

The future is here



Top Article: The Future Is Here
General purpose technologies reshape the nature of production and service activities irreversibly.

They open up new opportunities, create complementarities and necessitate reorganisation of production. They share characteristics like wide scope for changes and elaboration, applicability across a range of uses and potential for use in a variety of products and processes. They change human capital requirements and alter the skill mix in the economy by biasing it towards higher-skilled people. Human history is replete with instances of how diffusion of general purpose technologies transformed societies. Take the US where electricity changed the way factories were organised in the 19th century, while assembly lines transformed manufacturing. In communications and logistics, the telegraph enabled rapid conveyance of goods in stock and instructions to employees, forever changing the way businesses were managed. More rapid communications between firms prevented resource misallocations.

Employees could work from more convenient locations. Railroads and the logistics revolution transformed retailing. An entire nation could become the market for a firm located in any corner of the country. The replacement that occurred of unskilled human and obsolete fixed capital by skilled human capital and new technology catalysed productivity growth in the 19th century.

It led to the USs emergence as the world economic power, with gains accruing to human capital responsible for implementing these technologies. The impact of general purpose technologies on individual productivity is

profound thanks to changes in the organisation of production. Their diffusion raises the returns for cognitive skills and education. As these are deployed, there is demand for higher skilled human capital and higher-order mental skills.

These include interpersonal and management skills, and skills to operate autonomously and exercise judgment. In contemporary times, the emergence of modern technologies has transformed work by making it complex, analytical and abstract. Effective general purpose technology use involves invention by users. Equipment is not simply installed equipment. Firms innovate in organising work, by defining new jobs and management structures. Businesses improve customer service and provide new services. Take information and communications technologies enabling firms to develop new service delivery processes.

Invention of new services, and of the human side of the delivery mechanism, has created demand for innovators. Take the telephone network, a classic general purpose technology. It carries a conversation between two people without the network understanding what they are talking about. The network is designed for the task of transmitting sounds from one place to another. It is indispensable because it can be used to talk about anything. Take broadband, the most important general purpose technology today. Individual users use the network for multiple purposes: voice, e-mail, games, media and on-line content streaming services. Broadband enables not only communication but also connectivity to carry out transactions efficiently.

It helps develop new activities, raising telecom network capacity by an order of magnitude. For customers, its critical functionality is internet access. Other uses are tele-medicine, e-learning, e-government, e-business, telecommuting and media and entertainment. The newest phenomenon is social networking. Each use has its own social benefits. Telecommuting offers savings in travel, congestion and pollution costs.

As for tele-medicine, some key functionalities are tele-diagnosis, tele-ultrasound, tele-sonography, tele-monitoring, tele-consultation and tele-radiology. All use the telephone network with broadband functionalities. Broadband can transform healthcare in many unimagined ways.

Communications professionals are required to understand medical applications to design tele-medicine systems for doctors and hospitals. They need marketing skill to effectively market these. Such skills requirement create new employment. Clearly, general purpose technologies have a phenomenal capacity to transform societies.

As it launches its second generation of reforms, India must focus on how rapidly such technologies diffuse through society. Their impact can be mega-transformational. With respect to electricity, lack of it has meant that India is in the unfortunate position of never catching up with China, Japan or South Korea. Indias manufacturing position has been compromised in perpetuity. But Indias telecom revolution means Indians no longer have to remain silent, nationally or globally. The mobile sector phenomenon has made talk cheap: supply exceeds demand. It is time to harness the energies and thoughts behind the speech of millions of Indians into viable business models

enhancing national wealth and productivity. For that, India needs diffusion of another critical general purpose technology.

As of now, India is broadband-poor. Yet the possibilities of broadband being supplied by wireless providers mean India need not suffer the tyranny of landline constraints impeding diffusion. Third and fourth generation wireless broadband functionalities are at its doorstep. The transformational possibilities for the economy and society via a general purpose technology may well lie in thin air.