Time for the Great Course Correction

The core objective of Infrastructure creation is to support various economic activities. The dynamics involving demand and supply along with the multiple cross linkages between them shape and strengthen the entire economic landscape. Innovations in science and technology, complexities of global trade barriers, cultural influences on consumer behaviour, harmony between business processes and environment sustainability as well as dynamism in financial markets are the major cross linkages between demand and supply. Therefore Future of Infrastructure can be best defined based on the predictive paths of each of these cross linkages.

Industrialization, cold war and global trade shaped the economic activities in the 2nd half of previous century. But as it appears now, technology, wealth distribution and climate concerns could well be the key drivers of economy in current century. Geo-political and economic trends in just about 1/3 rd of the global landscape had influenced economic activities in previous century, but those in 2/3rd of the global landscape could well be defining economic activities in present century.

Thus it is evident that future of infrastructure is set to change in a manner that we have never witnessed. This article is not intended to or capable of visualising the whole gamut of changes that could be a reality by the middle of present century, but strives to draw a perspective of the future horizon for the benefit of infrastructure planners and professionals to understand the spectrum of challenges that await them over next few decades.

The Big Picture

The biggest change for Infrastructure will be the very purpose for which it is created. Historically, the primary use of infrastructure development was to help maximise the utilisation of natural resources for the economic and social benefit of human beings. But hereon, the purpose of infrastructure would be largely to help economic activities achieve harmony with environment.

Energy

Since Industrialisation, Energy infrastructure formed the backbone of broader economy. The design of infrastructure for energy production has been aimed at maximising extraction and utilisation of natural resources. But now we see the world strives to reduce the extraction and maximise renewable sources. In 1970, as much as 90% of the world's energy production was based on consumption of natural resources. By 2019, their share has dropped to below 80% (source: IEA). The scale of reduction is significant considering the positive annual growth in energy production over the period. The future energy infrastructure would certainly be leaner, cleaner and more efficient.

Communication

Communication technology emerged as a strong engine of economic growth over the past few decades and the trend is here to stay. The future of communication infrastructure would certainly be to further increase the speed, widen the access and improve the user experience. In most countries, investment in communication infrastructure is dominated by private sector. However as Governments hold the asset ownership of spectrum; its rational allocation would be crucial. Further geo political issues can also influence the choice of technology and nature of infrastructure. In a seamlessly connected World, countries may need to create a global platform of co-operative regulation of the communication sector to safeguard against the issues arising from exclusivity of technology rights creating imbalances, inefficiencies or geo political tussles.

Transport & Logistics

The most significant change would probably be felt in the automotive sector. The one significant change over next two decades could be change in fuel that powers automobiles since its invention. Fossil fuels are set to shed their space progressively to electricity or other alternative fuels like hydrogen. Electric recharging facilities or other fuel stations would replace the road side fossil fuel stations over the next few centuries. With several mass rapid transit and high speed rail systems under planning or development, share of public transport in cities would shift more towards rail mode especially in large countries like china and India. Large geographies would also witness significant growth in civil aviation with improving interior connectivity, making air travel more popular than elitist.

In cargo logistics too, the modal shares are changing with the break bulk cargo share rising over that of bulk cargo. Volume of light weight – high value products is expected to increase. Online sales are likely to grab larger share than show room sales. Drones could emerge popular mode for last mile delivery. These will lead to aggregation in goods logistics even in domestic movements and cause visible changes in both intercity and intra city logistics, just as containers changed the transcontinental shipping in 2nd half of previous century. Road bearing the burden of higher pollution, is likely to shed more share to cleaner rivals like rail, water and air.

Real Estate

Changes in communication, transport and logistics would cause significant changes in real estate demand across cities. Need for large warehousing parks in city suburbs likely to grow while swanky shopping malls in prime areas getting increasingly redundant. Real estate is set to lose its sheen as an asset class in an integrally cloud connected world, as economic activities have less significance to the spatial attributes to land and location. Developing countries with more young demography could witness strong demand for housing supporting their real estate sector.

Healthcare

Covid Pandemic has demonstrated to the world that health care shocks could be more damaging to economy than even geo political wars. This realisation is set to change future policy responses and planning approaches for public and private healthcare infrastructure. The pandemic and rising natural calamities have exposed the vulnerability of civic infrastructure to such crisis. Cities in populous countries would need to invest in large isolation cum rehabilitation facilities and strengthening integrated crisis response team (CRT) with adequate health care and evacuation infrastructure.

Education

The impact of technology is already changing the dynamics of education sector. Technology innovations threaten several traditional job roles making many traditional courses redundant, but they also necessitate varied knowledge creation and new skill sets. Further as technology makes business life cycles for many products and services shorter, re-skilling becomes inevitable.

Thus future of education infrastructure is likely to shift from the current rigid frameworks of systematic education to highly flexible one. Spatial attributes of campuses become less relevant in a connected world. Continuous education and skilling become a sheer necessity than just a tag line. This means the nature of physical infrastructure for future education would witness change from sprawling campuses to cloud connected class rooms and shop floors. Virtual networks across global institutions could help reduce the wide variations in quality of education across the institutions opening up possibilities for policy actions to help collaborations or even consolidation in education services.

Waste Management

Time has come for the World to invest in managing waste. Our world now has nearly four times the population it had over 100 years back and which now generates twice the waste per capita than those lived then. Creating infrastructure for reuse, recycle and replenish is imperative to help the world not become a dump yard of just one generation. Policy makers need to acknowledge the true social cost of wastes and devise strategies to make it an economic opportunity.

Speed Breakers

But there are some major hurdles in Infrastructure development especially in developing countries where traditionally Public funds have been the main stream for infrastructure investment in many sub sectors. The financing need of the future infrastructure in these countries is far in excess of the capacity of their public finance. Hence attracting private sector to complement public investment in infrastructure would be unavoidable to achieve the desired level of economic growth. However the

inherent risk concentration typical to the infrastructure and the compelling political need to make equitable access to all user segments, make infrastructure investments highly complex for private sector.

Thus making infrastructure as an asset class is the most crucial challenge in mobilizing resources to meet the massive financing need of Public infrastructure in many developing economies. Experience in developed countries has demonstrated the potential of some financial instruments and policy interventions by Governments to help channelize public savings to infrastructure investment. Instruments such as InvITs and REITs are examples of such monetary instruments. Creating independent and well regulated financial institutions such as Pension Funds and Debt Funds are also proven to serve as sustainable platforms for mobilisation of public savings for infrastructure investment. Thankfully many of the fast growing developing economies are also showing rising trend for public savings which can be tapped into through suitable fiscal policies and monetary instruments.

Road ahead

We are now at cross roads in the history of World's economic development and very much set for the inevitable course correction towards the path where economic development and environment sustainability complement each other. Thus future of infrastructure development would be to help build harmony between economy and environment.