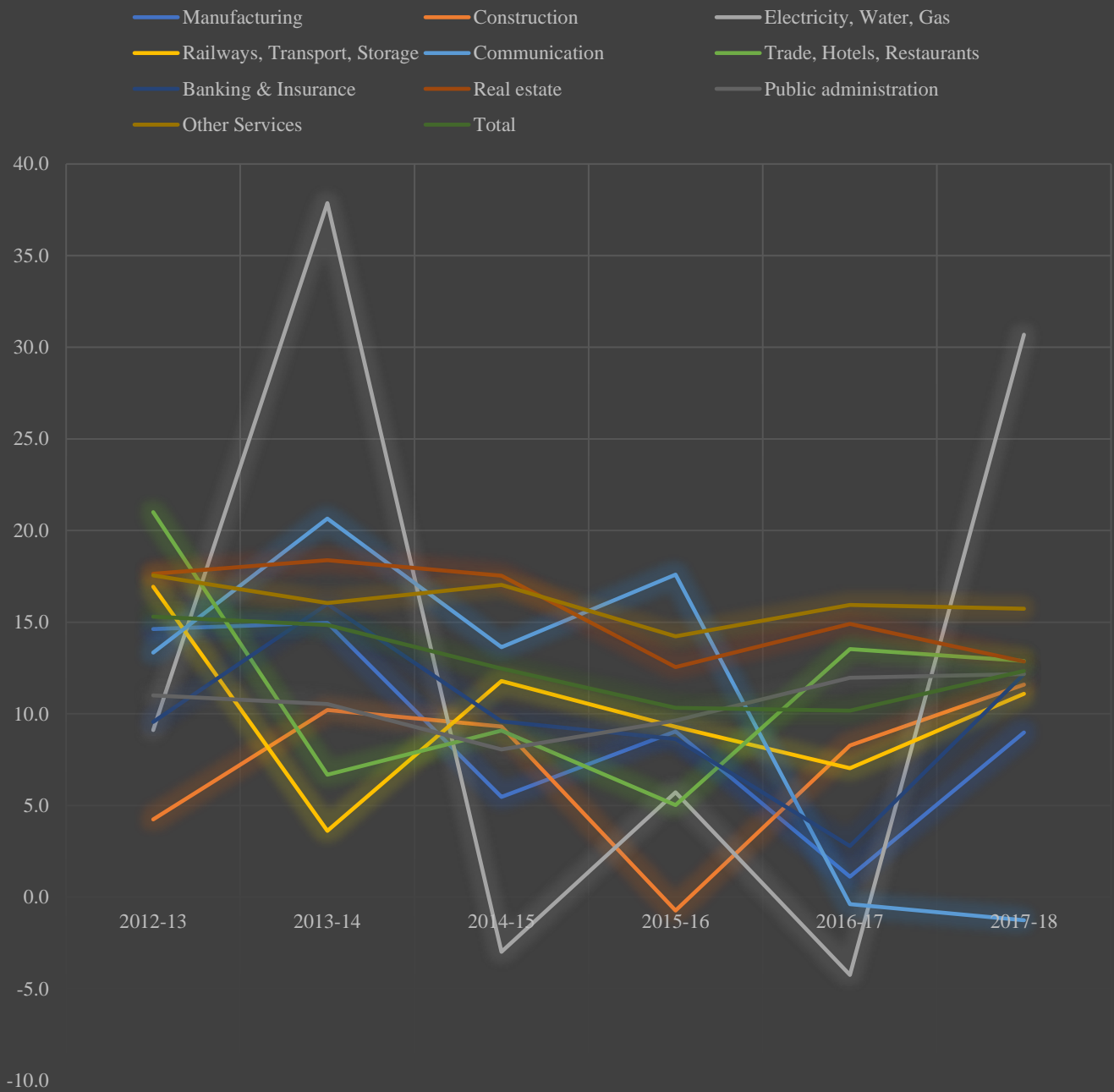
Figure 7: Shares of Compilation Categories in Estimated Thane City GVA, 2011-12 to 2017-18 (UM+LI Method)

Legend:
- Agriculture, Forestry & Fishing
- Mining & Quarrying
- Manufacturing
- Construction
- Electricity, Water, Gas
- Railways, Transport, Storage
- Communication
- Trade, Hotels, Restaurants
- Banking & Insurance
- Real estate
- Public administration
- Other Services

Figure 8: Percentage Shares of Compilation Categories in Estimated Thane City GVA for 2017-18 (UM+LI Method)

- Other Services 15%
- Manufacturing 13%
- Construction 4%
- Electricity, Water, Gas 1%
- Railways, Transport, Storage 4%
- Communication 2%
- Trade, Hotels, Restaurants 10%
- Banking & Insurance 11%
- Real estate 37%
- Public administration 3%

Figure 9: Annual Growth Rate of GVA of Thane City by Compilation Categories

Legend:
- Manufacturing
- Construction
- Electricity, Water, Gas
- Railways, Transport, Storage
- Communication
- Trade, Hotels, Restaurants
- Banking & Insurance
- Real estate
- Public administration
- Other Services
- Total

Highlights from the findings for Thane City GDP Estimation (2011-12 to 2017-18)

- Thane City makes up 1.64% of the State population and 3.62% of the population of Urban Maharshtra.
- The estimated GVA (by UM+LI method) for Thane City for FY 2017-18 is ₹ 60773 crores. Thane City accounts for 2.89% of Maharashtra's income and 3.92% of Urban Maharashtra's, as per this estimate.
- The estimated Gross City Domestic Product (GCDP) for Thane City, FY 2017-18, would, therefore, be ₹ 69695 crores (with GSDP taken from Economic Survey of Maharashtra 2018-19, Directorate of Economics and Statistics, Maharashtra). Real estate (37%), manufacturing (13%), banking and insurance (11%), trade, hotel & restaurants (10%), and other services (15%) sector constitute majority of these.
- Thane City's per capita GDP (as estimated from this study) is over ₹ 3 lakh – almost double that of the state.
- The own-tax to GDP ratio for the city stands at about 2.46%. The actual expenditure of Thane Municipal Corporation in the FY 2018-19 was ₹ 3642 crores.
- Thane City's estimated annual growth rate of GVA has consistently been around 2 percentage points higher than that of Urban Maharashtra and the state.

Figure 10: Annual Growth Rate of GVA
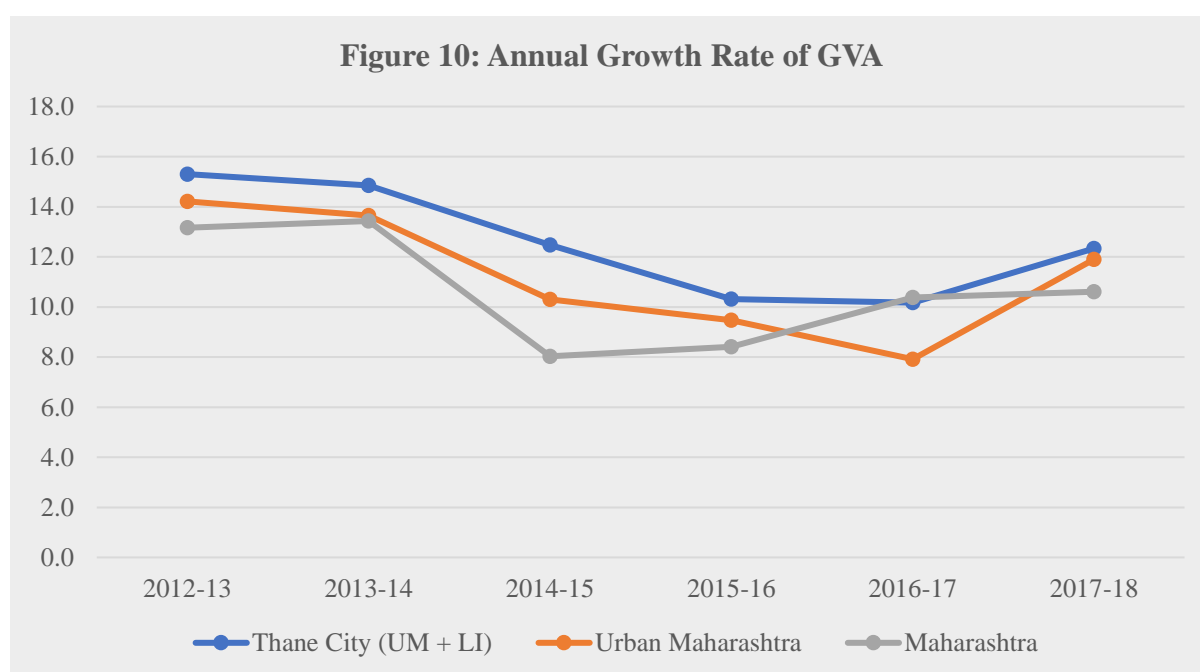
4. Conclusions

This paper attempts to review existing methodologies of estimating GDP at the city level and to examine the scope and feasibility of adapting them to the Indian context, by taking the case of Thane city. It has explored various approaches to estimating City GDP or GCDP. These include simple methods of apportioning the GSDP to the city by applying an appropriate weight such as population or employment, as well as methods proposed by the Consultation Paper by MoHUA, with modifications. Limitations and the scope of replicability of such an exercise have also been outlined.

This study provides a basic economic profile of Thane city by utilising secondary official data sources, to establish a context. The profile includes a demographic outline, details of workforce participation and compilation category-wise establishments and value added. Outputs of the spatial mapping component of this study have also been provided, with a ward-wise visualisation of indicators such as Worker Population Ratio, Access to Banking and Literacy Rate.

The methodologies used for GCDP estimation in this study are those based on simple calculations as well as more rigorous methods - namely UM+LI and TC+LI methods - based on data at the granular level. The CSO NAS methodology for estimating rural and urban national income could also be replicated at the state level, after seeking clarifications from CSO. A part of the estimation remains, as there is an unavailability of the required pooled sample data (centre and state sample) from the DES. Further computation would be carried out as and when the pooled sample data would be obtained. The methodology would also be refined and finalised after requisite clarifications and feedback from concerned stakeholders.

The estimated Gross City Domestic Product (GCDP) for Thane City, FY 2017-18, stood at ₹ **69695 crores**. Real estate (37%), manufacturing (13%), banking and insurance (11%), trade, hotel & restaurants (10%), and other services (15%) sector constitute majority of these. Thane City accounts for 2.89% of Maharashtra's income and 3.92% of that of Urban Maharashtra's, as per this estimate. Thane City's per capita GDP is over ₹ 3 lakh – almost double that of the state. Thane City's estimated annual growth rate of GVA has consistently been around 2 percentage points higher than that of Urban Maharashtra and the state.

Overall, this study pioneers the organisation of the structures and processes of estimation and enables evidence-backed policymaking and planning. This becomes instrumental for the growth and development of cities and in ascending towards the vision of a US$ 5 trillion economy of 'New India'.

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Annexures

Annexe Table 1: Details of Industry-wise allocation of income between Rural and Urban Sectors

S No	Industry	Indicator used for allocation between rural and urban	Data Source	Recent data
1	Agriculture	Total area operated in rural and urban areas from Situation Assessment Survey (SAS) of Farmers, 2002-03 conducted by NSSO	NSSO Situation Assessment Survey (SAS) of Farmers, 2002-03	NSSO Situation Assessment Survey (SAS) of Farmers, 2013, 70th Round
2	Livestock	Livestock population in rural and urban areas from All India Livestock Census 2003	All India Livestock Census 2003	19th All India Livestock Census 2012
3	Forestry and Logging	Firewood production: firewood consumption expenditure in rural and urban areas from 61st round Consumer Expenditure Survey, 2004-05; Industrial wood: growing stock of Trees Outside Forest in rural areas as estimated by Forest Survey of India	NSSO CES 61st Round, 2004-5; Forest Survey of India	NSSO CES 68th Round, 2011-12 (upcoming 75th Round 2017-18); Forest Survey of India 2017
4	Fishing	Rural and urban workforce estimates multiplied by estimated average wage for unskilled workers in rural and urban areas respectively as available from 61st round Employment Unemployment Survey (EUS), 2004-05	NSSO EUS 61st Round 2004-5	NSSO EUS 68th Round, 2011-12 (upcoming 75th Round 2017-18)
5	Mining and Quarrying	Rural and urban workforce estimates in mining and quarrying as available from 61st round EUS, 2004-05	NSSO EUS 61st Round 2004-5	NSSO CES 68th Round, 2011-12 (upcoming 75th Round 2017-18)
6	Registered Manufacturing	Estimated NVA in rural and urban areas as available from Annual Survey of Industries, 2004-05	Annual Survey of Industries, 2004-05	Annual Survey of Industries, 2016-17
7	Unregistered Manufacturing	Rural and urban GVA estimates as available from Enterprise Survey on unorganized manufacturing sector, 62nd round, 2005-06	NSSO Enterprise Survey on unorganized manufacturing sector, 62nd round, 2005-06	NSSO Unincorporated Non-agricultural Enterprises (exc. Construction) 67th Round 2010-11 and 73rd Round 2015-16
8	Electricity, gas, water supply	Rural and urban workforce estimates in electricity, gas, water supply as available from 61st round EUS, 2004-05	NSSO EUS 61st Round 2004-5	NSSO EUS 68th Round, 2011-12 (upcoming 75th Round 2017-18)
9	Construction	Public Administration and DCUs: Estimated labour input from 61st round EUS, 2004-5 for the construction industry in the respective institution.; NDCUs: agriculture and allied, mining and quarrying: NVA on account of generation of type of asset 'construction' in industries like agriculture and allied, mining and quarrying is allocated to rural areas only. NVA on account of generation of type of asset 'construction' in	NSSO EUS 61st Round 2004-5; ASI 2004-5; RBI Statistical Tables for Banks 2004-5; NSSO AIDIS 2002-3	NSSO EUS 68th Round, 2011-12 (upcoming 75th Round 2017-18); ASI 2016-7; NSS AIDIS 70th Round 2013

		industries like construction, trade, hotel-restaurants, transport, storage, real estate, other services etc is allocated to urban areas only. For remaining industries, the indicator is rural-urban distribution of new construction of joint-stock companies from ASI, 2004-05.; Private Corporate Sector: Except for other scheduled commercial banks (OSCB), similar methodology as in case of NDCUs. OSCBs (private banks and foreign banks): Rural and urban share of sum of deposits and credits of OSCBs in 2004-05 from the publication 'Statistical Tables relating to Banks in India, 2004-05', of RBI.		
10	Trade, hotel and restaurants	Public: Rural and urban workforce estimates in trade and hotel restaurants in public sector as available from 61st round EUS, 2004-05; Private organized: Rural and urban workforce estimates in trade and hotel restaurants in private organized sector as available from 61st round EUS, 2004-05; Unorganized: rural and urban NVA estimates are prepared separately for unorganized sector utilizing estimates of GVAPW and workforce in rural and urban areas from 57th round Enterprise Survey on service sector and 61st round EUS, 2004-05 for hotel and restaurants and estimates of GVAPW and workforce in rural and urban areas from 55th round survey of NSSO on informal sector for trade sector	NSSO EUS 61st Round 2004-5; NSSO Enterprise Survey on Service Sector 61st Round; NSSO ES Informal Sector 55th Round 1999-2000	NSSO EUS 68th Round, 2011-12 (upcoming 75th Round 2017-18); NSSO Enterprise Survey on Service Sector 63rd Round 2006-7 & 74th Round 2016-17; NSSO Unincorporated Non-agricultural Enterprises (exc. Construction) 67th Round 2010-11 and 73rd Round 2015-16
11	Transport other than railways	Similar methodology as above	'	'
12	Communication	Public sector: Rural and urban workforce estimates in communication in the public sector as available from 61st round EUS, 2004-05; Private sector: i. Courier and cable activities: similar methodology as in hotel and restaurants; ii. Other communication in private organized part: assumed to be occurring in urban areas only; iii. Other communication in unorganized sector: similar methodology as in the unorganized sector in hotel and restaurants	NSSO EUS 61st Round 2004-5	NSSO EUS 68th Round, 2011-12 (upcoming 75th Round 2017-18)
13	Banking and Insurance	Rural and urban deposits and credits of scheduled commercial banks from 'Basic Statistical Returns, 2004-05' published by Reserve Bank of India	Basic Statistical Returns, 2004-05 by Reserve Bank of India	Basic Statistical Returns 2018 by Reserve Bank of India
14	Real estate, ownership of dwelling, business services	Similar methodology as in hotel and restaurants except for private organized part of software and ownership of dwellings. GVA in software service in organized sector assumed to be in	As in hotels and restaurants; Census 2001	As in hotels and restaurants; Census 2011

		urban areas only. GVA in Ownership of dwelling is estimated separately for rural and urban areas as described in the respective chapter.		
15	Public administration and Defence	Estimated distribution of regular central government employees in different pay scales and location wise dispersal of employees in different type of locations from table 7 and table 8 of 'Census of Central Government Employees as on 31st March 2004' of Directorate General of Employment and Training (DGET); Information on pay and allowances in different pay ranges available in the brochure on Pay and Allowances of Central Government Civilian Employees, 2004-05 published by the Pay Research Unit of Ministry of Finance; Using above two estimated income of central government employees are generated in different type of locations. Cities categorized as A1, A, B, C are classified as urban and remaining are treated as rural; Proportion of estimated rural income out of total income in case of central government employees used as the indicator.	Census of Central Government Employees as on 31st March 2004' of Directorate General of Employment and Training (DGET); Pay and Allowances of Central Government Civilian Employees, 2004-05 published by the Pay Research Unit of Ministry of Finance	Recent Estimates from same source
16	Railways	Estimated rural and urban workforce from RGI Population Census, 2001	Census 2001	Census 2011
17	Other Services	For education, medical, sewage, television & radio broadcasting in public sector, estimated rural and urban workforce from 61st round of EUS, 2004- 05; For remaining similar methodology as in case of hotel and restaurants	NSS EUS 61st Round 2004-5	NSSO EUS 68th Round, 2011-12 (upcoming 75th Round 2017-18)
Source: National Accounts Statistics: Sources and Methods 2012, CSO, MoSPI, GoI				