Infrastructure Engineering and Poverty Alleviation

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1. Introduction

This paper is anchored on opportunities for better jobs for engineers vis-à-vis what could be termed "regular jobs". Engineers must devise solutions for the pressing problems of the society, through Developmental Engineering, finding immediate applications towards social progress that is equitable and broad-based. Such engineers are "Developmental Engineers".

Poverty can be atomized to one of opportunity, of limited accessibility and affordability, energy/power, transport, water, public hygiene, environmental, disaster response poverty … Infrastructure must address this comprehensive reckoning of "poverty", through "Developmental Engineering".

2. Energy/Power Poverty

Eradicating energy poverty demands multi-disciplinary and seamless engineering. The solar updraft tower converts solar energy into electricity and utilizes local labor, local material, and involves no hi-tech Intellectual Property Right issues. Geothermal energy melds foundation engineering,

pile foundations and heat transfer. Power generation cannot impose health, environmental, safety negatives. Engineering has to chart a navigable route through the positives and negatives. Power transmission needs an engineering viewpoint leavened with governance perspectives. The possibility of distributed generation – mini and micro-hydels – will obviate transmission and that is a plus. By lighting remote areas which are typically power starved, engineers contribute to poverty alleviation.

3. Transport Poverty

There is tremendous urban in-migration from rural areas. It is rather unfortunate, however, urban in-migration ghettoizes poverty. To overcome the same engineers have to offer affordable, accessible transport. This happens with Delhi Metro and has an effect on reducing inequality, a developmental positive enabled by a transport facility, an engineering contribution. Students of Harvard University heard about the Dabbawalas of Mumbai, made possible by the city's suburban trains – an engineering contribution.

Transport infrastructure breaks the barriers between rural and urban areas. However, a fast corridor isolates the communities on either sides of the alignment. This is a development negative, to be set right by engineers, but by measures the society can afford. Small crossings made from innovative carbon fiber tubes that are inflated to surround a steel support structure built in the shape of the bridge span may fit the bill in the near future.

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4. Water and Public Hygiene Poverty

The options to address water and public hygiene poverty cover the gamut – from the simple, cost-effective and expedient controlled chlorination – say, "a drop per glass" – as is being practiced in Kenya to major, cost-intensive desalination.

Cost-effective must be reckoned in terms of developmental economics. Ineffective urban drainage causes cesspools, which lead to malaria, affecting the poor disproportionately. As engineers, then, by draining that land and creating a healthy habitat while catering to the natural drainage of the land reduce health negatives. This is cost-effective. Likewise for sanitation, lack of which has been fingered for stunted growth in children. An engineer has to work against the NIMBY syndrome.

5. Contingent Poverty – Disaster Mitigation, Management

The poverty due to contingency under focus now is disasters, which hurtle people into poverty. As backsliding is very difficult to stop, it would be better to build backstops. This is an engineer's task.

To foreclose disasters, beyond prediction, we have codes and specifications. But economics may trump these. The result is the type of unmitigated disaster we witnessed in Uttarakhand recently. It is the unavoidable and discouraging truth that engineers cannot compel the optimistic public to invest in safety, however marginally costlier it may be. But, we cannot give up hope. We should equip our engineers, as a measure of reducing contingent poverty, with enhanced communication skills.

6. Opportunities for Better Jobs

In each one of the different kind of poverty that has been delineated, it is stressed that engineering solutions exist that also show the concern of the engineering fraternity towards holistic development of society, poverty alleviation being an integral part of the paradigm.

If engineers want to be involved in social development, they need to look out for better jobs and not merely better job opportunities. This is what "Developmental Engineering" means.

7. Summary and Conclusion

There is no dearth of opportunities, each leavened by expertise in engineering and each tuned to employment opportunities for the prepared engineer. The "prepared engineer" is prepared in at least dual dimensions, in engineering and in beyond-engineering, such as holistic development, poverty alleviation.

We must understand, if not the genesis of poverty, why it is sustained. Persistent poverty in society is not exclusively the fault of the poor, but combines the result of lack of "attitude" in the society as a whole; of love for right work at right time, the will to be technically, productive , not to be satisfied with sub-standard production, to aim for the engineering best .

The word poverty has to be atomized yet within an integrated perspective – a balancing act. While at the working level poverty alleviation is one of providing transport, sanitation, water and other such infrastructure facilities, the focus must be in enhancing the quality of life of the poor. This perspective would also include additions to the language of engineering, in taking infrastructure to society. This is what we would call infrastructure engineering.

To conclude, engineering is not merely "engineering" anymore. Engineers must look out for, and be prepared to avail of, opportunities for better jobs. That is how they will enhance infrastructure engineering and contribute towards poverty alleviation.