



PUNE INTERNATIONAL CENTRE

**Growth Pillars of the Economy – Agriculture,
Industry and Services**

October 2022

**Pradeep Apte, Ganesh Natarajan,
Ejaz Ghani and Aravind Chinchure**



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Growth Pillars of the Economy- Agriculture, Industry and Services

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The growth story of India has largely been one of an agriculture-based economy, and the country has been somewhat slow to embrace manufacturing and capture the service industry, particularly technology services. Like India, China is one of the fastest-growing economies in the world. But the two nations have followed very different growth paths. China has been a formidable exporter of manufactured goods, while India has acquired a global reputation for exporting services. India went straight from agriculture into services, leapfrogging the manufacturing sector. India's growth pattern resembles that of the US. This raises big questions. Can services sustain output and job growth? Should India allow itself to be a laggard in manufacturing? And, is there any hope at all for being a high- productivity player in global agriculture?

We will address the progress and the future opportunities in each of these key pillars of economic growth. To start on a positive note, the research paper and subsequent book produced by the Pune International Centre (PIC) in 2021¹ clearly pointed out that the Indian economy has demonstrated stellar growth from 1991 to 2019—\$275 billion to \$2.9 trillion GDP, \$18 to \$330 billion exports, though imports have also accelerated from \$24 to \$514 billion, foreign exchanges from less than a billion to \$425 billion, and the most heartening data, that population below the poverty line has dipped from 45 to 22 per cent.² In 2019, an Electronic National Agriculture Market research study, eNAM Report 2019, mentions that India was ranked globally ninth by market capitalization and fifth in nominal GDP, on course to become the third-largest economy in the world by 2030.

AGRICULTURE—POLICY AND PROSPECTS

During the last seven decades, Indian agriculture and, consequently, policies in agriculture have undergone several transformations and changes. In the initial 18 years post Independence (1947 to 1964), there was a severe scarcity of many agricultural produces. The administrative response to such a scarcity situation was mostly designed along the experiences and devices of the Second World War years. On the one hand, trade in many food grains and commodities, like sugar, was heavily regulated, with movement restrictions across districts in states, etc. Maximizing availability of food was the principal preoccupation, even obsession in design and working procedural content of policy. Ushering in the Green Revolution, principally in the agriculture of wheat and rice, and encouraging success in Operation Flood in the milk sector stabilized food availability in the country.

This period also witnessed the appointment of the Agricultural Pricing Commission (APC), with the aim of regulating prices that balance consumer interests and farmers' aspirations. Yet, the scarcity in pulses and oilseeds, and dependence on imports persisted and continue to

haunt us even today.

The retention price mechanism may be broadly described as follows: normal average cost covering price per ton plus 24 per cent gross return on capital costs was calculated for every manufacturer. From such a price, the administered price fixed for the farmer was subtracted. The difference was paid as the subsidy payment to the manufacturer. Such a subsidy was available for only those units with a capacity utilization of 80 per cent or more of its installed/stated capacity. Evidently, this signalled understatement of installed capacity to ensure eligibility. This was often euphemistically referred to as 'gold-plated capacity'. This also implied that the actual incidence of such a subsidy scheme was only partly accruing to the farmers. However, as it was declared as a subsidy to farmers, the political label of farmers' subsidy stuck. Hence, this design became a holy cow, and any reforms or revision of the same was perceived as being anti-farmer.³

The period from the 1980s witnessed several important developments that triggered diversification and gradual shift in favour of high value crops. This period also witnessed the rise of horticultural and floricultural crops. The relaxation of import restrictions on several crop plantation materials for vegetables, fruits and flowers brought about a change in the quantity and quality of these crops. The oilseed mission opened up the opportunity to introduce new varieties and crops. It was during the period up to 2002 that proposals were made for reforming the system of markets of agriculture produce. However, these were less noticed and discussed, perhaps eclipsed by the euphoria about industrial delicensing that occurred concurrently. In 2002, the Task Force on Agricultural Marketing Reforms⁴ recommended the abolition of several policy restrictions and barriers, including the Agricultural Produce and Livestock Market Committees (APMCs) under the Agriculture Produce Marketing (Regulation) Acts of several states. It was also followed by the Union government's appeal and attempt to liberalize agriculture in 2006 by suggesting a model act for agriculture produce that facilitated abolition of the licensing regime enjoyed by extant middlemen in APMCs, and setting up of private mandis, including farmers' mandis. It also strongly argued in favour of promoting and stabilizing forward market-based trading platforms and pointed out sudden unreasonable bans on the alleged grounds of so-called speculative trading fears. In 2003 (and again 2007, with some modifications), the model Agricultural Produce Market Committee (APMC) Act made similar suggestions for reforms in the APMC system.

Let us look at some of the burning issues that need serious attention for the decade to come, as well as reforms that can be implemented to remedy them. But before we proceed to these issues, it may be useful to note certain features of the agricultural and rural economy in India.

1. The share of agriculture in India's gross value added (GVA) is dwindling, and it is now



in the vicinity of 20 per cent.⁵ The population dependent on agriculture, though not strictly employed in agricultural and allied activities, is around 52 per cent.⁶ Naturally, the sector engages a significantly high share of the poor population. (The estimates of rural poverty are drawn from various poverty studies, including Tendulkar and C. Rangarajan committee report of 2011–12.) At the same time, the farmers in several areas complain about scarcity or non-availability of labour, and the wage rates of agriculture labour have risen in many areas. This is also one of the complaints about the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), which exacerbates the higher wage and scarcity.⁷

2. Most of the states have been experiencing what is often called feminization of agriculture. In broad terms, this means that in operative, effective employment, the share of female labourers and labour performed by the female labourers is significantly higher. In many areas, male workers perform relatively fewer heavy-duty menial tasks and ordinarily command higher wages per day. Several other tasks are usually performed by women. The labour participation rates in officially published estimates, however, are much lower.⁸
3. Average operational land holding has been securely declining, and the numbers and proportion of small and marginal farmers have been consistently rising.⁹
4. One of the rounds by the National Sample Survey Office (NSSO) revealed that a large number of farmers desire to quit agriculture.¹⁰
5. With rising population, the average population size of villages has been climbing and many of them will resemble semi-urban areas in many economic characteristics. The villages with greater proximity to national or state highways exhibit different features of migration and employment preferences.
6. The cropping patterns and character of allied activities of villages in many urban peripheries have changed and show remarkable shifts in favour of non-food products.
7. Share of non-food products in the total value of output in agriculture has been rising, and it is presently estimated to be 55 to 60 per cent.¹¹
8. Notwithstanding the reference to agriculture-related activities as the sovereign domain of state governments as per the Seventh Schedule of the Constitution, the market of agricultural produce has been inherently and historically national in character. The promulgation of the Essential Commodities Act in 1956, together with
 - (i) the Agricultural Price Policy of the Commission for Agricultural Costs and Prices (CACP);
 - (ii) working of the Food Corporation of India (FCI) for dual responsibility of minimum support price (MSP) policy and the public distribution system (PDS) mechanism; (iii) scheme-based planning/financing process in vogue for six decades;
 - (iv) working of the fertilizer subsidies scheme operated by the Union government, have resulted in substantial centralization of this 'sovereign subject'. The state government has become the implementing agency of the schemes and policies that were largely defined,

designed and governed by the Union government. At best, the state governments enjoy greater autonomy in land legislations governing land markets (principally, tenancy, ceiling limits and more or less non-operative anti-fragmentation/subdivision acts). Thus, common assertions in public discourse about agriculture being a sovereign domain of state governments should be taken with a sizable pinch of salt.

Major policy recommendations

Agricultural market reforms

There are three distinct yet related problems that are entangled in the current debate. There are some distinct problems that are entangled in a significant issue and the subject of many debates. The policy conception that prevailed in the early years was overshadowed by the management of challenges posed by scarcity. The APMC was thought to be an institutional structure where the supplies could more easily be monitored and their movement easily regulated, as expressed in the preamble to the APMC Act. The unintended consequence of this was the creation of an exclusive class with licence to trade in the APMC, in collusion with a political class that controlled the APMC. Such an alliance of interests and collusive oligopolistic control of trade channels and trading finances (including underground illegal usurious transactions) were quite similar to the experience in industrial licensing policy.

This was further compounded when FCI entered the scenario with PDS and a food-supply safety mandate for principal food grains. FCI was also mandated to ensure such procurement at declared MSP. This has created a totally wrong impression that an MSP-type mechanism is viable and possible for all type of crops. Hence, it is worthwhile to look at the outcomes as actually achieved in this regard.

The FCI has been principally involved in the procurement of wheat, rice and maize, which it purchases at the MSP in some of the principal mandis in Punjab, Haryana and Western Uttar Pradesh.¹² Its operations are geographically extremely lopsided. The easiest way to appreciate this is to compare the share of Punjab–Haryana in the production of wheat and rice vis-à-vis the share of FCI procurements from these states. Moreover, excessive procurement by the FCI beyond the ‘safety level norms’ simply does not occur in several other mandis in other states. Most of the mandi prices remain much below the prescribed MSP level, across mandis and over the seasons, and they keep on fluctuating in response to underlying demand and supply forces.

Evidently, unless the FCI is willing and able to procure all the supply for all the weeks of the season, the MSP level can never be attained. Traders understand this elementary fact much better than those who believe that MSP can be enforced perennially for all crops. The FCI does



not have the required storage facility to hold even the wheat and rice or maize it procures, and the produce continues to rot for an average of two years. The FCI routinely sells such degraded stock with the label 'unfit for human consumption,' and several animal feedstock companies purchase the same at the convenient bidder price. Thus, the FCI may be credited for at least indirectly and partially protecting the livestock of the farmers.

Due to the limited financial and storage constraints, organizations like the FCI cannot stabilize prices at levels that would simultaneously please the farmers and consumers in a reasonably efficient manner. The burden of subsidy, even grossly calculated as MSP minus fair price/ration shop prices, is bound to become larger and larger. There is enough accumulated experience over years that makes it evident that the regime of MSP and PDS as operative today is an economically flawed idea. Farmers are being fooled by this mirage, and it is even more disastrous in its fiscal implications.

Given the heavy concentration of FCI operations in a few chosen states, the response to the 2020 farmer's agitation in most states remains lukewarm. Because the agitation is largely led by farmers from these few states, this minority have been able to supersede the other silent majority of farmers who would, in fact, welcome the freedom from the oligopolistic regime of the APMC. More curiously, the honourable Supreme Court did not even care to publish the report of the committee which it had appointed!¹³ It could have invited members of earlier committees, members of the chief ministers' committee to probe the truth of the claims and to voice what the other silent mass of farmers may have had to say. It could have also examined the views of the states where the regulatory regime had been partially and silently dismantled (e.g., Maharashtra). The government has shelved the bills and injured the future prospects of these overdue reforms. The bills constituted the welcome exercise of removing the dead wood of policy history. Let us hope that yet another consultation process with the provision of a joint body of the Union and state governments (something similar to the GST Council) is envisaged to effectively facilitate the open environment for trade in agricultural produce.

Let us not also ignore the fact that the basket of goods produced by the agricultural sector has undergone considerable change, and several of these goods have a flourishing market size that largely remains untouched by the APMC as well as the FCI. It would be suicidal to further perpetuate the myth of farmer prosperity through the MSP regime. The market mechanisms have discovered better pathways with very minimal regulatory intervention, as in the case of milk, fruits, eggs, etc.

The FCI is primarily responsible for procurement of farm goods at MSP. The use of such procurement for the PDS purpose is largely handled by the state government. Hence, reforms

will be needed at both levels, i.e., procurement and storage by the FCI and PDS operations by the state government.

Moreover, the state governments themselves are participants to these PDS operations, with some financial aid shared with the Centre, so that the regional and crop-wise imbalance in procurements and PDS requirements are addressed more effectively. State governments also need to look at the changing nature of crop patterns of their own states and think more carefully of their own fiscal-cum-administrative capacities (e.g., warehousing and further marketing channels necessary for the sale of procurements) before engaging in any scheme that involves support-price type interventions.

Water supply: Agriculture and non-agricultural uses

State governments are responsible for harnessing, building and conserving water resources of all types (principally groundwater and surface water resources). With rising urbanization, many states are already facing the issue of equitable water allocation between competing uses and users. Many of the surface water irrigation schemes were initially designed to cater to agricultural uses, but civic and industrial demand is expected to rise much faster. Hence, state governments should handle this responsibility with a serious examination of technological opportunities and options—recycling of water and more efficient methods of uses (e.g., micro-irrigation technologies, changes in crop patterns, etc.), institutional arrangements such as water user associations (WUAs) and, most importantly, pricing of the water delivered, which should cover operation and maintenance costs.

Some states (notably Punjab and Haryana) have exhausted their groundwater by unmindfully promoting unsustainable crop patterns (this too involves working of MSP procurement by the FCI).¹⁴ It would be advisable to introduce a blue-box subsidy for not cultivating these water-table depleted lands. Blue-box subsidy in World Trade Organization (WTO) parlance means production limitations subsidy. In other words, instead of engaging in large unaffordable procurement with entire value of output, it may be wise to declare net income subsidy per hectare for not cultivating wheat or paddy, which have excess production levels.

The most important reform effort would be building the necessary administrative and commercial intelligence of the state agriculture departments. The first and foremost step would be to develop a geographic information system (GIS) of land records, terrain and soil/slope profiles at the micro level, i.e., the farm plot level. It should endeavour to generate more realistic estimates of the area under crops, crop yields and potential market arrival data in all (public and private mandis). The department, with the help of the local government, should also install, operate and monitor weather data and warning systems. This would ensure that the agriculture department has sufficient information on all fronts. State governments should use



the public–private partnership (PPP) model to promote a packaging–cum–warehousing facility (including preservation–oriented cold–chain technologies), as such arrangements will attract private sector investments, including farmer/companies, and state government resources need not be burdened and blocked for such uses.

The Union government should refrain from using quota, and it is necessary to have stable predictable export–import (EXIM) policy to develop and consolidate the export markets for agricultural products. The Union government has a habit of declaring bans and price caps to arbitrarily curb exports on the basis of alleged or real fears of rise in domestic price levels. This invariably results in induced or forced fall in domestic prices and hence loss of income to the farmers. It may be pointed out that several farmers organizations have opposed such bans exclusively.¹⁵

There already exists an emerging service sector in the rural areas—transport services, packaging delivery, maintenance and repair of various equipment, including vehicles. There is a rising demand for equipment that is used in various operations (such as hormone sprays).

It is expected that the volume and diversity of service sector operations and products in agriculture will rise significantly in the coming decade. Rural schools and colleges should be encouraged to add courses that provide exposure to modern agricultural methods and practices through training kiosks.

MANUFACTURING—GETTING GLOBAL SCALE

There are many who argue that India totally missed the bus in capturing the demand for outsourced manufacturing of products for the global market, while China made aggressive investments and positioned itself as the factory of the world.¹⁶ It is true that in many areas of manufacturing, from rare earths to chemicals to electronics, China has stolen a long march over India, and in some traditional labour–oriented opportunities, such as textiles, Bangladesh, too, has shown better success. However, India has some successes and many opportunities to look forward to in this decade. India is among the world’s largest producers of farm equipment. India is also among the top five in coal and iron ore production, steel and cement, and reached the top in terms of real estate construction in 2019. A spate of recent announcements with large outlays for Production Linked Incentive (PLI) schemes in key sectors also give rise to the hope that we can indeed do much better in manufacturing and capture our rightful place as the preferred ‘China Plus One’ partner for global manufacturing. The PLI scheme, which was notified on 24 February 2021 by the Government of India with the objective to boost domestic manufacturing, investment and export in telecommunications and networking

products has now been expanded to multiple sectors and is spurring investment by global and Indian multinationals and niche companies.

In our earlier PIC publication, *Rising to the China Challenge*, we had done an assessment of global opportunity and the relative status of India and China to advocate industry-specific strategies in three broad categories of industry sectors:

- **Category 1: Huge asymmetry areas where India must progressively reduce dependence**

A case in point is rare earth metals, in which, having the largest natural availability of rare earths, China has a dominant position. With many clean energy applications and high-tech industry products, like electric and hybrid cars, dependent on rare earths, the concern of the world at this huge dependence on China is the only factor going against Chinese dominance in the future. Australia and the US will chip away at China's share. India has performed below potential in this industry in spite of significant beach sand mineral deposits. The future game plan for India has to be to make the mining and production of rare earths more attractive for the private sector and become part of at least some global supply chains in this area.

- **Category 2: Opportunities to focus on 'Aatmanirbhar' with 'Atmavishwas' and meet the domestic demand to gain technological leadership**

A classic example of such an opportunity is the telecommunications sector. The global telecommunication services market size is expected to grow from \$2.64 trillion in 2021 to \$2.86 trillion in 2022 at a compound annual growth rate (CAGR) of 8.5 per cent.¹⁷ Rising spending on wireless communication due to shifts to cloud technologies and mobile devices is changing the complexion of this industry. India's revenues in the telecommunications sector stood at \$37.36 billion in 2021.¹⁸ In contrast, China's telecommunication industry reported revenues of \$99.46 billion in the first five months of 2022, up 8.5 per cent compared to the same period the previous year, according to Xinhua, citing data from the Ministry of Industry and Information Technology.¹⁹ China's telecommunications market size was \$430 billion in 2021.²⁰ China's success in deregulation has led to the advent of mega-companies like China Mobile, China Tower, China Telecom and China Unicom and, more recently, Huawei and ZTE.

India's opportunities for the future lie in the move from traditional copper-based networks to dense fibre optic cable networks and the entry of major private sector players, such as Reliance Jio, with a focus on 5G. In 5G, India needs to be committed to block the entry of Chinese players for both self-reliance and security reasons. There is an imperative to stem the influx of imports of optical preform, optical fibre and optical fiber cable products through safeguards and/or higher basic customs duty to encourage local capacity development. The Indian government should allocate 1 per cent of annual GDP towards publicly funded fibre infrastructure and reduce dependency on the private sector. Broadband connectivity itself

has a correlation with GDP growth, so a sustained, structured programme will enable further economic growth across sectors.

It is important to underline recent developments in India in this segment. While the entire start-up investment in India was lagging behind the US and even Israel for many years, Jio's ability to raise over \$20 billion at an equity valuation of \$58 billion²¹ demonstrates what the tremendous global tech majors and investors see in the potential of the telecommunications segment in India. In the investment announcement made by Google, who came into Jio at similar valuations to fierce tech industry rival Facebook, CEO Sundar Pichai said their excitement stemmed from the potential for millions of users in India to become owners of smartphones.²² With the advent of 5G and the massive expansion and national push that Jio is expected to make, Google expects that new opportunities will be unlocked, powering the vibrant ecosystem of applications and pushing innovation to drive growth for the Indian economy.

- **Category 3: Global industry-building opportunities**

There are two significant areas that immediately jump out. The first is consumer electronics. The global consumer electronics industry is expected to reach \$838 billion in 2020 with over \$151 billion revenue generated by China. Investments in smart robotics and factory automation, extensive investments in artificial intelligence (AI) and prosperity-driving consumer appliances are all advantages for China. India needs to accelerate the rollout of 5G and internet of things (IoT) and leverage initiatives such as Digital India and the Smart Cities Mission to usher in a new era for electronic products. Tremendous opportunity has been lost in hardware even while the software and business process industries have made great strides.

While India has built an outstanding ICT industry with dominant market share in IT, engineering, BPM and product engineering services in the world, India has missed the opportunity in core ICT, where Taiwan, China and Thailand have built large industries. The core ICT layer includes base stations, routers, blade servers, phones, laptops, etc., that are built using semiconductors, like semiconductor chips, hardware processors and other components such as optoelectronics and sensors. A big frontier for core ICT systems is cloud for 5G, which will need a new class of server blades with the capability to support wireless networks with multi-gigabit per second throughputs. Important thrust areas in semiconductors include special purpose engines for deep neural networks that are capable of handling large modelling applications with large volumes of data and co-packaged optical transmissions with massive processing power (bits per second) and connectivity from a single chip. With the need to process large amounts of data and the coming capacity jumps for storage, processing and transmission with quantum computing, next generation data warehouses and 5G, these capabilities will become essential to build and sustain a digital economy.

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Through core ICT, the industry will move from just software to hardware, along with embedded software and firmware, and this will be the passport for India to be a true participant in the multi- trillion-dollar global core ICT industry. In the coming decade, ICT will be the key enabler of many high-growth industries in India, including biotechnology, pharmaceuticals, advanced materials and even energy. India's best bet to enter the core ICT ecosystem is to grow new companies while expanding the existing industry efforts in this area. India requires entrepreneurial university researchers and engineers from the industry both within and outside the country. The initial opportunities for India will be in the design layer—systems and semiconductor design—where the engineering skill sets are largely available and investments are relatively smaller. However, semiconductor and other component manufacturing is important too, and careful planning will be needed to build this sector. By focussing strongly on all three layers—domain, services and core ICT—and building a new era of patents and inventions, India can truly lead the world in all aspects of ICT. A reasonable 10-year target for India in core ICT can be a 5 per cent share of global revenue, which means a \$200 billion plus per annum value addition by 2030. Indian engineers have what it takes; there is now the ability to be part of a China-less supply chain, attract global venture capital and build the \$200 billion core ICT capability for the country.

The second sector where India can grow and dominate is automobiles. The global automobile market has been dominated by American, European and Japanese manufacturers, though China is counted among the largest markets worldwide. China's early moves in the autonomous, electric and connected car segment and their dominance in the production of batteries for electric cars have led to projections of market leadership by 2040, which India should watch, emulate and challenge. Indian Aatmanirbhar or self-reliant production of cars conforming to all emission standards have to be ramped up and an aggressive push for exports made. All major automobile makers in Japan, Korea, the US and Europe should be incentivized to use India as the base for massive global production. Exclusive automotive special economic zones (SEZs) offering significant tax benefits and excellent infrastructure could be the way forward. India should leverage its successful IT and automobile component sectors to manage the complex systems of vehicle electronics and connected vehicles, and use the accelerating investments of global players in Indian manufacturing plants to accelerate in this critical sector. Initiatives like the Ministry of Electronics and Information Technology's (MeitY) STPI Centre of Entrepreneurship for Autonomous Connected Electric Shared Mobility need to be substantially supported through domestic research and development (R&D) and investments to enable India to take the lead in the next generation of transportation. There are other opportunity segments and sectors too.

The first is chemicals, where the global revenues reached \$4.73 trillion in 2021.²³ India's revenues of \$178 billion²⁴ places it far behind China, which became the world's largest



producer in 2009 and today enjoys over 40 per cent of global industry revenue. With more than 600 chemical parks and upwards, with 60 million employed compared to India's 5 million plus,²⁵ China is far ahead in this sector, though given the context of oil prices moving to lower levels and Chinese labour costs rising, China's competitive advantage might be less in the future.²⁶ India has opportunities to leverage a China Plus One objective of many global consumers to present a real alternative destination by creating special purpose SEZs, positioning the country as a leader in certain value chains and segments, and showcasing the use of digital technologies and Industry 4.0 smart production systems as well as low-cost labour to be the destination of choice for the future.

Another opportunity sector is healthcare and pharmaceuticals. While India has done well in the pharmaceuticals segment, a large percentage of inputs to any drug manufacturing come from China. China also has one of the fastest-growing healthcare markets in the world. Global revenue in the healthcare segment has been projected by analysts to reach \$59.70 billion in 2022. Revenue is expected to show an annual growth rate (CAGR 2022–2025) of 11.80 per cent, resulting in a projected market volume of \$83.42 billion by 2025. China's revenue in this segment was projected to reach \$18.63 billion in 2022 and show an annual growth rate (CAGR 2022–2025) of 4.47 per cent, resulting in a projected market volume of \$21.24 billion by 2025.²⁷ In the case of India, it was projected to reach \$535.90 million in 2022 and was expected to show an annual growth rate (CAGR 2022–2025) of 13.88 per cent, resulting in a projected market volume of \$791.50 million by 2025.

Revenue of the worldwide pharmaceutical market in 2021 stood at \$1.42 trillion with 49.1 per cent revenue share of the North American market. The pharmaceutical industry in India was valued at an estimated \$42 billion in 2021.²⁸ According to India Ratings & Research, the Indian pharmaceutical market revenue is expected to be over 12 per cent year-on-year (YoY) in FY 2022–23. China's pharmaceutical industry saw combined business revenue climb 18.7 per cent YoY in 2021, registering a revenue of about \$502 billion in that year.²⁹

With a strong focus on healthcare in India and the extensive use of digital technology and services, India has an opportunity to substantially ramp up healthcare revenues and also make big impacts on the global pharmaceutical industry. There is an upside potential if Indian companies become major global producers of Covid-19 vaccines and syringes. Telehealth and wellness tourism are also significant segments to be exploited. On the pharmaceutical side, the Indian drugs industry is a heavy user of active pharmaceutical ingredients (APIs) sourced from China. In an environment where China is seen as a bad actor in the global economy, where Chinese nationalism can harm counterparties abroad, this presents a problem. India must look at diversifying our global sources of supply for APIs while boosting domestic API production and vertically integrating the pharmaceuticals industry from chemicals to APIs to

formulations. Market leaders like Sun Pharmaceuticals are already doing this, but much more needs to be accomplished.

One critical point we must make is that manufacturing is no longer purely labour-intensive; it is smart manufacturing which brings in automation, robotics and other technologies in new smart manufacturing and manufacturing execution systems environments. India has recognized this, and there are many initiatives that have been researched and discussed by PIC, and the Confederation of Indian Industry is now getting into implementation with smart manufacturing initiatives commencing in key sectors of the manufacturing economy.

The Opportunities in Industry 4.0

The fourth industrial revolution, or Industry 4.0, originated in developing countries to address challenges associated with ageing demographics and high cost of labour by introducing extreme automation in industrial operations. In contrast, India has young demographics, with 60 per cent of its population under 29 and an abundant workforce needing employment. India has a unique situation to deal with—India must adopt Industry 4.0 to remain competitive while creating more and more jobs for the youth. This challenge can be converted into an opportunity by empowering the Indian workforce with new-age skills and becoming the world's talent factory.

One of the most valuable intangible assets of any country is its human capital. If India wants to be competitive in the fourth industrial revolution, it must upgrade its human capital with twenty-first-century skills. The changes caused by Industry 4.0 are likely to be radically faster than anything experienced yet. We need to create new talent and reskill and upskill the existing workforce to meet the industry's growing requirements. Like any other revolution, Industry 4.0 also demands a new type of education and skilling to achieve national competitiveness and leadership.

A number of platforms have been initiated in India to help develop indigenous manufacturing technologies by converging India's technical resources on each of them. The technology areas covered by these platforms include manufacturing, mobility, advanced materials, additive manufacturing, robotics and automation, mechatronics, sensor control and power electronics, and machine learning and AI.

India has made a good start by initiating the PLI scheme and attracting global leaders, like Apple Inc., to expand their manufacturing operations from India. Spreading this to multiple sectors where India has been trailing, like semiconductors, chemicals and APIs, will restore manufacturing to the 20 per cent- plus share of GDP it once enjoyed and make India a global



manufacturing hub. These initiatives have great potential to lay a strong foundation for India's journey towards Industry 4.0 in the coming decades. Today, India has surpassed the US as the world's second-most-desired manufacturing destination, according to Cushman & Wakefield's 2021 World Manufacturing Danger Index,³⁰ indicating the growing interest shown by global manufacturers in India as a preferred manufacturing hub. However, the adoption of digital technologies and Industry 4.0 by Indian companies is still at a nascent stage, with only 14 per cent of the businesses in India really attempting to transform themselves.³¹ India should design and conduct a nationwide Industry 4.0 maturity assessment of large and small enterprises based on the local context across the sectors to know where India stands currently in terms of IT and operational technology (OT) systems implementation, process automation, availability of 'insightful data' to make easy and quick decisions, cost overheads, pockets of optimization (of cost of operations) and other relevant parameters.

The outcome of this study will provide direction, focus and relevance to various government programmes.

The micro, small and medium enterprises (MSME) segment, which is the backbone of the Indian economy, has very little access to knowledge, digitally aware talent and technology. The future of MSMEs depends mainly on their capacity to respond to industry needs by improving industrial management processes with proper planning, optimal use of resources, controlled production and continuously evaluating operational performance to maintain a competitive advantage in the market. Adopting Industry 4.0 for MSMEs can positively impact costs, revenues, equipment maintenance, design and customer interface for their overall growth. To make MSMEs adapt to these changes and become an active part of the global supply chain, India needs a special programme dedicated only for MSMEs to mentor systematically and handhold enterprises by creating awareness, building organizational and talent capability, designing specific solutions for demonstration, and providing right digital solutions for implementation. Along with initiatives of the Indian government, in a bid to uplift and revitalize the MSME sector, the World Bank launched a \$500 million programme in 2021, Raising and Accelerating Micro, Small and Medium Enterprise Performance (RAMP), aimed at improving the performance of 555,000 MSMEs, which can boost and accelerate the adoption of digital and smart manufacturing for longer-term productivity- driven growth.³²

Before 2025, India should aim to transform a large part of Indian enterprises to reach the level of Industry 4.0 with the support of various government initiatives. In addition, India should identify 25 lighthouse projects across industry sectors to showcase successful enterprises that have adopted and benefited from Industry 4.0. The idea of lighthouse projects originated at the World Economic Forum (WEF) to show the way for the world's manufacturing companies interested in implementing Industry 4.0. The lighthouse factories should demonstrate

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connected and intelligent factories, interconnected supply chains and distribution networks, real-time monitoring, tracking and tracing to improve productivity and prevent downtime, machine-to-machine and machine-to-human interactions, resources optimization, and safety. India needs to create a dedicated online platform to showcase lighthouse projects and share experiences from successful manufacturing companies.

Beyond 2025, the adoption of Industry 4.0 will rise during this period. The power of Industry 4.0 lies in the integration of physical assets with digital technologies in a dynamic environment for a smart and intelligent production system. A traditional factory consists of sourcing, procurement, design, production, quality and maintenance, working in silos with limited collaboration and communication. In smart factories, these silos are integrated into one large system with benefits of reduced cost and improved efficiency, quality and productivity to stay competitive in the global market.

During this period, every significant Indian manufacturing organization needs to transform into a smart and connected enterprise by integrating horizontal data capture across manufacturing, warehousing and supply chains, using cyber-physical systems and vertically integrating companies to their supply and demand chain partner organizations. Smart analytics (prediction, intelligence, decision-making capability), simulation-based production planning and smart control (the ability to automatically and remotely control machines and production) will all play a role in bringing Indian manufacturing capability, quality and productivity to world standards.

Advancing further, enterprises need to develop capabilities in digital twin, cognitive and biointelligent systems to increase reliability, optimize the use of resources, minimize downtime, and improve performance and efficiency. As a result, large and small organizations across industries can become competitive to produce goods capable of mass customization and become part of global supply chains.

While manufacturing companies progress towards Industry 4.0, Indian IT companies can offer smart solutions to the Indian and global markets. It is estimated that smart factories could add multi-trillion dollars in value to the global economy during this period. Today, India is the world's largest sourcing destination for the IT industry, employing more than 4 million professionals. Industry 4.0 sees massive usage of IT in the manufacturing sector and requires smart solutions on assembly lines. Extending India's current strength of IT to OT would make the current IT industry reach over a trillion dollars by 2030, as the adoption will accelerate in this period.

In the long term, the goal for Indian enterprises should be to transform from a smart and



connected enterprise to an intelligent, self-aware, autonomous, sustainable and networked enterprise to achieve leadership in the fourth industrial revolution. The data produced from operational and biological systems will grow exponentially, and the power of AI must multiply to make machines capable of predicting actions and be autonomous and intelligent. This growing AI capability has various benefits. Intelligent robots can manoeuvre delicate procedures and work in extreme conditions. Enterprises will be able to function autonomously, with intelligent and self-aware machines to accomplish specific tasks in the presence of uncertainty and variability, and self-simulate to adapt to novel situations. And systems will also be capable of self-diagnosis and repair.

During this period, industry structures and business models will be disrupted. The largest and most successful companies in the world during this period will be platform companies, who are able to connect all ecosystem players in an industry and enable them to share data and collaborate. In recognition of this and after the success of UPI as a payments platform par excellence, the Indian government has announced the Open Network for Digital Commerce (ONDC), which will create standards for all platforms under digital India for the future. An estimated 70 per cent of the new value created in the economy will be based on digitally enabled platform business models. The next wave of innovations for enterprises will be on the back of the platforms and ecosystem of multiple platforms. A diverse set of large-scale integrated systems that can operate independently on their own will be networked together for a common purpose. The new-age companies rely on the principle of demand economics rather than supply economics and grow through network effects.

India's prospects for the future lie in the new wave of wealth creators by unleashing India's entrepreneurial spirit. The lower costs of infrastructure and assets pave the way for more suppliers, inspiring healthy competition among businesses and promoting entrepreneurship, in turn, triggering a culture of fast-paced innovation to ensure survival. In emerging economies like India, this competition makes for a thriving market, thus pushing the economy to further growth. What's more, this trend received a boost from the pandemic, which saw the acceleration and expansion of digital technology in sectors like e-commerce, telehealth and education. Industry 4.0 is opening up new opportunities for businesses, and the innovative implementation and other technological frontiers as platforms are giving birth to new start-ups, transforming Indian economics like never before. We must conclude this discussion on manufacturing by cautioning that Made in China 2020 has announced its targeting of 10 key sectors for additional government support. These sectors are: (1) new energy vehicles, (2) next-generation IT, (3) biotechnology, (4) new materials, (5) aerospace, (6) ocean engineering and high-tech ships, (7) railway, (8) robotics, (9) power equipment, and (10) agricultural machinery. China has always supported industry creation and scaling through significant government backing, and India will have to pay heed and build active partnerships between

industry and government to gain market share in these and other emerging segments.

India launched the PLI scheme in February 2021 in chosen sectors for deep investments. It is an encouraging step that the Indian government has committed \$26.6 billion to address the nation's manufacturing capabilities and enhance exports across 13 sectors through PLIs.³³ These include mobile handset and components, automobiles and automobile components, solar photovoltaic (PV) modules, specialty steel makers, man-made and technical textiles, food processing, specialized pharmaceutical products, advanced chemistry cell battery and IT hardware. This scheme relies on identifying national and global champions in each sector to manufacture part of their needs and hence make India an integral part of the new supply chain. It is inherently World Trade Organization (WTO) compliant and serves the need of those who would like to see their global value chains insulated from a possible trade war between India and China. These are small steps but could pave the way for India to become a true manufacturing powerhouse and create at least a hundred million new jobs for our youth by 2030.

SERVICES—CONSOLIDATION AND EXPANDING OUR GAINS

India's growth story in the twenty-first century is remarkable because it contradicts a seemingly iron law of development that has held true for almost 200 years since the start of the Industrial Revolution. This law—which is now conventional wisdom—says that industrialization is the only route to rapid economic development. It further states that as a result of globalization, the pace of development can be explosive. But the potential for explosive growth has, until now, been distinctive to manufacturing. This is no longer the case. India's experience suggests that latecomers to development can benefit from a global service revolution that has fundamentally changed the pattern of development.

India's experience with the service revolution offers hope that globalization can indeed be a force for development in many more developing countries. The marginalization of Africa during a period when China and other East Asian countries grew rapidly led some to wonder if latecomers to development were doomed to failure. The process of globalization in the late twentieth century led to a divergence of incomes between those who industrialized and broke into global markets and a 'bottom billion', to use Paul Collier's phrase, of people in some 60 countries, where incomes have stagnated in this century. It seemed as if the bottom billion would have to wait their turn for development, until the giant industrializers like China become rich and uncompetitive in labour-intensive manufacturing.

The promise of the ‘service revolution’ is that India and other developing countries do not need to wait to get started with rapid development. There is a new boat that the latecomers can take. The globalization of service exports provides alternative opportunities for developing countries to find niches beyond manufacturing, where they can specialize, scale up and achieve explosive growth, just like the industrializers. Industrialization is not the only route to economic development.

The Service Revolution

Services have characteristics that differ significantly from goods. Goods are physical objects that can be put in a box and traded. They can be made anywhere, at any time and at any scale. More and more goods are produced each year as firms develop new products and as production processes are broken down into individual parts and components. With a growing number of goods, productivity can rise due to specialization (a finer division of labour) and scale economies (falling unit costs of production). This specialization in goods and the exploration of new markets allow even small countries to find a niche in global markets where they can be competitive.

Traditional services are difficult to place in a box because they are constrained by time and proximity. For example, running a restaurant, providing a haircut, setting up medical check-up centres or offering individual loans, all require face-to-face transactions. This makes it difficult to trade in traditional services. They are produced where and when demand is present.

But technological changes (telephone, internet and AI) have made many services tradable, just like manufactured goods. These services, called modern impersonal progressive services, include communication, banking, insurance, business-related services and much more. They have been created by three global forces—technology, transportability and tradability—the 3 Ts that are driving the services revolution. Technology, especially ICT, has given services a physical presence. They can be produced and stored in a digital format.

Thanks to the internet, modern services can be easily transported today over long distances with little or no degradation in quality. One indicator of the cost of transporting services is the average cost of an international telephone call to the US. For most developing countries, this has fallen by more than 80 per cent or more over the last decade,³⁴ a decline in cost which is much more rapid than the fall in transport costs for goods. Perhaps as important as cost is the speed, clarity and reliability with which information can now be transported. There are no borders, customs or tariffs on the international exchange of most business services. Service exports are now one of the fastest-growing components of global trade.

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The digital age will continue to transform more services into modern impersonal services. The range of business processes that can be globalized and digitized is constantly expanding: processing insurance claims, desktop publishing, the remote management and maintenance of IT networks, compiling audits, completing tax returns, transcribing medical records, financial research and analysis. The list of possible activities is almost endless.

Modern impersonal services have many features in common with manufacturing. Like manufacturing, they benefit from technological advances that generate productivity growth year after year. They exhibit similar tendencies for scale as in tailoring and industrial security. Service producers can bring down unit costs by expanding operations. They benefit from being in close proximity to one another, as that creates a pool of well-trained workers and is labour-intensive. Many modern services, like some types of manufacturing, provide employment for women. Enhanced economic status for women, in turn, can create development spillovers like lower population growth rates, more emphasis on better education for children and higher household savings rates.

There is mounting empirical evidence that India and other developing countries are relying more on services and less on manufacturing as drivers of growth and job creation.³⁵ The relationship between income and economic structure has shifted over time, with countries across the income distribution uniformly increasing the share of labour in service sectors and an increasingly less stark relationship between manufacturing intensity and GVA per capita. While global growth convergence in manufacturing was a clear and strong trend some decades ago, it is no longer as strong in recent decades. The service sector has shown stronger growth convergence in recent decades.

Services-led Growth

Services are now the largest contributor to GDP growth in India, contributing nearly twice that of industry.³⁶ High service growth is associated with high service export growth, and this suggests that it is services that have been driving overall economic growth rather than vice versa. Although there is also a positive relationship between manufacturing growth and overall growth, the effect of services is much stronger than the effect of manufacturing on economic growth.

How dynamic is total factor productivity (TFP) growth of services? Services were once thought of as stagnant, with low productivity growth areas and without the dynamic externalities attributed to manufacturing. That was one reason why services were not thought of as a potential leading sector for development. But India's growth experience shows that services have displayed significant productivity growth, approaching a healthy 2 per cent annually.³⁷ India's TFP growth rate in the service sector has increased at twice the rate of its



TFP growth in industry, and India has outperformed China in terms of TFP growth rates in services.³⁸ One reason for rapid productivity growth in services is that India is starting from a low technological base compared to international best practice, and there is ample room for rapid catch-up. Beyond this, services also display potential for productivity gains from learning, networking and knowledge spillovers. As the service sector is much larger than manufacturing, heeding the needs of services growth is important for policymakers.

The ability of services growth to drive overall economic growth is a new phenomenon. Because modern services can be traded, the demand curve has become much more elastic, meaning that prices do not decline rapidly as volumes increase. This permits services to be a source of sustained growth.

Service Export

In India, the majority of foreign direct investment (FDI) inflows are concentrated in the service sector, and, in particular, modern impersonal services. For India to sustain growth over the long run, it needs to leverage the global economy. The East Asian experience of a manufacturing-led growth model has shown that domestic demand is not sufficient to sustain growth. Firms need exports to take advantage of scale and agglomeration economies. Successful growth experiences are typically associated with greater integration into the world economy, as developing countries' domestic markets are much too small to support sustained expansions of production.

The globalization of services provides new opportunities for India to find niches beyond manufacturing, where it can specialize, scale up and achieve explosive growth, just like the industrializers. As the original set of services expands in various parts of the world, they will open opportunities of related but additional services, adding much-needed foreign exchange to the country. This pace of change will be rapid and in line with the digital revolution. An indication of this revolution is that global internet usage has grown. This growth is much faster in developing countries—India alone adds one million new users every month to a booming mobile phone market.

Spatial Awakening

One source of productivity growth in services is urbanization and agglomeration of activities in select locations. Modern impersonal services tend to cluster together to take advantage of scale economies and externalities. Clustering in services can potentially be more persistent and concentrated than in manufacturing, as services are less land-intensive. A thick market for services attracts more service firms and workers. Service corridors arise just like

manufacturing clusters. These benefit from externalities such as knowledge spillovers between firms, workers and universities. Productivity-enhancing externalities are far more prominent in service corridors compared to goods clusters, as services tend to be 'non-rival' goods and lend themselves to more collaboration.

It is easier for service firms to cluster than manufacturing firms. Service firms take up less space, do not cause traffic jams when shipping their goods and pollute less. This is not only true for developed countries, with notable tradable services hubs in New York, London, Silicon Valley and also in India.

Services have shown a distinctly different spatial development pattern in India. The high-density services clusters are gaining relative to those locations with slightly lower employment density. Many of the well-known IT clusters continue to benefit from agglomeration economies. For example, service employment in Hyderabad and Chennai is growing at an annual rate of 11 and 4 per cent, respectively.³⁹

A reasonable question may be whether these results are driven by particular subgroups of manufacturing or services. To answer this question, we distinguished between the formal and the informal sectors. This distinction may be relevant, since firms in the informal sector are less subject to laws and regulations, and thus, perhaps more free to operate and choose their location. Differentiating between the unorganized and the organized sectors does not change our finding. The service sector is becoming increasingly concentrated in high-density clusters, whereas in manufacturing, the picture is more mixed. We examined multiple sectors for which we had data (22 manufacturing subsectors and 12 services subsectors). Still, the main result holds. Services are becoming increasingly concentrated in high-density clusters, and this is not driven by a few subsectors. In the case of services, around 90 per cent of employment is in subsectors that exhibit increasing concentration in high-density clusters, whereas the corresponding figure in manufacturing is around 60 per cent.

The strong evidence of agglomeration economies in the service sector is consistent with findings for the US and Europe. Given the impact of ICT in India's rapidly growing service sector, this is what we would have expected. Being a 'young' industry, services benefit from knowledge spillovers, leading to the emergence of high-density service clusters. In contrast, the evidence for such agglomeration economies in manufacturing, though weaker than in services, differs from the tendency towards dispersion across the entire distribution in the case of the US and Europe. This suggests that manufacturing in India is not as mature as in the US or Europe.

Despite concentrated spatial location, the benefits of service growth appear to be widely



distributed. Service growth is the largest contributor to poverty reduction globally and regionally. Globally, there is cross-country evidence from some 50 developing countries that poverty reduction is correlated more strongly with growth in the service sector than with growth in manufacturing or agriculture.⁴⁰ Regionally, it is also the case that localities with higher service sector growth exhibit lower rates of poverty. Each one percentage increase in trend growth in the service sector among Indian states is associated with a decrease in the trend of the headcount poverty rate by almost 1.5 points.⁴¹ Some states in India, such as Karnataka, Tamil Nadu and Andhra Pradesh, have experienced a significant decrease in urban poverty that may be associated with an increase in their service sector share. If we are to learn any lessons from the US and Europe, India's engines of growth should be its medium-density cities.

The trade-off between agglomeration economies and congestion is indeed similar in India, as in China and the US.

In India, we have seen that over decades, business activity tends to gravitate towards densely populated urban centres, and the tier 2 cities have often been laggards in both growth and development. What frictions or barriers might be holding back tier 2 cities? We can obtain some suggestive evidence by controlling certain district-level characteristics—the percentage of the population with a high school degree or more and the percentage of the population with post-secondary education; household access to infrastructure (percentage of households with electricity, percentage of households with toilet, percentage of households with telecommunication services, percentage of households with tap water); travel time to a top-10 city and distance to a top-7 or a top-3 city.⁴² When exploring which of these controls can explain the advantage of high-density clusters, we can rule out most. For example, being close to a major city or having access to some of the basic utilities, such as tap water or toilets, do not seem to matter. Only two variables, the percentage of the population with post-secondary education and the percentage of households with access to telecommunication services, have the potential of accounting for the relative advantage of high-density clusters.⁴³ Once we control either of these two variables, there is no longer evidence of high-density service clusters growing particularly fast. In other words, if all locations had the same percentage of their population with post-secondary education or if in all locations the access to telecommunication services in households were the same, then high-density service clusters would lose their attractiveness.

If part of the worse performance of India's medium-density locations is their deficient local infrastructure, it may be useful to compare India's experience not just to that of the US but also to that of the other large emerging economy, China. Our analysis shows that China looks very different from India. Once a threshold of around 150 employees per square kilometre is

reached, agglomeration economies start dominating in India, whereas the opposite happens in China. For Chinese locations with a density above 150 employees per square kilometre, service employment growth strongly decreases with size, indicating important congestion costs. Along that dimension, China looks more like the US, where congestion costs also dominate for locations above the 150 employees per square kilometre threshold. Given that the overall level of local infrastructure is better in China than in India, this finding is consistent with the interpretation of frictions holding back the growth of medium- density locations in India but not in China.

The Future

What might future patterns look like? We compute the counterfactual employment growth of Indian districts if the relationship between density and growth was the one we estimated for the US. Two features stand out.

- First, many of the relatively slow-growing Indian districts would grow much faster. These correspond to medium- density places, similar in density to places such as the Silicon Valley. As mentioned before, with few exceptions, these districts in India do not seem to be able to take advantage of the service revolution.
- Second, different areas of the country would benefit from growth in the service sector. Growth would be more concentrated in the coastal regions, especially in southern states such as Tamil Nadu and Kerala as well as in northern states such as West Bengal, Bihar and Uttar Pradesh. Of the well-known IT clusters in India, medium-density places such as Ahmedabad and Pune, and especially Bangalore, have high growth rates in the counterfactual, whereas the high-density places, such as Chennai and Mumbai, do not.

We find strong evidence that two key barriers in tier 2 cities are the small share of highly educated population and the deficient local infrastructure, in particular poor access to telecommunication services. The findings for China, an emerging economy that has suffered less from a lack of infrastructure, support this interpretation. It is not obvious to us why Indian individuals should dislike congestion less than Americans or should benefit more than Americans from agglomeration economies. These forces seem to be more technological and universal. Therefore, the likely culprits are restrictions to economic growth in intermediate-density cities or districts.

Limitations to growth in modern impersonal service are mostly on the supply side, and, in particular, the availability of employees with education and skills that meet the requirements of the global services market. The globalizing market for skills, however, allows developing countries to capitalize on their cost advantage in terms of labour and to make investments in expanding the skills of their labour forces to meet the demands of the fast-growing global



IT and information technology enabled services (ITES) industries. Locations with comparatively large talent pools will have an advantage in attracting IT services and ITES companies because large companies prefer to source services from locations where scalability is feasible.

Telecommunication

India and other developing countries are well known for their poor infrastructure. But the infrastructure that matters to service trade is in better shape. India has experienced a telecommunications revolution. The sector has experienced major investment and competition, and this has improved electronic delivery of services tremendously.

Telecommunications growth is the most powerful symbol of the vitality of the service sector and is, at the same time, critical for the further development of other parts of the economy. While there has been a dramatic transformation of this sector, some policy issues remain. A key issue is the design of universal access regimes. The policy priorities should be to reform the incumbent operator; strengthen the regulator and enhance its independence from both the incumbent and the government; eliminate barriers to entry other than those dictated by say scarcity of spectrum; and establish an effective universal access scheme that widens access to services in poor and remote areas. Global and regional cooperation in telecommunications and the internet could strengthen the competitiveness of India in the services export sector.

Civil Aviation

India has marched ahead with aviation reform, especially on international routes. Landlocked countries may be victims of geography but their isolation is sometimes deepened by their own policies as well as those of their neighbours. There are three obvious priorities for policy. The first political challenge is to prepare national airlines for a more competitive environment. Serious consideration should be given to a possible joint venture with a foreign airline, which could inject the necessary capital as well as technological and managerial improvements. At the same time, policymakers can push for more liberal bilateral air service agreements that do not restrict capacity or flight frequency or even opt for more open-sky agreements. Finally, there is a need for regulatory reform, in particular, to enhance both the independence and capacity of the departments of civil aviation.

Organizing for Services

India has broken with economic convention. Its decade-long growth spurt has been largely fuelled by the global trade in services. The best-known examples are states such as Andhra Pradesh and Karnataka, which have been transformed from stagnating rural economies to dynamic service hubs. The ICT revolution has rapidly introduced a large array of new products that developing countries can produce at lower costs. What is certain is that the old idea of services as being non-tradable and non-scalable because of inelastic demands no longer holds

for a host of modern progressive products.

Development is a process of organizing resources according to their best use. When that is done right, there are incentives to accumulate through investment in profitable activities. Until now, it was assumed that the critical task was how to organize for industrial growth. Even the World Bank's Doing Business report and its Enterprise Surveys focus exclusively on goods-producing firms, and policy prescriptions for development have focussed largely on what can help countries industrialize.

Moving forward, what is important is that countries seize opportunities in line with their comparative advantage, whether this is in services or in manufacturing. India's comparative advantage in services arose because of its history of quality higher education institutions, its English language heritage and its computer-savvy diaspora. It also arose because of the comparative disadvantage in logistics and infrastructure on which trade in goods depends. The right mix of incentives, policies and investments in education, telecommunications and connectivity can create the enabling conditions to ignite a services-led growth revolution.

What could India do?

Although the same set of general non-distortionary growth policy is as important for services as for manufacturing, specific strategies for services matter. Investments in both physical and human infrastructure matter greatly for attracting new enterprises in both the manufacturing and services industries. But unlike in the manufacturing sector, investments in human infrastructure, education and skills matter much more. Human capability plays a bigger role in services. Given its stage of development, India needs accelerated investments in both physical and human infrastructure to support new drivers of growth and job creation. India's experience offers hope to other latercomers to development. The process of globalization in the late twentieth century led to a sharp divergence of incomes between those who industrialized and broke into global markets and the 'bottom billion' in some 60 low-income countries, where incomes stagnated. It seemed as if this stagnation would persist till opportunities arose to fill the spaces left by giant industrializers like China becoming rich and uncompetitive in labour-intensive manufacturing. This is no longer the case, and this is indeed the opportunity for India and many aspiring nations of the world.



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