

# **International Workshop on Measuring Investment in Transport Infrastructure**

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## **Magnitude & Measurement of Investment in Transport Infrastructure**

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- Transport infrastructure plays a key role in Adam Smith's vision of development
  - “No roads, no transport, no trade, no specialization, no economies of scale, no productivity progress and no development”
- It is a space shrinker, enlarges markets, and operates like the lowering of trade barriers.
- It is a service, industry & infrastructure and affects price competitiveness of tradeables

- Transportation contributes to economic activity and to a nation's global competitiveness as a service, an industry, and an infrastructure. It affects the price competitiveness of domestic goods and services because final market prices incorporate transportation

## Share of Different Modes of Transport in India's GDP

Sector	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
	<b>As percentage of GDP (at factor cost and constant prices)</b>									
Transport	6.0	6.0	6.2	6.3	6.7	6.7	6.7	6.7	6.6	6.5
of which:										
Railways	1.3	1.2	1.2	1.2	1.0	1.0	1.0	1.0	1.0	1.0
Road Transport	3.9	3.9	4.1	4.3	4.8	4.8	4.8	4.7	4.8	4.7
Water Transport	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Air Transport	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Services *	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4

*Source : Central Statistical Organisation; \*Services incidental to transport. All shares in GDP are inclusive of Financial Intermediation Services indirectly Measured (F.I.S.M.).*

# Sources -Transport Investment

- Central Statistical Organisation (CSO) is the nodal agency for compilation and estimation of Gross Capital Formation (GCF) for infrastructure including transport.
- CSO follows United Nations Classification for preparing GCF
  - Capital formation by Industry of Use
  - Capital formation by type of Institutions & Assets
- GCF for many subsectors of transport like roads, bridges, airports, ports, pipelines, etc. are not compiled separately.
- Roads & Bridges in National Accounts Statistics (NAS) is an asset classification and not an industry classification. This asset could come under any of the industries.  
  
National Accounts Statistics (NAS), Roads & Bridges came under public administration, Non Departmental Commercial Undertakings (NDCU) & Departmental Commercial undertakings (DCUs)

## Other sources of Transport Investment Data

- Other source of data is Indian Public Finance Statistics brought out by the Ministry of Finance
  - it gives break up of expenditure incurred on Roads & Bridges, Ports, Civil aviation.
  - expenditure on these are classified as developmental & non developmental and categorized in terms of revenue and capital for both the Central Government and State Governments (combined) and separately.
- These are different from the data compiled by the CSO

# Combined Capital & Revenue Expenditure of Centre & States

(Rs Cr at current prices)

	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
1. Railways	8468	7811	7554	8135	9545	15331
2. Roads & Bridges	24728	38996	52944	56165	64604	73253
3. Civil Aviation	385	769	505	1289	878	2005
4. Ports & Shipping	690	791	1088	1338	1353	1324
Total (1+2+3+4)	34271	48366	62092	66926	76380	91913
Rs per US Dollar	44.9315	44.2735	45.2849	40.241	45.917	47.4166
	<b>In US \$ Million</b>					
1. Railways	1885	1764	1668	2021	2079	3233
2. Roads & Bridges	5503	8808	11691	13957	14070	15449
3. Civil Aviation	86	174	112	320	191	423
4. Ports & Shipping	153	179	240	332	295	279
Total (1+2+3+4)	7627	10924	13711	16631	16634	19384

Source: Based on Indian Public Finance Statistics, 2011, Ministry of Finance

# Combined Capital Expenditure of Centre & States

(Rs Crore at current prices)

	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
1. Railways	8468	7811	7554	8135	9545	15331
2. Roads & Bridges	13129	21000	26194	30584	36998	41932
3. Civil Aviation	23	347	22	96	137	884
4. Ports & Shipping	98	156	320	372	350	406
<b>Total (1+2+3+4)</b>	<b>21718</b>	<b>29315</b>	<b>34090</b>	<b>39186</b>	<b>47031</b>	<b>58553</b>
	<b>In US \$ Million</b>					
1. Railways	1885	1764	1668	2021	2079	3233
2. Roads & Bridges	2922	4743	5784	7600	8058	8843
3. Civil Aviation	5	78	5	24	30	186
4. Ports & Shipping	22	35	71	92	76	86
<b>Total (1+2+3+4)</b>	<b>4834</b>	<b>6621</b>	<b>7528</b>	<b>9738</b>	<b>10243</b>	<b>12349</b>

Source: Based on Indian Public Finance Statistics, 2011, Ministry of Finance



# Investment in Transport Infrastructure 11<sup>th</sup> Plan (2007-12)

Rs Cr at 2006-07 Prices

	2007-08	2008-09	2009-10	2010-11	2011-12
1. Roads total investment	42741	48108	54638	63183	69988
Private	7009	7572	9043	10370	11893
2. Railways total investment	31182	39094	42829	40875	46821
Private	460	677	1233	1947	3999
3. Ports total investment	4942	7148	8323	9453	10779
Private	3888	5733	6593	7582	8720
4. Airports total investment	6912	7523	7092	7178	7434
Private	4600	4711	4615	4615	4615
5. Total (1 to 4)	85777	101873	112882	120689	135022
Private	15957	18693	21484	24514	29227

Source: Mid-Term Appraisal of the 11<sup>th</sup> Plan.

# Investment in Transport Infrastructure

## (as % of GDP)

	2007-08	2008-09	2009-10	2010-11	2011-12
1. Roads total investment	0.91	0.96	1.02	1.09	1.11
Private	0.15	0.15	0.17	0.18	0.19
2. Railways total investment	0.66	0.78	0.80	0.71	0.74
Private	0.01	0.01	0.02	0.03	0.06
3. Ports total investment	0.10	0.14	0.16	0.16	0.17
Private	0.08	0.11	0.12	0.13	0.14
4. Airports total investment	0.15	0.15	0.13	0.12	0.12
Private	0.10	0.09	0.09	0.08	0.07
5. Total (1 to 4)	1.82	2.04	2.10	2.08	2.14
Private	0.34	0.37	0.40	0.42	0.46

Source: Based on data given in Mid-Term Appraisal of the 11<sup>th</sup> Plan.

# Gross Capital Formation (GCF) by industry of use

(Rs Crore at current prices)

	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
1. Total GCF by Industry	1011178	1224853	1491040	1842971	1901322	2230805
1.a GFCF	931028	1120291	1343773	1641515	1788803	2016186
2. Railways GCF	13124	15049	18329	22229	29661	32074
2.a GFCF	12975	15045	18129	21945	29407	32337
3. Trp by other GCF	36817	42760	37486	50093	59778	56720
3.a GFCF	36417	42295	37069	48685	59790	56874
4. Transport GCF (2+3)	49941	57809	55815	72322	89439	88794
4.a GFCF (2a+3a)	49392	57340	55198	70630	89197	89211
GDPmp FC	2971464	3389621	3952241	4581422	5282086	6133230

Source: Based on National Accounts Statistics (NAS), 2011, CSO , Government of India

## Gross Capital Formation (GCF) by Industry of Use (US \$ Million)

	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
1. Total GCF by industry*	225049	276656	329258	457983	414078	470469
1.a GFCF	207211	253039	296738	407921	389573	425207
2. Railways GCF	2921	3399	4047	5524	6460	6764
2.a GFCF	2888	3398	4003	5453	6404	6820
3. Trp other GCF	8194	9658	8278	12448	13019	11962
3.a GFCF	8105	9553	8186	12098	13021	11995
4. Transport GCF (2+3)	11115	13057	12325	17972	19478	18726
4.a GFCF (2a+3a)	10993	12951	12189	17552	19426	18814

Source: Derived from National Accounts Statistics (NAS), 2011, CSO using average Rs/\$ exchange rate ;\*covers 9 industry groups which includes railways and transport by other means

# Gross Fixed Capital Formation (GFCF) by Assets & Institutions (Rs Crore)

	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
<b>GFCF (A+B)</b>	931028	1120291	1343773	1641515	1788803	2016186
<b>A. Construction</b>	513764	612240	738556	905966	1021753	1163255
Public	144108	181332	226288	268523	317996	368945
Private Corporate	74653	134604	161312	214805	119814	200031
Households	295003	296304	350956	422638	583943	594279
<b>B. Machinery</b>	417264	508051	605217	735549	767050	852931
Public	80000	90010	113329	132803	160711	183419
Private Corporate	220968	301870	374343	496378	460432	508738
Households	116296	116171	117545	106368	145907	160774

Source: Based on National Accounts Statistics (NAS), 2011, CSO

# Gross Fixed Capital Formation by Assets & Institutions (US \$ Million)

	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
<b>GFCF (A+B)</b>	207211	253039	296738	407921	389573	425207
<b>A. Construction</b>	114344	138286	163091	225135	222522	245327
Public	32073	40957	49970	66729	69255	77809
Private Corporate	16615	30403	35622	53380	26094	42186
Households	65656	66926	77500	105027	127174	125331
<b>B. Machinery</b>	92867	114753	133647	182786	167051	179880
Public	17805	20330	25026	33002	35000	38682
Private Corporate	49179	68183	82664	123351	100275	107291
Households	25883	26239	25957	26433	31776	33907

Source: Derived from National Accounts Statistics (NAS), 2011, CSO using exchange rate

## GCF/Investment in Transport (NAS)

- GCF comprising railways & other transport (road transport, water borne & civil aviation) rose from \$ 11.1 Billion in 2004-05 to \$ 18.7 Billion in 2009-10
- Share of transport in total GCF has fluctuated between 4 % to 5 %.
- As a percentage of GDP GCF has fluctuated between 1.4 % to 1.7 %.
- Investment in roads & bridges an important component is classified in terms of Asset & Institutions and is not captured in terms of industries of use.
  - This lends downward bias in investment for transport sector.
- However, GCF in construction in terms of asset classification covers roads & bridges apart from buildings etc. by institutions-Government, Corporate and Households
- GCF in construction by public & corporate sector was close to 2% of GDP.

## Expenditure on Transport (Budgetary Transactions)

- Increase in expenditure on transport sector (civil aviation, railways. Ports ,roads & bridges) has been impressive
- Combined (Central & State Governments) capital & revenue expenditure on transport sector as per budgetary transactions rose from US \$ 7.6 Billion in 2004-05 to more than \$ 19 billion in 2009-10
- Combined capital expenditure rose from \$ 4.8 Billion in 2004-05 to more than \$ 12 Billion in 2009-10



# Investment in Transport : Issues

Two distinct conceptual ways of estimating

- Using expenditure data as reported in Budgetary Statements of Central and State Governments
- National Accounts Statistics (NAS)
  - NAS gives Investment/GCF estimates based on UN system using
  - Asset classification
  - Industry by use classification
- Roads and Bridges in NAS is an asset classification and not an industry classification. In NAS Roads & Bridges could appear under any of the institutional categories or industry
- GCF in terms of industry of use is available only for railways and transport by other means and not separately for bridges and roads, ports, airports.
- Transport by other means includes road transport, water transport, air transport covers both government and the private sector.
- Road transport covers road freight/passenger segment.
- GCF does not cover acquisition of non produced assets like land, equity investment, capital transfer.
- Provides no estimates of GCF on a regional/State wise basis

# Investment in Transport: Issues

- Budgetary Statements give disaggregated expenditure on roads & bridges, railways, civil aviation and ports by State & Central Governments only
  - Expenditure is classified in terms of revenue (recurring) and capital which is used for acquisition/replacement of assets.
  - Available for Centre, States and combined
- Includes expenditure on non produced assets (land etc), capital transfers, equity investment, dredging of navigation channels
- Excludes financing of investment by extra budgetary resources, financing of assets by internal resources by public sector undertakings
- Possible to generate regional/state-wise expenditure on transport and its sub sectors.
- GCF as per NAS (Industry by use) covers Railways, Road Transport, Waterborne & Civil Aviation but does not cover road and bridges which are covered under asset classification and not shown separately.
- Need for disaggregated Investment/GCF data for all transport subsectors separately based on Standard UN Systems.

# Valuation of Transport Infra

- Time savings, main justification for road expressways
  - A new expressway allows faster transit but does not contribute much to GDP
- Data on value of road stock debatable
- What is the value of a Road
  - Is it its historic cost?
  - How should we treat depreciation & repairs
  - Or is it what it would cost to build it a new?
- Depends whether service is free or priced (road, bridge) over utilized (congested) or underutilized
- Prone to over investment followed by underinvestment
  - Over investment imposes cost; underinvestment leads to benefit foregone. Full cost recovery feasible in a few (Telecom, Airports Container terminals)

# Transport Infrastructure

- Transport Infrastructure are many & diverse
  - Roads, bridges, ports, navigational channels, airports,
- Infrastructure investments are lumpy & long lasting
  - Usefulness of a bridge 90% built is zero
- Road Infrastructure is space specific & immobile
  - A road in Paris can in no way render services in Delhi
- Infrastructure has economies of scale & scope
  - Minimum size facility
  - Inelastic adjustment of capacity to demand (usage mismatch)
- Has elements of natural monopoly
- Has public good character (positive externality)
- Transport assets are capital goods not consumed directly
- Transport services are used by both households & firms and at the same time are final & intermediate consumption

# Current Status of RT Data Systems

- Data on vehicle registration rather than on “vehicles in use” which is the global practice
  - Decentralised nature of data collection through nearly 1000 Regional Transport Offices spread across India
- Lack of regular data on following parameters
  - Freight movement (origin, destination, size)
  - Trucking industry (operational data)
  - Passenger (Private) movement by roads
  - Transaction costs (time & money spent)

# Major Gaps in Road Transport Statistics

- No data on movement of people, goods & vehicles
  - Hence lack of data on volume & geographic flow of traffic
- Passenger & freight flows measured in a variety of ways
  - Vehicle Km/miles of travel (passenger and freight)
  - Passenger Km : (Distance traveled \* no. of passengers carried)
  - Freight flows: Ton Km (movement of tonnes of cargo over Kms)
- No Price Index to measure changes over time in actual prices paid by the users
- Data on vehicle population in terms of registration rather than “vehicles in use”
- Vehicle weights impact condition and longevity of infrastructure. No information on vehicle weights.
- Lack of data on other dimension make it difficult to assess current capacities and plan expansion.

# Improvement of Data System

## Suggestions

- Make vehicle registration IT based
- India has launched centralized depository of motor vehicle registration in electronic mode
- Generate data on motor vehicles 'in use'
- Need for 5 yearly surveys on:
  - Freight movement by road
  - Passengers (Pvt. operators) by road
  - Trucking industry
  - Time motion survey – to study transaction cost.

**THANK YOU**