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Linking Tourism, Local Environment and Waste Generation in Indian Himalayan States : Constructing a Tourism SAM for Uttarakhand 2015-16

Working Paper 1

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I. Introduction

Background

Indian Himalayan Region (IHR) constitutes about 17% of the country's geographical area and is classified as one of the 35 Global Biodiversity Hotspots. The region is home to nearly 25,000 plant species which is 50% of India's endemic flora and hosts several species of fishes, amphibians, reptiles, birds, and mammals. The importance of this rich biodiversity and the ecological services that it offers is well recognized and a lot of efforts have been undertaken to assess and conserve the area by governmental as well as non-governmental organizations. Organizations such as the World Wildlife Fund (WWF) for Nature have been working extensively to conserve the region and create sustainable livelihood opportunities for the native population. Several action-based studies focusing on combining conservation with the socio-economic development of the region are also being carried out. However, most of these studies are focused on small geographies and there is a disconnect between macro policies implemented by state government and micro-level interventions undertaken by governmental and non-governmental institutions.

Recognizing the importance of promotion of high-quality research with adequate field data support and integrated state-level policy approach in finding solutions to prevailing environmental problems, the Government of India launched the "National Mission on Himalayan Studies (NMHS)" a central sector grant-in-aid scheme with a vision "to support the sustenance and enhancement of the ecological, natural, cultural and socio-economic capital assets and values of the Indian Himalayan Region (IHR)"¹. This study carried out under the aegis of NMHS intends to provide guidance on state-level policies for better management of municipal solid waste (MSW) in IHR. According to the data shared by the Ministry of Housing and Urban Affairs in 2018, out of five states in IHR which are Jammu & Kashmir (Now a Union Territory), Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh, Uttarakhand had the lowest proportion of MSW undergoing treatment which makes it a good case-study area for this study².

The objectives of the study are as follows:

- Understanding the linkages between tourism, local environment and waste generation at state level.
- Finding the ideal policy instruments for effective waste management in the state.

¹ <u>https://nmhs.org.in/pdf/publication/Mission_Documents/MIssion_Document.pdf</u>

² http://164.100.47.193/lsscommittee/Urban%20Development/16_Urban_Development_22.pdf

A Synopsis on the State of Uttarakhand

Geography and Demographics

Formerly, a part of the Indian state of Uttar Pradesh, Uttarakhand became the 27th state of India on 9th November 2000. The total geographical area of the state is 53,483 square kilometers with 86% of area categorized as mountainous regions and 65% covered under forests. It also hosts 6 national parks and 7 wildlife sanctuaries and is split into 13 districts. According to the 2011 Census, Uttarakhand is home to a population of little above 1 Crore with 70% population living in rural parts and the remaining 30% residing in urban regions of the state.

Tourism in Uttarakhand

Uttarakhand, often referred to as 'Devbhumi' (Land of the Gods), attracts millions of domestic and foreign tourists every year. In the year 2015-16, approximately 32 million tourists from all over the world visited Uttarakhand. The 2018 Tourism Policy of Uttarakhand predicts the tourist arrivals in the state to grow at 7% (Compounded annual growth rate) between the years 2017 and 2027 (Uttarakhand Tourism Policy, 2018).



Figure 1: Year-wise Tourist Visits to Uttarakhand

(Source: Market Research Division, Ministry of Tourism)

The rise in tourism in the state has led the state government to allocate more resources to tourism-based schemes and policies. However, this push towards tourism and the resultant increased economic activity has resulted in a substantial rise in Municipal Solid Waste (MSW) generation. This poses a challenge for the state government which needs to deal with the same urgently and efficiently.

This study focuses on three main components which are: a) Development of an Input-Output (I-O) model and Social Accounting Matrix (SAM) with tourism and waste as separate sectors, b) Development of a separate waste model to integrate it into the SAM, c) Development of a Computable General Equilibrium (CGE) model for the state economy and d) Formulation of policy recommendations for better waste management in Uttarakhand based on the model results.

In this paper, the discussion centers on the construction of a regional I-O model and SAM for the state of Uttarakhand. This SAM has been further utilized to prepare a working CGE model for Uttarakhand and has been linked with a waste model of the state. The details of the CGE and waste model are in working paper 2 of this series, 'Linking Tourism, Local Environment and Waste Generation in Indian Himalayan States Using CGE Model: Case-study of Uttarakhand'.

This working paper is organized in the following manner: section II provides a review of existing literature pertaining to regional SAM and inclusion of tourism as a distinct sector in the SAM. Section III discusses the methodology behind the preparation of SAM for Uttarakhand and the construction of tourism as a sector. Furthermore, section IV details out the tourism multiplier analysis for Uttarakhand, and section V deals with tourism policies in the state. Lastly, the conclusion has been presented in section VI.

II. Literature Review

Regional Input-Output Model and Social Accounting Matrix

There are a number of papers that look at input-output tables from the state or local economy lens. However, papers looking at tourism input-output are rare. Rarer still are papers that look at the interaction of both tourism and waste generation. Drilling down input-output models at the sub-national levels requires extensive data from multiple sources. In the current case, macroeconomic data has been taken from the State's Directorate of Economics and Statistics (DES), unit-level national sample surveys as well as other state-level bodies. For requisite data that was not readily available we have imputed the numbers from the national input-output tables.

Linking Tourism and Local Economy

The United Nations World Tourism Organization (UNWTO) defines tourism as a social, cultural and economic phenomenon which entails the movement of people to countries or places outside their usual environment for personal or business/professional purposes (Tourism Satellite Account: Recommended Methodological Framework, 2008). These people are called visitors (which may be either tourists or excursionists; residents or non-residents) and tourism has to do with their activities, some of which

involve tourism expenditure. With, on average 32 million tourists visiting every year from all over the world, Uttarakhand is mainly a tourism-driven economy.

The UNWTO has recommended a methodological framework to streamline the methodology to build a Tourism Satellite Account (TSA) for an economy in which tourism has been recognized as a demand side phenomenon. Based on the UNWTO recommended framework, the National Council for Applied Economic Research (NCAER) under the studies commissioned by the Indian Ministry of Tourism has been prepared TSAs for India for the years 2002-03³, 2009-10⁴ and 2015-16 (Munjal, et al., 2018). Other countries such as the United States, the European Union, Hong Kong etc. have also been preparing TSAs from time to time to study the impact of tourism on their economies. NCAER also prepared a regional TSA for Uttarakhand for the year 2009-10 in which the share of tourism, direct and indirect, in total state domestic product in that year was found to be 9.3 per cent. Further, the contribution of tourism to total employment in 2009-10 was 17.10 per cent (Munjal, et al., 2016).

Due to its demand-based nature, linking tourism with other sectors of the economy has always remained a complex exercise. However, introduction of tourism as a distinct sector in the state SAM to link it with the economy and with waste generation is the core of the study. This is carried out through calculation of Tourism Industrial Ratios (TIRs) for a set of tourism-dependent industries in the state. Further elaboration on TIRs and introduction of tourism to the SAM has been provided in section III.B.

III. Methodology

For maintaining consistency with the available macroeconomic data, the base year chosen for this study is 2015-16.

A. Compilation of Input-Output Table and Social Accounting Matrix

The construction of the I-O table and SAM for Uttarakhand requires data on the sector-wise value of outputs, input structure, estimates of sector-wise consumption of all the components of final demands, sector-wise, and household-type wise factor earnings as well as tax revenues accruing to the government.

Output Structure

Agricultural Sectors: Crops, Livestock, Forestry & Logging and Fishing

The sectoral estimates of Gross value Added (GVA) for crops, livestock, forestry & logging and fishing are gathered from the disaggregated state domestic product data brought out by the Directorate of

³ <u>http://tourism.gov.in/sites/default/files/Other/011%20TSAI.pdf</u>

⁴ <u>http://www.ncaer.org/publication_details.php?pID=112</u>

Economics and Statistics, Government of Uttarakhand (DES, 2017). Estimates of the Gross Value Output (GVO) are calculated using the proportion of GVA to GVO according to the revised estimates for 2015-16 for Uttarakhand, provided by the Uttarakhand Directorate of Economics and Statistics (DES) Report on State Domestic Product Estimates⁵.

Mining and Quarrying

Due to the lack of item wise data for the sub-components of mining and quarrying at the state level, this sector is not disaggregated while incorporating into the IO matrix. The data for GVA in Uttarakhand, is obtained from the (DES, 2017). For calculating the GVO at the state level, first the national level GVA from mining and quarrying is divided by its corresponding GVO. The ratio so obtained is further divided by the GVA for this sector in Uttarakhand. Thus, the assumption is that the ratio of GVA to GVO at the national level, holds true for the state level calculations as well.

Manufacturing Sectors

Inter-industry demand, value of output and value added for registered manufacturing firms in Uttarakhand have been computed using the Annual Survey of Industries 2013-14. Concordance tables had to be built between the industrial classification (NIC 2008) and the type of products produced (NPC 2011). This mapping was useful not just to understand the total value of output and value-added created firm-wise, but it also helped to identify joint-products produced by each industry. This concordance table was thereupon matched with the consumption profile of all industries to derive the inter-industry demand for products.

A similar, albeit simpler, exercise was done for unorganized manufacturing using the NSSO survey data on unincorporated non-agricultural enterprises (73rd Round, 2015-16). In this case while a systematic characterization of output wasn't available like ASI's NPC, we attempted to classify the outputs produced ourselves using the broad contours of the NPC. Data on value of output and value added was however, easily estimable.

Construction

Due to unavailability of data on construction output for the state of Uttarakhand, national level estimates have been put to use to derive the state level numbers. The data for GVA in Uttarakhand of this sector has been obtained from statistics published by DES Uttarakhand for the year 2015-16. For calculating the GVO at the state level, first the national level GVA from construction was divided by its corresponding GVO. The ratio so obtained was further divided by the GVA for this sector in Uttarakhand. This has been done assuming that the ratio of GVA to GVO for Uttarakhand are same as the National level.

⁵ Available at: <u>https://des.uk.gov.in/files/GSDP_BOOK_2016-17.pdf</u>

Electricity, Gas & Water Supply

The GVO estimates for this sector have also been estimated from the national level numbers in a similar manner as done for the construction sector.

Services Sectors

The recent data from NSSO survey round on services conducted for the year 2016-17 hasn't been released for research purposes. While the GVA numbers are collated from statistics published by DES, Uttarakhand, due to unavailability of the NSSO data, the GVO estimates are calculated from the national level estimates of the same for services sector. This has been done assuming that the ratio of GVA to GVO for Uttarakhand for services follow same structure as observed at national level (DES, 2017)

Input Structure

Crops, Livestock, Forestry & Logging and Fishing

For the crops and livestock subsectors, the difference between GVO and GVA estimates has been used as the value of inputs after, adjusting for taxes. Data pertaining to value of individual inputs is obtained from the DES report⁶ and their respective shares in the total input value are calculated. After the input categories are concorded with the IO sectors used in this study (shown in Tables 1 and 2 below), the ratios so obtained are multiplied by the value of inputs calculated earlier. Similarly, the input values for forestry & logging and fishing is calculated by subtracting GVA and taxes from GVO estimates. However, the input structures for Uttarakhand for these subsectors are derived using the all India figures for 2015-16. After calculating the ratio of inputs for each item as a share of the total inputs used in that sector, at the all India level, the proportions are multiplied with the value of inputs calculated earlier for the state.

Inputs	Concordance
Seeds	Agriculture
Organic Manure	Livestock
Chemical Fertilizers	Chemicals and Pharmaceuticals
Current repairs, maintenance of	
fixed assets and other operational	
costs	Other services
Feed of livestock	Agriculture
Irrigation charges	Electricity and water supply
Market charges	Trade, Hotels & Restaurant
Electricity	Electricity and water supply

Table 1: Inputs for Crops

⁶ Available at: <u>https://des.uk.gov.in/files/GSDP_BOOK_2016-17.pdf</u>

Pesticides and insecticides	Chemicals and Pharmaceuticals
	Other manufacturing (other
Diesel oil	petroleum products)

Table 2:Inputs for Livestock

Inputs	Concordance
Market Charges	Trade, Hotels & Restaurant
Repair and maintenance	Other services
Feed for livestock	Agriculture

Mining and Quarrying

The value of inputs is calculated by subtracting GVA and taxes from GVO and the input structure in the IO follows the same ratios as the all India estimates of 2015-16.

Manufacturing Sectors

The input structure has been taken from Annual Survey of industries and was aggregated based on an extensive concordance exercise. For each industry (based on National Industrial classification or NIC), products consumed (according to National Product classification or NPC) were identified in value terms. After this step, these specific items or product categories (according to NPC) were concorded to industries that primarily produced it (NIC based). This helped derive a direct NIC to NIC concordance to arrive at the interindustry consumption.

Construction, Electricity, Gas & Water Supply and Services Sectors

The input structures for the sectors, Construction, Electricity, Gas & Water Supply and the remaining services sectors for Uttarakhand are derived using the all India figures. After calculating the ratio of inputs for each item as a share of the total inputs used in that sector, at the all India level, the proportions so obtained are adjusted according to items produced in Uttarakhand. These adjusted ratios are then multiplied with the total inputs for each of the items for Uttarakhand. In case of unavailability of total inputs for a sector, the total inputs used are computed based on national-level ratios. (DES, 2017)

Final Demand

Government Final Consumption Expenditure (GFCE)

Data for tax revenue raised by the Uttarakhand government was obtained from the Report of the Comptroller and Auditor General of India (2017)⁷. The different revenue heads were then categorized into direct and indirect taxes. The revenue head titled 'others' was divided into direct and indirect tax

⁷ Available at <u>http://agua.cag.gov.in/files/Report_No.1_2016-17_English_.pdf</u>

in proportion to the shares of direct and indirect tax collection for the state. In addition, the devolution of taxes collected by the center that are received by the Uttarakhand government was also accounted for. Transfer payments in the form of Grants in Aid have been included as well. Our study differs from the Saluja (2014) ⁸ paper in this regard, who has not incorporated the share of the state government in the proceeds from duties and taxes collected by the center and receipt of grants. The report on the Analysis of Uttarakhand State Budget 2013-14 was used for collecting data on interest paid on public debt.⁹

Gross Fixed Capital Formation (GFCF)

The Uttarakhand State Budget Analysis Report (2013-14) was used to collect the data on Gross Fixed Capital Formation (GFCF).

Taxes

The data on taxes paid by the corporate sector was collected from the Uttarakhand State Budget Analysis Report (2013-14).

Net Factor Income from Abroad (NFIA)

The data for both remittances received and paid was obtained from the Uttarakhand State Budget Analysis Report (2013-14). The difference between these heads was hen calculated to arrive at NFIA.

Private Final Consumption Expenditure (PFCE)

For the calculation of item-wise PFCE, data from National Sample Survey Office (NSSO) 68th Round Household Consumption Expenditure Survey (2011-12) has been used. The methodology has been explained in detail in Annexure 6 attached. The data has been adjusted to arrive at PFCE numbers for Uttarakhand for the year 2015-16 using the national level PFCE estimates published by National Account Statistics (NAS) for that year.

Household Income Levels

The data on household type-wise income has been extracted from the Centre for Monitoring Indian Economy (CMIE) Consumer Pyramids survey. The details regarding this are explained in Annexure 7 of this paper.

⁸ Saluja, M. R. "Construction of Social Accounting Matrix for Andhra Pradesh (AP) for 2007–08." *Review of Market Integration* 6, no. 2 (2014): 175-235
⁹Available

http://des.uk.gov.in/files/AN_ANALYSIS_OF_STATE_GOVERNMENT_BUDGET_OF_UTTARAKHAND_ [2013-14(Actual),2014-15(Revised)__2015-16(Estimated)],.pdf

B. Tourism Industry Ratios and Inclusion of Tourism into SAM

In the study, TIRs are calculated for a set of tourism dependent industries of the state. TIRs are defined as the share of tourism demand in a particular industry's total supply and are derived for a set of certain tourism-dependent industries. These tourism-dependent industries are further classified into two sets of industries: tourism characteristic industries and tourism related industries. Tourism characteristic industries are industries which are significantly dependent on tourism and may cease to exist in the absence of it. These are:

- a. Accommodation services
- b. Food and beverages serving services
- c. Passenger transport services- railway, road, water and air
- d. Transport equipment rental services
- e. Travel agencies and similar
- f. Other tourism driven recreational and entertainment activities

On the other hand, tourism related industries are the ones whose products are consumed by tourists in considerable amount, but they would not cease to exist in the absence of it. Those industries are as follows:

- a. Clothing and Garments
- b. Processed Food
- c. Tobacco Products
- d. Alcohol
- e. Durable Goods
- f. Footwear
- g. Toiletries
- h. Gems and Jewelry
- i. Medicine and Public Health Related Items
- j. Printing and Publishing

The study follows the methodology recommended in the works of Bhatt and Munjal (2013) to present tourism as a distinct sector in a SAM of an economy. NCAER in its 2009-10 study (Munjal, et al., 2016), derived the state TIRs from national-level TIRs. This has been done due to unavailability of Supply-Use Tables (SUT) for the state. As this study involves development of state specific SAM, the TIRs are also computed directly at the state level.

The computation of TIRs requires measurement of internal tourism consumption and outbound tourism consumption for the abovementioned set of tourism-dependent industries. Internal tourism consumption is the sum of domestic tourism consumption and inbound tourism consumption. For Uttarakhand, domestic tourism consumption is the tourism consumption of a resident within the state. The inbound tourism consumption is the consumption of a non-resident visitor in Uttarakhand.

Outbound tourism includes the activities of a resident of Uttarakhand outside the state. It can be either as a part of a foreign trip or as a part of a domestic journey. For the outbound tourism consumption, only the pre-trip expenditure incurred by residents of the state is considered.

Required Data Sources for Estimation of Tourism Consumption Expenditure and Tourism Industry Ratios

Domestic Tourism Survey 2014-15

The study uses data from Domestic Tourism Survey (DTS) carried out as a part of 72nd round (2014-15) of sample surveys conducted by National Sample Survey Office (NSSO). It is an all-India household survey and provides data on parameters such as household characteristics, number of trips taken by a household member, total consumption expenditure incurred by a household on a trip etc.

This data is used to get estimates of item-wise expenditure incurred by tourists who travelled within the state and also tourists who belonged to other states of India but their main destination was Uttarakhand.

Indian Tourism Statistics published by Ministry of Tourism

Market Research Division, Ministry of Tourism publishes Indian Tourism Statistics annually. This data is required to get the number of total tourist arrivals, both foreign and domestic, in Uttarakhand.

<u>Tourism Satellite Account for India 2015-16 and Regional Tourism Satellite Account for Uttarakhand 2009-10 prepared by NCAER</u>
 NCAER in its preparation of TSA for India uses data from International Passenger Survey (IPS)¹⁰ of India to arrive at outbound expenditure incurred by residents of the country on foreign trips and also expenditure done by foreign tourists visiting India.

¹⁰ Under the studies commissioned by the Indian Ministry of Tourism, Indian Statistical Institute, Kolkata conducts International Passenger Survey (IPS) for India. This survey is crucial as it provides estimates of the expenditure incurred by the outbound tourists of the country going on foreign trips and also to estimate the expenditure done by foreign tourists visiting India. The survey has been conducted for the years 2010-11 and 2015-16.

The study refers to the estimates of outbound expenditure and foreign inbound expenditure in regional TSA of Uttarakhand for the year 2009-10 and for India for the year 2015-16 as published by NCAER. These estimates are utilized to derive the outbound expenditure and foreign inbound expenditure for Uttarakhand for the year 2015-16. Following assumptions are made in the course of this particular exercise:

-The expenditure pattern of foreign tourists visiting the state are same as observed at national level. -The expenditure structure of outbound tourists in the state for the year 2015-16 has remained similar to those observed in 2009-10.

 Estimates of State Domestic Product published by Directorate of Economics and Statistics, <u>Uttarakhand</u>

The study also uses the State GVA and State Domestic Product (SDP) published annually by the DES, Uttarakhand (DES, 2017)

Calculation of Tourism Expenditure and Tourism Industry Ratios

i. Internal Tourism Expenditure

Internal tourism expenditure is the sum of inbound tourism expenditure and domestic tourism expenditure. The inbound tourism expenditure has both domestic and foreign components.

Inbound Tourism Expenditure

• Inbound Domestic Tourism Expenditure

The inbound tourists consist of tourists visiting Uttarakhand from other states of India. The data on item-wise expenditure incurred by them is extracted from DTS for year 2014-15. These are adjusted for the year 2015-16 using the Private Final Consumption Expenditure (PFCE) of the year 2015-16 available from National Accounts Statistics (NAS) for India.

• Inbound Foreign Tourism Expenditure

The inbound foreign tourism expenditure for Uttarakhand are derived by adjustment of inbound foreign tourism expenditure for Uttarakhand available for the year 2009-10 by national level estimates published by NCAER for the year 2015-16. As stated earlier, an assumption that the expenditure pattern of foreign tourists visiting the state are similar as observed at national level has been made.

Domestic Tourism Expenditure

Domestic Tourism Consumption includes consumption of tourists from and within the state. The detailed estimates of domestic tourism expenditure are computed from DTS for the year 2014-15 and are adjusted for the year 2015-16 using the PFCE estimates for the state for the same year.

ii. Outbound Tourism Expenditure

This includes the pre-trip expenditure incurred by the residents of the state on tourism characteristic and tourism connected products. This is calculated by adjusting the 2010-11 state-level estimates to the 2015-16 estimates of outbound tourism expenditure available at national level. Over the course of this exercise, it has been assumed that the expenditure structure of outbound tourists in the state for the year 2015-16 has remained similar to those observed in 2009-10.

The tourism expenditure is determined for the abovementioned set of tourism dependent industries. These industries are then mapped to the other sectors already present in the SAM. The mapping is presented in Annexure 2. Out of those sectors, the sectors such as Processed Food, Rubber and Plastic, Other Manufacturing, Transport, Trade, Hotels & Restaurants and Other Services are identified as tourism relevant sectors. Following this, the TIRs are computed for these sectors by taking the proportion of tourism expenditure in the total output of these sectors. The TIRs are present in Annexure 3 of the paper.

The derived TIRs are first applied to row components of the tourism relevant sectors to get the value of tourism components which are used as intermediate inputs to other sectors. The components drawn out from each cell of the rows are added to form the tourism row. Following the similar methodology, the tourism column is also derived.

IV. Tourism Multiplier Analysis

Tourism has both direct and indirect effects on an economy. As part of the study, a separate SAM-based multiplier analysis is also carried out to evaluate the contribution of tourism to Uttarakhand's economy for the year 2015-16. More specifically, the contribution of tourism to state's total GVA and employment are reviewed.

To calculate multipliers, the sectors other than the production accounts are taken as exogenous. Based on the production account, input-output coefficients for each sector are computed and this matrix is called coefficient matrix (Bhatt & Munjal, 2013).

	Production	Factors of	Households	Indirect	Government	Capital	Rest of	Total
	Account	Production		Taxes		Account	the	
							World	
Production	I _{ij}	Exogenous	-					Xj
Account								
Factors of	Exogenous							
Production								
Households								
Indirect Taxes								
Government								
Capital								
Account								
Rest of the								
World								
Total	X _j							

That is, coefficient of matrix is derived as:

$$a_{ij} = \frac{l_{ij}}{X_j}$$
 for $j = 1$ to 22

Where, I_{ij} = Intermediate input going from sector *i* to *j*,

 X_j = Value of output of sector *j*,

and $X_i = \sum_{j=1}^{22} a_{ij}$. If the final demand vector is *Y* and the coefficient matrix is represented by *A* then a system of equations is presented as:

$$X = AX + Y$$

If A and F are known, this system could be solved for final levels of output. Further,

$$X = AX + Y$$
$$(I - A)X = Y$$
$$X = (I - A)^{-1}Y$$

and $(I - A)^{-1}$ is called the Leontief Inverse, also called as R-matrix or the Matrix Multiplier. A single element of this matrix is an indicator of all the direct and indirect effects created in sector *i* to supply a single unit of final demand for sector *j*. The sum of each column representing a sector in this matrix is called the output multiplier of that sector.

As part of the study, both the indirect and direct contribution of tourism to state's GVA and total employment are computed using the Leontief Matrix. While the Value Added (VA) for sectors other than tourism are compiled from annual reports published by DES, Uttarakhand, the VA of tourism sector is determined by applying TIRs to tourism-relevant sectors. The sector-wise employment figures

for Uttarakhand are estimated using the Periodic Labour Force Survey (PLFS) 2017-18. It should be noted that while conducting this exercise, it has been assumed that the employment structure in the same has not undergone significant change from the year 2015-16 to 2017-18.

The Leontief Matrix is shown in Annexure 5 of the paper. The output multiplier of tourism for Uttarakhand is equal to 3.30. The direct contribution of tourism to state's GVA is 3.6 % and the GVA multiplier is equal to 4.3. By applying the GVA multiplier, the total (indirect + direct) contribution of tourism to Uttarakhand's GVA stands at 16%.

Similarly, the employment multiplier is equal to 4.0 and the total contribution of tourism (indirect + direct) to state's total employment is 12.3%.

V. Commentary on Tourism Policies in Uttarakhand

The results of this study undoubtedly indicate that tourism is a critical sector in Uttarakhand and contributes immensely to the state's SDP and livelihood generation. The same has been acknowledged in the Uttarakhand Tourism Policy (2018). With a vision of creating Uttarakhand a safe and sustainable global tourist destination, the 2018 tourism policy also predicts that the number of tourist arrivals would be growing at a 7% compound annual growth rate between the years 2017 and 2027. The state government also has plans to establish 13 unique tourist destinations in 13 districts of the state. While the promotion of the tourism sector is vital from the perspective of the overall economic development in Uttarakhand, the challenges which it brings should not be neglected.

The most popular tourist destinations in the state such, as the Char Dham, sit at disaster-prone zones of the Himalayas. Uttarakhand has been recognized as an earthquake Zone 4 (High damage risk zone) area and has been hit by major earthquakes in 1991 and 1999¹¹. In 2013, the cloud-burst and massive flood at the Alakananda basin had a severe impact on the state economy. The number of tourist arrivals had decreased tremendously in the year 2013 and 2014¹². Nonetheless, the state got back on its feet within two years.

Therefore, along with developing Uttarakhand as a major tourism hub, importance also needs to be given to building disaster-resilient infrastructure and proper safety nets for people whose livelihoods depend on tourism. The promotion of sustainable tourism has also been identified as one of the objectives of the 2018 tourism policy. This objective can be seen taking shape. For instance, Uttarakhand suffers from a massive rise in municipal waste during the tourist seasons, most of which

¹¹ <u>https://www.iitk.ac.in/nicee/wcee/article/2838.pdf</u>

¹² Market Research Division, Ministry of Tourism, Government of India

so far was being directed to landfills. The state government has been actively working on promoting the scientific treatment of waste. There are also plans for setting up a waste-to-energy plant in the state¹³.

Further, tourism in Uttarakhand is highly seasonal. Char Dham yatra is usually undertaken from April to November, with a peak occurring in the summer months. Also, due to the lack of regular maintenance of the roads, traveling in the hilly areas becomes risky during the monsoon season, consequently, affecting the number of tourists arriving in those months. The tourism policy 2018 lays emphasis on the advancement of the state as a winter tourism destination which, has the potential to create livelihood opportunities for the locals throughout the year. Auli, situated in the Chamoli District of Uttarakhand, serves as an excellent example of this. The state government has been aggressively marketing Auli as a winter tourism hub which, has successfully resulted in it emerging as a famous hiking and ski destination in India.

The policy also focuses on the need for better and disaster-prone infrastructure in the state. Many remote areas become inaccessible during the monsoon and winter seasons. Better roads would keep these places accessible throughout the year and also attract tourists. In 2016, the Char Dham Highway Development Project was initiated in the state. Under the project, the Char Dham National Highway connecting Badrinath, Kedarnath, Gangotri, Yamunotri, Champawat and Pithoragarh is being constructed. These all-weather roads will have bridges and tunnels to mitigate landslides and reduce road accidents¹⁴.

The policy places importance on unleashing the potential of the tourism sector in the economic transformation of the state. With better infrastructure and strong marketing, Uttarakhand can emerge as a prominent tourist destination around the world. Furthermore, the policy discusses incentives and subsidy mechanisms for more tourism-based employment generation in the state. However, it avoids a discussion on the provision of safety nets to people whose livelihood depends significantly on tourism. Tourism is a highly fragile sector. For instance, the COVID-19 pandemic has harshly hit the tourism sectors of all the countries around the world in 2020. The tourism sector of Uttarakhand has also been severely affected. With no or very few tourist arrivals, the incomes have drastically diminished. Safety nets in the form of income support to the locals dependent on tourism or significant tax breaks or provision of loans could be an effective solution to getting the economy back on track. In addition to this, the government of Uttarakhand should also focus on development of a comprehensive marketing and branding strategy for tourism in the state. This would help in building Uttarakhand as an all-season tourism destination and attract more high value tourists.

¹³ <u>https://www.newindianexpress.com/good-news/2020/jul/15/uttarakhand-planning-to-generate-5-megawatt-of-electricity-from-waste-2170290.html</u>

¹⁴ https://www.euttaranchal.com/uttarakhand/char-dham-project

VI. Conclusion

The IHR attracts lakhs of tourists every year. From an economic perspective, the sector is of considerable importance as it contributes immensely to employment generation and livelihood opportunities in the Himalayan states. The state of Uttarakhand has been no exception. The tourist footfall has been steadily rising over the years and contributing significantly to the overall value-added. However, tourism is a highly fragile sector in itself. The impact of COVID-19 on tourism has shown that the need of the hour is a comprehensive tourism policy for Uttarakhand with emphasis on upgrading the marketing and branding strategies to bolster its efforts in transforming itself as a tourist destination, one that is popular across the globe.

VII. References

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VIII. Annexures

Annexure I

132 Sector IO	SAM Sectors			
Paddy				
Wheat				
Jowar				
Bajra				
Maize				
Gram				
Pulses				
Sugarcane				
Groundnut				
Coconut	Agricultura			
Other oilseeds	Agriculture			
Jute				
Cotton				
Tea				
Coffee				
Rubber				
Tobacco				
Fruits				
Vegetables				
Other crops				
Milk and milk				
products				
Poultry & Eggs	Livestock			
Other livestock	LIVESTOCK			
production				
Animal Services				
Forestry and				
Logging	Forestry & Logging			
Fishing &				
Aquaculture	Fishing			
Coal and Lignite	Mining & Quarrying			

Table 3:SAM Sector Concordance

Crude petroleum	
Natural Gas	
Iron ore	
Manganese ore	
Bauxite	
Copper ore	
Other Metallic	
minerals	
Lime stone	
Mica	
Other non-metallic	
minerals	
Sugar	
Khandsari, boora	
Hydrogenated	
oil(vanaspati)	
Edible oils other	
than	
vanaspati	Manufacture of food products
Tea and coffee	
processing	
Miscellaneous food	
products	
Grain Mill	
products, starch	
and starch products	
Beverages	
Tobacco Products	
Khadi, cotton	
textiles(handlooms)	Other Manufacturing
Cotton textiles	
Woollen textiles	
Silk textiles	

Art silk, synthetic	
fibre	
textiles	
Jute, hemp, mesta	
textiles	
Carpet weaving	
Miscellaneous	
textile	
products	
Ready made	
garments	
Wood and wood	
products	
except furniture	
Paper, Paper	
products and	Manufacture of paper & paper products
newsprint	
Publishing, printing	
and	
allied activities	
Furniture &	
Fixtures	Other Manufacturing
Leather footwear	
Leather and leather	
products	
Rubber products	Pubber & Plastic
Plastic products	
Petroleum products	Other Menufacturing
Coal tar products	
Inorganic heavy chemicals	Chemicals & Pharma

Organic heavy	
chemicals	
Fertilizers	
Pesticides	
Paints, varnishes	
and	
lacquers	
Soaps, cosmetics	
&	
glycerin	
Synthetic fibers,	
resin	
Other chemicals	
Drugs and	
medicine	
Structural clay	
products	
Cement	Other Menufacturing
Other non-metallic	Other Manufacturing
mineral	
prods.	
Iron, steel and	
ferro alloys	
Iron and steel	
casting &	
forging	Pasia Matels
Iron and steel	Basic Metals
foundries	
Non ferrous basic	
metals	
(including alloys)	
Hand tools,	
hardware	Other Manufacturing

Miscellaneous	
metal	
products	
Tractors and agri.	
implements	
Industrial	
machinery(F & T)	
Industrial	
machinery(others)	
Machine tools	
Other non-	
electrical	
machinery	
Electrical industrial	
Machinery	
Electrical wires &	
cables	Electrical Equipment
Batteries	
Other electrical	
Machinery	
Electrical	
appliances	
Electronic	
Equipment	
(incl.TV)	
Watches and clocks	Other Manufacturing
Communication	
equipment	
Ships and boats	
Rail equipment	
Motor vehicles	Motor Vehicles

Motor cycles and	
scooters	
Bicycles, cycle-	
rickshaw	
Other transport	
equipment	
Aircraft &	
spacecraft	
Medical, precision	Other Manufacturing
& optical	
instruments	
Gems & jewellery	
Miscellaneous	
manufacturing	
Construction and	
construction	Construction
services	
Electricity	
Water Supply	Electricity and Water Supply
Railway Transport	
Land transport	Transport
Water Transport	r
Air transport	
Supportive and	
Auxiliary	Other Services
transport activities	
Storage and	Storage
warehousing	Storage
Communication	Other Services
services	Other Services
Trade	Trade, Hotels & Restaurant

Hotels &	
Restaurant	
Financial services	Other Services
Insurance services	
Ownership of	Real Estate, Ownership of Dwellings & Professional Services
dwellings	Real Estate, Ownership of Dweinings & Professional Services
Education and	
research	
Medical and Health	
Legal services	Other Services
Computer related	
services	
Other Business	
services	
Real estate services	Real Estate, Ownership of Dwellings & Professional Services
Renting of	
machinery &	
equipment	
Community, social	Other Services
and	
personal services	
Other services	
Public	
administration and	Public Administration
defence	

Table 4:Tourism	Industries	and SAM	Concordance

SAM Sector	Tourism Industry
Trade, hotels & restaurant	Accommodation, food & drinks
Transport	Railway Expenditure, Air Expenditure, Road
	Expenditure, Water Expenditure
Food products	Processed food
Rubber, plastic & others	Travel related consumer goods
Other manufacturing	Clothes, footwear, toiletries, gems & jewellery,
	printing, alcohol & tobacco
Other services	Transport equipment, travel agency services,
	cultural & religious services, sports &
	recreation, health & medicinal services

Table 5:Tourism Industry Ratios

SAM Sector	Tourism Industry Ratios
Trade, Hotels & Restaurant	0.073
Transport	0.197
Food products	0.027
Rubber, plastic & others	0.003
Other manufacturing	0.156
Other services	0.043

Table 6: Social Accounting Matrix of Uttarakhand, 2015-16

								Chemicals	Rubber				
			Forestry		Mining &	Food		and	and	Basic	Electrical	Motor	Other
	Agriculture	Livestock	& Logging	Fishing	Quarrying	products	Paper	pharma	Plastic	Metals	equipment	vehicles	Manufacturing
Agriculture	46308.54	163339.9	0	1.495116	0	280917.8	0	13929.99	0	212.1678	0	0	31619.18
Livestock	16912.29	0	0	138.828	0	0	0	0	0	0	0	0	0
Forestry & Logging	0	0	464.9866	0	0	3822.614	447.1606	11907.81	14574.42	0	0	845.6501	25525.64
Fishing	0	0	0	63.98722	0	0	0	0	0	0	0	0	0
Mining &													
Quarrying	0	0	0	124.1796	9805.592	0	0	0	0	0	0	0	0
Food products	0	0	0	2.048227	0	8145.348	0	0	0	0	0	0	84.9804
Paper	0	0	780.7971	0	1771.777	50222.33	38397.52	387863.4	37862.94	2391.677	25429.63	13919.83	321461.5
Chemicals and													
pharma	28978.43	0	0	10.05797	57335.4	36399.18	409766	36256.14	2064.416	50.10588	859.1173	661.0946	621747.8
Rubber and Plastic	0	0	461.5711	0	4959.172	50030.55	8822.189	379453.4	29987.77	2382.545	17685.71	8958.061	118977.4
Basic Metals	0	0	32.8157	0	14663.87	34323.48	19135.19	896588.9	866001.4	144342.8	71459.76	67411.07	311619.6
Electrical													
equipment	0	0	5107.834	0	6.305126	63.87524	2627.641	556.8223	27079.11	1994952	274827.1	409249	275614.3
Motor vehicles	0	0	1412.613	0	14982.74	0	0	0	1158.408	33892.63	18482.47	159854.4	142096.1
Other													
Manufacuring	5709.815	0	19634.41	15.6871	89904.69	220540.2	34709.51	164654.7	72549.18	1796409	339317.5	741588.7	799721.5
Electricity, Gas,													
Water Supply &													
Other Utility													
Services	3033.833	0	5795.664	0.423985	9960.389	82233.37	99215.58	601589.2	104068.9	427394.5	107457.1	690585.9	1017774
Construction	0	0	2230.255	0	989.9231	0	0	0	0	0	0	0	0
Transport	0	0	13141.54	40.45968	32852.68	0	0	0	0	0	0	0	48949.21
Storage	0	0	0.693137	0	0	0	0	0	0	0	0	0	0

Trade, Hotels &														
Restaurants	26675.91	44.1646	4482.865	69.91164	17173.57	0	0	0	0	0	0	0	0	

						Real Estate,			
	Electricity, Gas,					Ownership of			
	Water Supply &					Dwellings &			
	Other Utility				Trade, Hotels &	Professional	Public	Other	
	Services	Construction	Transport	Storage	Restaurants	Services	Administration	Services	Tourism
Agriculture	21551.36	32972.04	15610.84	0	99872.86	0	52689.4	0	25633.5
Livestock	8877.694	29394.04	0	0	225372.7	0	53695.23	0	17849.14
Forestry & Logging	85.28041	186117.6	0	0	4480.369	0	8.295248	0.330361	5252.435
Fishing	183.3943	1.387655	0	0	4893.093	0	0	0	387.5248
Mining & Quarrying	70858.79	106884	1557.596	0	33265.83	0	0	0.187502	3018.536
Food products	565.0413	11.2752	0	0	14798.33	81.10294	29017.47	0	2964.083
Paper	15197.7	1278.426	10245.67	19.93652	5473.133	29968.52	122.4403	185887	72519.9
Chemicals and									
pharma	4994.322	48201.19	6372.648	138.7793	19761.93	5891.068	34.38611	31223.44	120867.4
Rubber and Plastic	5269.688	66074.68	0	85.23629	103193.4	403.4673	4696.26	10383.04	35477.92
Basic Metals	75185.43	330536.4	0	0	44662.94	0	0	111942	70660.22
Electrical equipment	172.9367	57270.44	32.16468	0.071666	6732.833	0	0	23.59072	51749.12
Motor vehicles	153.4255	43.84328	13099.21	0.045123	27099.44	281.1592	4868.437	7560.486	32066.22
Other Manufacturing	147475.8	557944	108311.3	159.6291	178436.1	216.2288	5945.348	3639.639	1212645
Electricity, Gas,									
Water Supply &									
Other Utility Services	50912.01	73239.5	28707.79	182.5329	72388.53	25130.93	17860.83	63729.06	207131.5
Construction	56245.47	43.51288	7365.308	8.286756	49119.76	12968.92	13952.4	162289.1	13023.15
Transport	61031.33	173344.6	10188.45	84.37121	107942.9	4856.776	27598.99	72192.86	165273.5
Storage	0.017999	9449.631	0	0	8248.94	217.8301	1740.867	438.3894	673.0689
Trade, Hotels &									
Restaurants	94596.22	385094.3	29883.47	73.21254	149368.3	4803.152	19628.95	61538.76	86548.96

		Waste1-		Waste3-Compacting	Waste 4-				
	IIUSE	Composting	Waste2-RDF	/Segregation	Landfill	Labour	Capital	Land	Wages
Agriculture	784659.1	0	0	0	0				
Livestock	352239.9	0	0	0	0				
Forestry & Logging	253532.5	0	0	0	0				
Fishing	5529.387	0	0	0	0				
Mining & Quarrying	225514.7	0	0	0	0				
Food products	55669.68	0	0	0	0				
Paper	1200814	0	0	0	0				
Chemicals and pharma	1431718	105.58	0	0	0				
Rubber and Plastic	847302	0	0	0	0				
Basic Metals	3058566	0	0	0	0				
Electrical equipment	3106245	0	139.4664	39.56506	0				
Motor vehicles	457412.5	0	27.89328	15.82602	317.131874				
Other Manufacturing	6500950	148.4439	470.6103	133.5069	668.823952				
Electricity, Gas, Water Supply & Other Utility									
Services	3688571	0	139.4664	39.56506	0				
Construction	318236	0	0	0	0				
Transport	717497.6	0	0	0	0				
Storage	20769.44	0	0	0	0				
Trade, Hotels &									
Restaurants	879981.768	0	0	0	0				

	Profits	Rent	PFCE RH	PFCE UH	Pvt. Corp.	Pub. Enter.	GFCE	Ind. Taxes	Capital a/c	Exports	Total
Agriculture			939351.567	419991.4			0		0	-1870036	1058625
Livestock			585855.293	252782.6			0		1866.069	-920300	624684.2
Forestry & Logging			150737.905	14686.05			0		0	-212538	459951.3
Fishing			5384.93396	3211.631			0		0	-14030.7	5624.605
Mining & Quarrying			110.740397	777.368			0		0	456183.3	908100.8
Food products			226585.616	84039.82			0		0	620335	1042300
Paper			44642.4518	27611.57			0		0	-1719690	754192.5
Chemicals and pharma			280261.016	134969.6			0		0	914977.2	4193645
Rubber and Plastic			53495.6067	21351.14			0		7399.7445	-222424	1554427
Basic Metals			18345.6786	8371.13			0		0	-694533	5449316
Electrical equipment			41408.1427	44637.52			0		32441.385	-5096076	1234900
Motor vehicles			39165.0099	27374.39			0		90718.936	2341306	3413389
Other Manufacturing			830258.05	466517.3			0		257741.7	-8209535	6346882
Electricity, Gas, Water Supply & Other Utility Services			94470.6397	64003.35			0		0	-6070847	1464768
Construction			52507.0828	22573.29			0		744952.43	2966582	4423087
Transport			89990.2304	51671.25			0		3489.5785	-744987	835159.5
Storage			0	0			0		0	-39418.8	2120.112
Trade, Hotels & Restaurants			0	584.592269			0		32362.97	1814958	3607869

			Forestry &		Mining &			Chemicals and	Rubber and	Basic
	Agriculture	Livestock	Logging	Fishing	Quarrying	Food products	Paper	pharma	Plastic	Metals
Real Estate, Ownership of Dwellings &										
Professional Services	0	0	2400.03	0	8356.773	0	0	0	0	0
Public Administration	0	0	0	0	0	0	0	0	0	0
Other Services	23762.53	8064.82	8751.516	4.99169	59504.31	0	0	0	12.01864	0
Tourism	4242.77	367.1342	7631.031	18.70175	28829.04	64363.31	6469.259	31982.91	18048.95	333078.9
Waste1- Composting	0	0	0	0	0	0	0	0	0	0
Waste2-RDF	0	0	0	0	0	0	0	0	0	0
Waste3-Compacting/Segregation	0	0	0	0	0	0	0	0	394.1398	0
Waste 4- Landfill	0	0	0	0	0	0	0	0	0	0
Labor	500587.8	218157	121328.7	1611.368	156913.1	54089.05	32213.62	159306.2	82624.77	28863.68
Capital	333479.9	229545	264111.3	3507.632	389479.9	132543.7	83180.06	1430210	259080.9	523281.3
Land	64269.35									
Wages										
Profits										
Rent										
RH										
UH										
Pvt. Corp.										
Pub. Enter.										

				Electricity,					
				Gas, Water					
				Supply &					Real Estate, Ownership
	Electrical			Other Utility				Trade , Hotels &	of Dwellings &
	equipment	Motor vehicles	Others	Services	Construction	Transport	Storage	Restaurants	Professional Services
Real Estate, Ownership of									
Dwellings & Professional									
Services	0	0	67642.65	6469.54	248414.6	30662.42	4.459241	16638.92	3203.651
Public Administration	0	0	0	0	0	0	0	0	0
Other Services	0	0	12992	186502.9	167574.7	81728.19	292.7264	172287.7	37131.36
Tourism	62980.19	137531.3	895304.2	58324.25	184483.3	120439.8	69.717	192895.8	3295.716
Waste1- Composting	0	0	0	0	0	0	0	0	0
Waste2-RDF	0	0	1176.526	0	0	0	0	0	0
Waste3-									
Compacting/Segregation	0	0	0	0	0	0	0	0	0
Waste 4- Landfill	0	0	0	0	0	0	0	0	0
Labor	60224.96	135124.3	273001.6	179445.4	94377.55	54137.39	152.2625	91021.84	214901.7
Capital	220684.1	959242.7	1214179	378102.6	1535350	295882.7	784.7375	1894589	696632.3
Land									
Wages									
Profits									
Rent									
RH									
UH									
Pvt. Corp.									
Pub. Enter.									

							Waste3-			
	Public	Other			Waste1-		Compacting/	Waste 4-		
	Administration	Services	Tourism	IIUSE	Composting	Waste2-RDF	Segregation	Landfill	Labour	Capital
Real Estate, Ownership of Dwellings &										
Professional Services	435.9725	31210.35	22824.49	438584.2	26.395	111.5731	23.73904	158.5659		
Public Administration	0	0	0	0	0	0	0	0		
Other Services	9703.623	624702.2	130088	1523317	42.0937	133.4493	37.85807	0		
Tourism	10743.01	115504.8	47155.14	2324032	29.42076	93.27234	26.46032	124.0057		
Waste1- Composting	0	84.18741	3.795944	87.98335	0	0	0	0		
Waste2-RDF	0	0	218.138	1394.664	0	0	0	0		
Waste3-Compacting/Segregation	0	0	1.510811	395.6506	0	0	0	0		
Waste 4- Landfill	0	0	0	0	0	0	0	0		
Labor	149310.1	276806.8	85510.52		527.9001	1673.597	474.7807	1902.791		
Capital	633174.9	2386799	560492.1		0	0	0	0		
Land										
Wages										
Profits										
Rent										
RH										
UH										
Pvt. Corp.										
Pub. Enter.										

					PFCE			Pub.		Ind.			Total
	Land	Wages	Profits	Rent	RH	PFCE UH	Pvt. Corp.	Enter.	GFCE	Taxes	Capital a/c	Exports	
Real Estate, Ownership of													
Dwellings & Professional Services					247117.4	797771.2			0		0	-873780	1048277
Public Administration					0	0			724981.3		0	326661.3	1051643
Other Services					246818.9	164806.3			315173.1		44027.19	449263.7	4266724
Tourism					193916	109189.1			14210.91			-1951541	3013840
Waste1- Composting									791.8501			-87.9833	879.8335
Waste2-RDF									1394.664			-1394.66	2789.328
Waste3-Compacting/Segregation									395.6506			-395.651	791.3012
Waste 4- Landfill									3171.319			0	3171.319
Labor													2974289
Capital												5570506	19994839
Land													64269.35
Wages													2974289
Profits												4825326	19249659
Rent													64269.35
RH													19011939
UH													3927620
Pvt. Corp.													4489715
Pub. Enter.													

			Forestry &		Mining &	Food		Chemicals	Rubber	Basic	Electrical	Motor	
	Agriculture	Livestock	Logging	Fishing	Quarrying	products	Paper	and pharma	and Plastic	Metals	equipment	vehicles	Others
GFCE													
Ind. Taxes	4663.978	5166.162	2182.696	14.833	10611.58	24604.89	19208.74	79345.57	38919.53	162063.6	35492.59	88417.31	167395
Capital a/c	0	0	0	0	0	0	0	0	0	0	0	0	0
ROW													
Total- State													
Value Added at													
Basic Prices	898337	447702	385440	5119	546393	186632.8	115393.7	1589516	341705.6	552145	280909	1094367	1487180
Total- Output	1058625	624684.2	459951.3	5624.605	908100.8	1042300	754192.5	4193645	1554427	5449316	1234900	3413389	6346882

	Electricity, Gas, Water Supply &					Real Estate, Ownership				
	Other Utility				Trade, Hotels &	of Dwellings &	Public	Other		IIUSE
	Services	Construction	Transport	Storage	Restaurants	Professional Services	Administration	Services	Tourism	
GFCE										
Ind. Taxes	42567.74	134985.1	20934.54	64.10804	85324.65	8292.638	16415.65	120768.2	43805.22	
Capital a/c	0	0	0	0	0	0	0	0		
ROW										
Total- State										
Value Added at										
Basic Prices	557548	1629728	350020.1	937	1985611	911534	782485	2663606	646002.6	
Total- Output	1464768	4423087	835159.5	2120.112	3607869	1048277	1051643	4566724	3013840	28193021

			Waste3-									
	Waste1-		Compacting/	Waste 4-							PFCE	
	Composting	Waste2-RDF	Segregation	Landfill	Labour	Capital	Land	Wages	Profits	Rent	RH	PFCE UH
GFCE												
Ind. Taxes												
Capital a/c												
ROW												
Total-State												
Value Added												
at Basic Prices	527.9001	1673.597	474.7807	1902.791								
Total- Output	879.8335	2789.328	791.3012	3171.319	2974289	19994839	64269.35	2974289	19249659	64269.35	19011939	3927620

	Pvt. Corp.	Pub. Enter.	GFCE	Ind. Taxes	Capital a/c	Exports	Total
GFCE	132994			1466664			1319567
Ind. Taxes	0	0	36406.76	0	41725.71	41791.36	1466664
Capital a/c	4356721	-39669	-561295			-19879296.96	1256726
ROW							0
Total- State Value							
Added at Basic Prices							
Total- Output	4489715	-39669	1319567	1466664	1256726	-28193020.5	123521331.5

Table 7:Leontief Inverse Matrix

			Forestry &		Mining &	Food		Chemicals	Rubber and
	Agriculture	Livestock	Logging	Fishing	Quarrying	products	Paper	and pharma	Plastic
Agriculture	1.052686802	0.275342618	0.003627064	0.00854275	0.007498722	0.29696183	0.014666771	0.015098808	0.013627857
Livestock	0.018951147	1.005009862	0.001803354	0.026169969	0.003640424	0.009507727	0.005548441	0.004949197	0.005436377
Forestry & Logging	0.000467792	0.000166328	1.002073578	0.000196581	0.002315984	0.007898864	0.006067365	0.006976673	0.013869078
Fishing	4.63184E-05	1.31747E-05	3.66697E-05	1.011530448	7.49639E-05	0.000100922	0.000111423	9.88426E-05	0.000110008
Mining & Quarrying	0.001377164	0.0004407	0.0029081	0.023154808	1.017041714	0.013253976	0.019663875	0.016870192	0.0167944
Food products	0.000149262	4.32376E-05	0.000140587	0.000447947	0.000290332	1.008294103	0.000418082	0.000380385	0.000457527
Paper	0.008070122	0.003100546	0.014868397	0.002829491	0.039247205	0.108648731	1.157707682	0.149695455	0.093321054
Chemicals and pharma	0.037853479	0.010829748	0.021908542	0.00763173	0.117612308	0.161596572	0.681001196	1.137770979	0.124425076
Rubber and Plastic	0.005640281	0.001706639	0.007310722	0.001946012	0.025938257	0.081198334	0.090956449	0.12148126	1.055164487
Basic Metals	0.016976045	0.005515001	0.022734298	0.005610865	0.088025261	0.171830329	0.2884417	0.379380157	0.714365054
Electrical equipment	0.010609281	0.00346078	0.033662143	0.004238124	0.063145179	0.117652728	0.169872798	0.209616966	0.403828777
Motor vehicles	0.001574411	0.000533093	0.007806945	0.001358164	0.027615133	0.017578944	0.01610871	0.017426175	0.029540838
Other Manufacturing	0.031232323	0.010013488	0.10714398	0.018616666	0.253421106	0.488719651	0.375187652	0.384174463	0.607871913
Electricity, Gas, Water Supply & Other									
Utility Services	0.020575642	0.006550841	0.049164032	0.00785224	0.108921256	0.253019731	0.382382372	0.327408417	0.323606913
Construction	0.002624955	0.001342364	0.009090254	0.000957951	0.011045048	0.013745929	0.018888221	0.016353739	0.016818764
Transport	0.003632011	0.001414607	0.036159947	0.009908779	0.05280825	0.027570781	0.029867908	0.027208327	0.032894037
Storage	8.23383E-05	2.61041E-05	7.7837E-05	4.01518E-05	0.00014094	0.000153914	0.000155664	0.000139868	0.000161845
Trade,Hotels & Restaurants	0.030440475	0.008475698	0.017832626	0.015217338	0.03527397	0.033693319	0.034260489	0.030081065	0.032204195

					Electricity,				
					Gas, Water				
				Other	Supply &				Trade,Hotels
		Electrical	Motor	Manufacturin	Other Utility				&
	Basic Metals	equipment	vehicles	g	Services	Construction	Transport	Storage	Restaurants
Agriculture	0.016897816	0.014717214	0.014506272	0.021042552	0.029431519	0.022516386	0.031077332	0.01068819	0.055403701
Livestock	0.00651239	0.00574989	0.00607825	0.006804469	0.014438278	0.015777554	0.00690447	0.005942584	0.068515046
Forestry & Logging	0.005686871	0.004991349	0.004314863	0.008750866	0.004450494	0.045128678	0.003448255	0.003220364	0.00381854
Fishing	0.000131851	0.000116382	0.000122901	0.000136641	0.000291246	0.000190044	0.000136114	0.000122298	0.001480508
Mining & Quarrying	0.019012089	0.017217462	0.020300881	0.019498347	0.058635017	0.033096084	0.011210048	0.010893616	0.0153179
Food products	0.00056836	0.000494183	0.0004855	0.000599531	0.000969868	0.000668747	0.000558179	0.000440608	0.004532024
Paper	0.090826838	0.097510815	0.063652522	0.12521037	0.053536883	0.043919209	0.060126336	0.055417729	0.028365944
Chemicals and pharma	0.149138853	0.137269339	0.10099809	0.232747206	0.07715802	0.082076805	0.089728098	0.130508518	0.049348546
Rubber and Plastic	0.047089381	0.053994577	0.032624714	0.061190436	0.025278634	0.038341334	0.022971922	0.064422116	0.043000433
Basic Metals	1.200190582	0.212479008	0.137069774	0.208592714	0.129307545	0.159938299	0.078274805	0.105475269	0.075170879
Electrical equipment	0.626884519	1.439716164	0.265705577	0.197451005	0.085513743	0.1197741	0.068002621	0.070382593	0.055173773
Motor vehicles	0.042075536	0.044440689	1.070474484	0.04442871	0.014358448	0.015831864	0.030679848	0.011210211	0.016694669
Others	0.849574635	0.708479969	0.548990692	1.499673923	0.310190079	0.359241647	0.355106581	0.254236121	0.191243475
Electricity, Gas, Water Supply & Other Utility									
Services	0.3649156	0.331070648	0.393210099	0.373686036	1.148389451	0.143984971	0.16031645	0.195687882	0.095131277
Construction	0.019303679	0.01735007	0.019830429	0.020063451	0.05448127	1.012957663	0.024051652	0.021472811	0.02261206
Transport	0.040668648	0.035351194	0.034673724	0.047093667	0.068927641	0.064736058	1.041100029	0.063513788	0.046992877
Storage	0.000197274	0.000172789	0.000175942	0.000207159	0.0003845	0.002474598	0.00027267	1.000233257	0.002508247
Trade, Hotels & Restaurants	0.037803099	0.033641986	0.036850116	0.039327584	0.093895951	0.111833872	0.062541545	0.060603419	1.060025433

	Real							
	Estate,Ownership							
	of Dwellings &							
	Professional	Public			Waste1-		Waste3-	Waste 4-
	Services	Administration	Other Services	Tourism	Composting	Waste2-RDF	Compacting/Seggregation	Landfill
Agriculture	0.002210568	0.078240242	0.005446666	0.027378199	0.006604519	0.007167267	0.007290224	0.007069532
Livestock	0.001241517	0.054709021	0.00324576	0.013349222	0.002380858	0.00286956	0.002917927	0.002626933
Forestry & Logging	0.001054974	0.001333643	0.00306084	0.007189566	0.002732131	0.002420721	0.00245332	0.002610901
Fishing	2.37546E-05	4.99229E-05	6.1612E-05	0.000278131	4.78757E-05	5.78626E-05	5.8854E-05	5.31708E-05
Mining & Quarrying	0.002866358	0.002996453	0.005387817	0.016954157	0.006224838	0.008224711	0.008399057	0.006948509
Food products	0.000161046	0.027982236	0.000230265	0.001558634	0.000214765	0.000248787	0.000252031	0.000243988
Paper	0.039262033	0.010543156	0.071866386	0.103087458	0.047152014	0.03777009	0.038013995	0.03876589
Chemicals and pharma	0.03245869	0.01772136	0.063604354	0.182636249	0.185925151	0.061448569	0.062133963	0.067950093
Rubber and Plastic	0.005840128	0.010965073	0.015327944	0.052599317	0.027569095	0.017339653	0.017607499	0.018516155
Basic Metals	0.019813292	0.021315419	0.07519251	0.170331837	0.09060655	0.06373909	0.064911655	0.065349734
Electrical equipment	0.012575282	0.01612021	0.045808795	0.155526605	0.066237147	0.120127415	0.122658718	0.074922734
Motor vehicles	0.002020747	0.00796751	0.007644615	0.036664994	0.011239476	0.022813244	0.033497781	0.117952084
Others	0.034334904	0.061255866	0.108393924	0.738583379	0.330036616	0.340702439	0.345848997	0.401773934
Electricity, Gas, Water Supply & Other Utility								
Services	0.047420488	0.045242753	0.076738285	0.294991707	0.11729486	0.156385161	0.159843057	0.132036417
Construction	0.016588054	0.017016976	0.049635342	0.023138773	0.008993591	0.010986894	0.011019318	0.00794856
Transport	0.009980126	0.033138833	0.031676871	0.08957698	0.016020837	0.018416318	0.018663254	0.017400989
Storage	0.000279484	0.001769459	0.000318922	0.000476184	9.13014E-05	0.000106936	0.000105901	9.38777E-05
Trade,Hotels & Restaurants	0.011318444	0.028979523	0.031280046	0.06375552	0.014213006	0.017461861	0.017717177	0.015038017

			Forestry &		Mining &			Chemicals and	Rubber and
	Agriculture	Livestock	Logging	Fishing	Quarrying	Food products	Paper	pharma	Plastic
Real Estate, Ownership of Dwellings & Professional									
Services	0.001228791	0.000529633	0.009194223	0.001071188	0.016873951	0.010245079	0.009713678	0.009226109	0.01243316
Public Administration	0	0	0	0	0	0	0	0	0
Other Services	0.034289037	0.024481045	0.038539532	0.007281221	0.109444634	0.062981245	0.07288385	0.063885074	0.068319137
Tourism	0.015012253	0.005515894	0.045956015	0.010485142	0.098231433	0.174166746	0.122949671	0.123839711	0.190996321
Waste1- Composting	6.9547E-07	4.89987E-07	8.18311E-07	1.56873E-07	2.28319E-06	1.46206E-06	1.59294E-06	1.4165E-06	1.58858E-06
Waste2-RDF	6.87612E-06	2.25544E-06	2.31876E-05	4.20989E-06	5.40867E-05	0.0001032	7.84477E-05	8.0178E-05	0.000126506
Waste3-Compacting/Seggregation	1.43767E-06	4.355E-07	1.87674E-06	4.98686E-07	6.62614E-06	2.06759E-05	2.31245E-05	3.08648E-05	0.000267643
Waste 4- Landfill	0	0	0	0	0	0	0	0	0

					Electricity,				
					Gas, Water				
					Supply &				
		Electrical			Other Utility				Trade,Hotels &
	Basic Metals	equipment	Motor vehicles	Others	Services	Construction	Transport	Storage	Restaurants
Real Estate, Ownership of Dwellings & Professional									
Services	0.016232119	0.013843274	0.012282169	0.02366125	0.017477797	0.066751917	0.047574629	0.012028824	0.012040957
Public Administration	0	0	0	0	0	0	0	0	0
Other Services	0.080080068	0.071309269	0.078325748	0.084956398	0.200604791	0.095556116	0.164237698	0.210586686	0.09055671
Tourism	0.25965264	0.217568546	0.173341002	0.271862266	0.130566271	0.138939062	0.230710926	0.110491547	0.109747508
Waste1- Composting	1.90711E-06	1.68104E-06	1.76378E-06	2.0187E-06	4.12261E-06	2.06043E-06	3.53118E-06	4.29428E-06	1.92502E-06
Waste2-RDF	0.00017628	0.000147079	0.000114313	0.000297673	6.69504E-05	7.66491E-05	8.25249E-05	5.51252E-05	4.33943E-05
Waste3-Compacting/Seggregation	1.20701E-05	1.37999E-05	8.3592E-06	1.56517E-05	6.47509E-06	9.79146E-06	5.9404E-06	1.63902E-05	1.09582E-05
Waste 4- Landfill	0	0	0	0	0	0	0	0	0

	Real Estate,Ownership of Dwellings &							
	Professional	Public			Waste1-		Waste3-	Waste 4-
	Services	Administration	Other Services	Tourism	Composting	Waste2-RDF	Compacting/Seggregation	Landfill
Real Estate, Ownership of Dwellings & Professional								
Services	1.005545556	0.00409646	0.014971016	0.024166115	0.036789929	0.047427127	0.037494493	0.057440549
Public Administration	0	1	0	0	0	0	0	0
Other Services	0.052624821	0.029206504	1.195653837	0.123718163	0.084919089	0.092158089	0.092415098	0.033218588
Tourism	0.017044063	0.034081536	0.068942053	1.178695433	0.103952979	0.108402805	0.109965774	0.121611097
Waste1- Composting	1.05982E-06	6.19204E-07	2.36785E-05	3.92567E-06	1.000001806	1.95492E-06	1.96196E-06	8.08611E-07
Waste2-RDF	7.59831E-06	1.38218E-05	2.5083E-05	0.000222224	6.87031E-05	1.000071002	7.20694E-05	8.32792E-05
Waste3-Compacting/Seggregation	1.48936E-06	2.79738E-06	3.92111E-06	1.39279E-05	7.04252E-06	4.45098E-06	1.00000452	4.75591E-06
Waste 4- Landfill	0	0	0	0	0	0	0	1

Calculation of Private Final Consumption Expenditure (PFCE)

The study uses data from Household Consumption Expenditure Survey carried out as a part of 68th round (2011-12) of sample surveys conducted by National Sample Survey Office (NSSO) to compute item-wise household consumption expenditure. It is an all-India household survey and provides data on parameters such as household characteristics and monetary values of goods and services consumed during a month or a year by a household.

Households in NSSO surveys are classified into the following nine categories:

- Self-employed in non-agriculture- Rural
- Agricultural labor- Rural
- Other labor- Rural
- Self-employed in agriculture Rural
- Others- Rural
- Self-employed- Urban
- Regular- Urban
- Casual labour- Urban
- Others- Urban

The data on item-wise consumption expenditure for each of these household categories is extracted for the state of Uttarakhand and are mapped to the respective SAM sectors. The Pradhan et al (2013)¹⁵ paper that provides the SAM for 2007-08 was kept as the guideline document. The paper facilitates a concordance of the SAM sectors with the item/sector codes for different products in the NSS 66th round Consumer expenditure survey. For our analysis, first the sectors in the IO table for 2013-14 were matched with the sectors in the SAM of 2007-08 to develop a uniform structure of the sectors in SAM. Then a concordance of these sectors with the item/sector codes in the 68th round consumer expenditure survey, as being utilized in the study, was developed.

¹⁵ Pradhan, B.K., Saluja, M.R. and Sharma, A.K., 2013. *A social accounting matrix for India 2007-08*. Institute of Economic Growth, University of Delhi. Available at: http://iegindia.org/upload/pdf/wp326.pdf

CMIE Pyramid Income Data

The data on household type-wise income has been extracted from the Centre for Monitoring Indian Economy (CMIE) Consumer Pyramids survey. CMIE has household-level income data in 2013-14 in four rounds at all India level. To bring it in concordance with the National Sample Survey Organization's (NSSO) household type-wise item expenditure data, we have mapped the occupation of the household head (HOH) or in case of retired HOH, occupation of the member next to the HOH to a household-type. The reasoning behind defining the household-type followed NSSO's definition of a household as close as possible. However, we would like to highlight that the household mapping may not exactly match NSSO's definition due to the lack of granular information regarding the occupation of HOH in CMIE data.

Some inconsistencies were found in the CMIE data related to age and occupation. For example, despite being of age more than 60 years, the occupation has been defined as a salaried professional. To make the data more consistent and error-free, the occupation to the HOH as 'retired' if he/she is more than 58 years old has been assigned. In case the HOH is engaged in business, the retirement age has been identified as 65 years. Secondly, in case the CMIE visited a particular household multiple times, only the information related to their most recent visit has been retained while defining the household-type. For example, if CMIE visited a household in January, April, July and, December in 2013, only the data collected during their December visit has been considered.

Occupation	Rural Household Type	Urban Household
Occupation	NSSO	Type NSSO
Agricultural Labourer	casual labour in	casual labour
	agriculture	
Businessman	self-employed in non-	self employed
	agriculture	sen-employed
Home-based Worker	others	others
Home Maker	others	others
Industrial Workers	casual labour in non-	casual labour
	agriculture	
Legislator/Social Worker/ Activists	others	others
Manager	regular wage/salary	regular wage/salary
	earning	earning

The following table presents the concordance of NSSO household-type and CMIE's HOH occupation. Table 8:CMIE Occupation and NSSO Household Type Concordance

Non-Industrial Technical Employee	regular wage/salary	regular wage/salary
	earning	earning
Non-Schooling Child	others	others
Organised Farmer	self-employed in	self-employed
	agriculture	
Qualified Self-Employed Professionals	self-employed in non-	self-employed
	agriculture	
Retired/Aged	others	others
Self Employed Entrepreneur	self-employed in non-	self-employed
	agriculture	
Self-employed professional	self-employed in non-	self-employed
	agriculture	
Small Farmer	self-employed in	self-employed
Sman Farmer	agriculture	
Small Trader/Hawker/ Businessman without	self-employed in non-	self-employed
Fixed Premises	agriculture	
Student	others	others
Support Staff	regular wage/salary	regular wage/salary
	earning	earning
Unoccupied	others	others
Wage Laborer	casual labor in	regular wage/salary
	agriculture	earning
White-Collar Professional Employees and	regular wage/salary	regular wage/salary
Other Employees		
1 5	earning	earning
White Collar Clerical Employees	earning regular wage/salary	earning regular wage/salary
White Collar Clerical Employees	earning regular wage/salary earning	earning regular wage/salary earning
White Collar Clerical Employees	earning regular wage/salary earning regular wage/salary	earning regular wage/salary earning regular wage/salary



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