



SDG 9: Build Resilient Infrastructure; Promote Inclusive and Sustainable Industrialization and Foster Innovation

Developing Sustainable and Resilient Infrastructure

Transport Infrastructure

A lot of investment is being made in transport like road, railway, shipping and aviation over the past few years. Capacity Addition Projects are being done, to elaborate:

- New ports are being built and announced. To name a few, Enayem or Colachel near Trivandrum, Sagar in West Bengal and Vizhinjam in Kerala.
- There is a thrust on air connectivity to Tier II and Tier III cities.
- Last year more than 600 kms of highways were constructed and for this year the target is 15,000 km.

Special Focus – North East

The topography, climatic conditions of North East make it vulnerable and thus resilient infrastructure is essential. Since past three years, a lot of effort is being made to build infrastructure and enhance connectivity in the region. Three state capitals in the region are being connected through the railways and recently, a train connecting Agartala to Delhi was recently launched. Imphal and (Mizoram capital) will also be connected through rail by 2020. A big road project called SARDPNE, i.e. (special accelerated road development programme in the northeast) has been ongoing in the region for the past few years to build a Trans Arunachal highway.

Learning from the States: Maharashtra

To build infrastructure, land acquisition is one of the key things. However, the passage of Land Acquisition Bill has made the process complicated. Maharashtra is an industrial hub and there are some measures which are being taken to curb various hindrances faced and facilitate the process of resilient and sustainable industrialization. To elaborate:

- The state had its own laws which made the process of buying rural land for private parties very difficult. Since the passage of LAAR in the country, these rules have been eased out. Now permission is not required to buy agricultural land. The zone conversion to convert it into industrial zone has been delegated at the district level now.
- The Delhi Mumbai Industrial Corridor has a node in Aurangabad. Storm water drainage is being provided in this area which was not done in the MIDC industrial estates. Sewage treatment plant, collection of waste are some other steps which are being taken towards sustainable development which have not been done before.
- Water is another critical aspect for industrialization and Maharashtra is a water starved state. Thus, in Aurangabad for instance, Singapore and Israel model of recycling water is being followed. The city's sewage is being treated using the Singapore model which Singapore treats 30% of its sewage and uses it recycles it for the purpose of industry, even for the purpose of drinking water. The plan is to recycle 20 million litres per day in the city of Aurangabad. The government of Maharashtra is coming out with a policy before the cabinet that sewage from all municipal corporations should be recycled and used for various purposes.

Private Investment in Infrastructure

The 10th five year plan envisaged private investment in form of PPP in the infrastructure sector. 21% of total investments were made by the private sector at the end of 10 year plan. At the end of 11 year plan, this figure rose to 37%. And this investment was confined to two sectors – road and port. In the 12th plan, a bigger role was envisaged for private investment in the sector, however, there has been significant shortfall from the planned estimated in the sector.

Steps which can be taken to enhance private investment flows:

- Equity shortage along with stringent norms by banks in providing debt impacted the finances that were available for private investment into these sectors. Concerted efforts are being made to curb this problem. A committee was constituted to revisit and revitalize the PPP sector so that more investments through PPPs could be done in the infrastructure sector.

- There have been attempts by various ministries to evolve alternative models for attracting private sector. For instance, in the road sector, instead of the BOT model, the emphasis is on bringing out a hybrid annuity model where 40% of the investments are provided by the government and only 60% financing is done by the developer. The tolling responsibility has also been taken over by the government. These initiatives have encouraged PPP in the sector again.
- Initiative is being taken to prepare models in social sectors to involve the private sector.

Rural Areas

Doubling farmer income is a goal which the nation is striving to achieve at this juncture. A research published in Economic and Political Weekly using NSSO data reveals that doubling income depends much more on animal husbanding, diversification to horticulture etc than just the crops¹.

Moving up the economic growth route should have a more evolved meaning now. The present data reveals that 5 crore households engage in unskilled work. We should look at has come to look at full employment from a perspective of the skill ladder that instead of an army of five crore households doing unskilled work.

There is a thrust on transforming rural India, using various initiatives like rural road connectivity for every habitation by 2019, one crore houses for those who are in 0/1 or 2 kuccha rooms by 2019, 4 crore women in about 40 lakh self-help groups as part of the livelihood movement. Thrust is on integrated farming systems through water conservation, farm ponds, dug wells, goatery, poultry, promotion to horticulture, multi-tier cropping. . Incomes in rural areas can double if focus is on those households well identified through the data sets available, provide for the skills that make their integration into the larger economy easier, open up the marketing linkages. Opening up rural areas through effective rural road transport schemes will be very beneficial.

¹ Chandrasekhar, S. and Mehrotra, Nirupam (2016): "What Would It Take? Doubling Farmers' Income By 2022", *Economic and Political Weekly*, 51 (18)

Meghalaya

In the state, an institutional framework called Meghalaya basin Development Authority has been set up to identify critical gaps in infrastructure and development areas and also for taking up separate livelihood missions.

MGNREGA is a very important programme in Meghalaya and it has reached out to 90% household and also helped in bringing connectivity in the state. An interesting program has been initiated in the state since the past four years with the objective of last mile connectivity. The roads which are constructed and also improved under MGNREGA, their black topping are happening using state resources. Idea is to converge and these roads are being connected to the markets so that the produce, for example cashew nut can be sold by the people in the market.

Another sub programme under MGNREGA in the state is Bottom 20. The idea is to identify bottom 20 from every village and promote their individual assets. The individual resources are being used to create sustainable livelihood and market agricultural produce.

In Meghalaya, there is a livelihood mission called Aqua. Fish is produced within the state and 20,000 fishery ponds have been created for this purpose. The idea is to be able to produce fish within the state instead of importing it. Through apiculture mission, Meghalaya's honey is being harnessed which is very organic and devoid of antibiotics. There are great opportunities with Indo-Bangladesh border. There are eight land customs stations through which a lot of agricultural produce is being exported to Bangladesh.

Green Financing and Green Accounting

Difference between GDP and Green Accounting

GDP does not account for natural resources or for anything which does not bear a market price tag. It also does not account for cornering of public non excludable goods. Green National Income Accounting takes into cognizance stock and flow variables, natural resources and their reserve to production ratios, their depletion and also new discoveries.

There have been increasing concerns and reservations about use of GDP as a measure of development. The biggest limitation of GDP is that it is unable to throw light on resources, resource use efficiency and no indication on distribution of growth. And it is important to look at alternative indicators and mainstream them. For example, mainstreaming green accounting into the conventional system of national income accounts

There are many issues with green accounting like what can be measured, how can it be measured, how to address inter-jurisdictional issues. The other huge area, problematic area is that of data. Some of the data is not easily available. For instance, during an exercise for Uttarakhand, data for physical extent of sedimentation in reservoirs was required and this information was just not available. If extent of reservoirs is unknown, it is difficult to estimate the cost of soil erosion in the country. There are issues at various levels with data, information is not being collected, some of it is being collected but is not available and the other big problem is that some information is being collected by multiple agencies and it doesn't tie up.

Though green accounting has conceptual and data problems, it can also provide valuable policy inputs. To enumerate, one of the best examples is the use of NPV as payment for diversion of forest land which comes from very elaborate accounting exercise. There is also the Mine and Minerals Development Regulation Act, MMDR 2012 provides for compensation to local people through district minerals foundation and the amount that has to be contributed by licensees to this foundation is something which can also come from the value of minerals and what is the cost of depletion to society. Similarly, there is a carbon cess on coal.

Instead of focusing on methodology, one can move ahead with ahead in a phased manner with different elements of green accounting. For example, material flows – how energy, water, wastes are flowing through different sectors of the economy can pertinent information.

A recent study by UNEP shows that in terms of energy intensity, India may not be too bad but in terms of material intensity of GDP, we are way behind developed countries. India's material intensity is 6 times that of Germany's². So per unit or per dollar of our GDP, we use six times more material that is used in Germany. So unless we have a detailed material flow account which shows which materials, which sectors, we will never be able to address whether this is just a technology issue, it is an efficiency issue or it is a larger structural issue.

Green Accounting can be useful for:

- There is need to develop indicators which go beyond GDP. The World Bank has recently come up with inclusive wealth index per capita which shows that country like China and India which may do very well in terms of GDP, lose their ranks significantly when their performance is measured in inclusive wealth per capita. Indicators which are not necessarily monetized but concern the well being of all need to be culled out and made a part of the mainstream debate.
- Several countries are promulgating pollution taxes which use the damage value to put a value on the pollution tax on the polluter's pay principle.
- Land use change is another example. For instance, the concept of 'wastelands' gives the impression that the land is of no value and hence it can be put to any other value which has "higher value". But if the cost benefit analysis does not only take into account only economic but also environmental and social value of the land, the land use decision would differ.

² Schandl, Heinz *et al* (2016): *Global Material Flows and Resource Productivity: Assessment Report for the UNEP International Resource Panel*, United Nations Environment Programme.

Innovation for Sustainable Industrialization and Development

Atal Innovation Mission

There are three major initiatives under which the mission has been put.

iv) Tinkering Labs

Tinkering labs will have do-it-yourself kind of kits through which the students will learn while they are doing different experiments and try to find products or create products which would solve their problems.

v) Atal Incubation Centres

These are technology led innovation labs at higher learning institutions. Colleges, engineering colleges, degree colleges, universities, such places, R&D centres, industries, anybody can come and set it up. Engineering colleges, higher educational institutes, R&D Centres can set these up.

vi) Atal Grand Challenge

The Grand Challenge Scheme challenges the innovators, researchers, entrepreneurs across the globe to come with solutions for an identified problem which the country faces. The problem should be unique, it should be related to the Indian conditions, it should be scalable and it should solve the problem faced by the masses. After a lot of deliberations, six such challenges have been identified.

Role of government in eco innovation

Different countries are using new instruments and techniques for eco innovation. Fiscal measures such as carbon emission taxes, energy tax, R&D tax incentives, emission target, trading schemes. The government can facilitate innovation in energy sector like technology regulation, energy saving requirement. Other steps to ensure sustainable innovation is permit, bans to operate if environmental conditions are not met, recycling rules like eco levels and other soft standardization instruments.

Other initiatives which could be taken in terms of capacity building is integration of environmental aspects in professional and formal training.

Indian industry has not only been resource intensive but has also been polluting and generating billions of tonnes of solid and hazardous wastes with no proper management system. Most of these industries consume a large quantity of water and as a result the waste water discharge also is very high. To quote some of the statistics, most major industrial sectors in India consume 25% to 100% more energy than the global best practices. And for every cubic metre of water consumed, the value addition in India is just 7.5 US\$. This figure is much lower in comparison to Korea, UK, Sweden and other industrialized countries. Such a model of industrialization is not sustainable.

The sustainable industrialisation which India needs to focus on is alternate system in every field. In healthcare, for example, Ayurveda, naturopathy and yoga, renewable sources of energy such as, solar, wind, hydro, biomass. Similarly, public transportation systems, light weighting of vehicles and development of electric vehicles rather than vehicles running on fossil fuels. Organic farming, drip less irrigation are also some examples of sustainable innovation models.

India's investment in Research and Development hover around 1% of GDP and the target of government is to raise it to 2% of GDP. The Department of Scientific and Industrial Research (DSIR) has a flagship scheme wherein it gives recognition to in-house R&D units of industries. Till now, around 3000 in house R&D centers of industries have been recognized.

The DSIR also has schemes which support innovative technology development and demonstration and also innovative supporters. DSIR also has a PSU called National Research Development Corporation which is for commercialisation of technologies from R&D institutions and it has the largest R&D organization in the country, CSIR, which is engaged in industrial research and provides significant technological interventions in many areas.

Learning from the States: Punjab

In Punjab, the vision has been to provide affordable technologies for environment protection and energy efficiency in small scale industry.

Small scale cupola furnaces are a very important industrial sector in Punjab. There exist 1000 cupola furnaces in Punjab. They together consume fuel worth 200 crores per annum and emit 800 tonnes of suspended particulate matter in the environment and 3 lakh tonnes of carbon dioxide. A technical advisory cell was set up in the state of Punjab which took up the challenge to develop air pollution control devices. Till now, 700 such devices have been replicated in the state of Punjab. This has also been demonstrated in states like Bihar, Jharkhand, Haryana, Jammu & Kashmir and Karnataka. The contribution of this intervention has been that though in conventional cupolas the metal-coal ratio is to the tune of 6:1, 6 parts of metal and 1 part of coke. This intervention has brought it down to 12 parts of metal and one part of coke.

In another intervention, the target zone is MSME's. There exist around 3000 brick kilns in Punjab which consume 2 million tonnes of coal and 1.15 million tonnes of biomass every year and they contribute something to the tune of 0.12 million tonnes of suspended particulate matter into the atmosphere. The technology brought in for air pollution control as helped in saving energy by bringing in small innovative changes in the operational practices. National Emission standards for brick sector for Central Pollution Control Board have also been designed.

Rerolling mills is another example wherein there is immense potential for bringing sustainability. Steel rerolling mills constitute an important link in the overall supply chain of steel in the country and there are about 1200 steel rolling mills in India. Out of these about 300 are in the state of Punjab and change is brought in terms of pollution mitigation and energy saving in say 60 rolling mills as of now. The plan is to expand the programme further.

Success Story through local/community intervention

There is a belt in Punjab called Shivalik foothill area or Kandi belt which unlike rest of Punjab is not much productive because of its topography, the soil constraints and so on. We had set up a facility for processing the locations, the local bio resources. The impact of this facility has been significant. It started with a 37 lakh grant from government of India with the involvement of a local cooperative society and today the cooperative society has a turnover of ten crores. It is processing the local bio resources and has generated employment to the tune of one lakh man days for the local communities.

¹ This Report is based on the deliberations during National Consultation on SDGs on 2nd and 3rd August, 2016. They

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i