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India's Self-reliant Development
Perspective for the Post-COVID-19 Pathways

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Preamble

The post-COVID-19 world has a clear message for India's science, technology and innovation (STI) system. Policymakers should integrate the agenda of basic needs of the urban and rural poor into the pathways for self-reliant development. Incomes of peasantry have been halved. Workers wage has declined. Drastic fall in the opportunities for gainful employment requires a robust socio-technical response. Livelihood agenda needs much attention. Cash transfers based provisioning of welfare does not secure a dignified living for the vast majority of urban and rural poor.

Expressways cannot meet the daily needs of the working class. Public health, child care, water and sanitation, slum improvement, renewable, energy digital connectivity, housing, livable, sustainable and productive cities capable of providing gainful employment to the poor is the need of the hour. These needs can be better served through the agenda of social wage to be provided through the pathways of Universal Basic Services (UBS) and Universal Basic Infrastructure (UBI) to offer to all a life of dignity, decent work, secure employment and sustainable livelihoods through the promotion of multi-sectoral networked systems of group entrepreneurship.

The contribution of new and emerging technologies can be integrated for the agenda of multipurpose path formation in which the capabilities of public sector will have a considerable role to play. The great acceleration of resource use is one of the major driving forces of current unsustainability. The other element is the declining contribution of established economic development processes to job creation. Employment generation is under pressure due to the transnational corporations selecting import dependent, non-local resource intensive socio-technical system configurations whose trickledown effect is also minimal. The globally emerging socio-technical systems have a high level of machine and ecological footprint.

The reform period has resulted in accelerating the influence of globalised value systems on provisioning systems. Global production networks and supply chains are not designed to integrate the imperatives of social, ecological and economic justice into their place specific solutions. Major challenges are also arising due to the unequal distribution of the potential welfare gains from industrialization for the people of less developed capitalist states. While formulating the policies and programmes for energy transition, digitalisation, conservation of resources and materials, waste management, climate adaptation and so on, there is the

need to put the livelihoods of people at the centre of the STI programmes. The domestic business enterprises, be private or public, need to be mobilized for the creation of place specific solutions.

Stop privatization of public sector. Integrate place specific STI programmes into the agenda of the future pathways to self-reliance. Politics of peoples' democracies on technology has consciously avoided techno-euphoria and techno pessimism. Techno-politics of social movements needs to focus on: how technical and social can be integrated to serve the basic needs of people first. It is possible to develop pathways capable of making the workers and peasants as the actual social carriers of innovation and transformations. Social cooperatives, knowledge and service providing platforms, infrastructures and practices need to be integrated into the agenda of pathways to self-reliant development.

Productive forces connected through existing class antagonisms based relationships will not automatically fully develop and contribute to justice. The incorporation of non-market calculations is necessary. Market calculations cannot develop the full potential of technological change for social good. The capitalist antagonism between productive forces and relations of production is also an antagonism between socially necessary labour (that technology reduces) and surplus labour (that capital seeks to increase) and between use value and exchange value.

Digitalisation, renewable energy and biomass based socio-technical changes will have to be secured in ways that are socio-ecologically sustainable by incorporating non-market calculations. Environmental friendly, livelihoods sustaining, inequality reducing and peasants and workers empowering solutions will have to find a greater place in the social and environmental movements' self-reliance discourse. Techno-politics will have to rein in the power of global and national capital to prevent the tendency of extracting rents; appropriate alternatives earlier also came from the contributions of anti-imperialist, anti-capitalist people-centric techno-politics.

Lessons from Nehruvian India

In the long sweep of historical change, mutations of path to socialism in China and to "mixed" economy in India through planned development need to be seen as more effective pioneers of capitalism than imperialism could ever be for the people of post-colonial world. In both China and India, there was the weakening of feudal and colonial shackles. India's independence from the British imperial rule allowed the political space gained by social forces coevolving to develop economic sovereignty and engage with social divides and inequality reinforced by colonialism over a period of one hundred years. India should not be allowed to lose this political space. The socially and economically marginalized people would be the net losers.

Home market development

There was a clear opening up of the space for autonomous capitalist development when India became politically independent in 1947. Favourable conditions could emerge for the construction of relatively novel pathways to socio-technical transitions in energy and

transport, industry and agriculture based on the resources and capabilities accessible at home for further development for the benefit of development of home market. Food security and reduction of import dependence for raw materials, capital goods and technological know-how got prioritized as the goals of planned development. Attempts of the emerging social forces to pursue diversity and plurality could get a greater space in post-independent India. Nehruvian, Gandhian and Left ideology got a chance to foster variegated paths to capitalist development.

Opportunity for the Indian Left

The Indian Left could take part in the radicalization and development of constitutional democracy. It got the opportunity to experiment with the ideas of development in the states of Kerala, West Bengal and Tripura. Even within the available limited political space the Indian Left could introduce to the Indian polity the ideas of land reforms, national planning and public sector, technological self-reliance, cultivation of modern sciences and scientific temper, peasant and worker cooperatives, state level planning and local self governments to shape the broader trajectory of national development. Conditions for “social progress” and “innovation democracy” significantly improved with the accommodation of plurality and diversity, which is a distinctive feature of the anti-imperialist struggle in the domains of science, technology and innovation efforts during the post-independence period in India.

Domestic industrial capital, peasantry, workers and S&T professionals could contribute to the reduction in abject dependence on foreign capital for the development of productive forces. India saw the emergence of institutions of development finance, capital goods industry, consulting and engineering and design organizations and universities capable of producing S&T graduates and post graduates. Investment support from the private and public sector grew for the development of enterprises exploiting local raw materials and diffusing novel adaptations of coevolving international technologies and indigenous innovations.

It is largely the Indian Left that has chosen to defend the contribution of self-reliant development. It is also well apparent that the resolution of conflict between environment and development is one of the key issues for Indian Left today. The resolution lies in the recognition of new people centric environmental friendly resource conserving alternatives and business models and technological choices and peasant worker based multi-sectoral local economy development as a valuable system in itself development along with large technical systems where necessary being suitably incorporated into national and state level plans and programmes.

Indigenization of technology

As there was an increased demand for investment in technological alternatives that could not gain support from the colonial state, India saw a number of developments of inter-linked transformative nature. Innovative programmes were developed for coal utilization, oil exploration, usar land reclamation, value added products from economic and medicinal plants, Amul milk dairy programme, development of capabilities for vaccine and pharmaceutical production, capabilities for space and atomic energy programme, food

production and immunization. Many of these changes resulted in accelerating the paths of relatively autonomous development of productive forces, also with their own distinct internal contradictions.

While it is very much true that favorable condition for the integration of policies for science, technology and innovation with the autonomous paths of self-reliant development of agriculture and industry could not still radically improve the well being of vast sections of Indian people and help achieve self-reliance to the desired extent across all sectors, but this happened due to the failure to recognize the salience of indigenization of technology and local economy upgrading as the important pathways to self-reliance. It is true that the historical significance of the "longer duration" transformative outcomes realized from the nation state driven planned development of productive forces even failed to get support and appreciation from the leadership of ruling class parties and even of the environmental and social movements which were wedded to small is beautiful per se.

From no acknowledgement to denunciation

Take the latest narrative of "nothing happened for seventy years" of Modi government. But it is paradoxical that the Modi government has also gone on to claim credit for the success in respect of the development and manufacturing of COVID-19 vaccines and pharmaceuticals, space programmes and Metro rail and renewable energy and many other such artifacts. The Vaccine R&D and manufacturing capabilities are clearly a historical contribution of the pre-reform period. In fact, this holds to a large extent even true for the new post-COVID "Atmanirbhar" (self-reliant / self-confident) programmes devised by the Modi Government under the production linked incentive (PLI) scheme which is under implementation now across thirteen sectors. Public sector is being consciously undermined. Opposition to self-reliance, public sector, workers organizations, and peasant worker cooperatives is ideological.

Public sector is on sale, Modi is on selling spree

- The union government will maintain only a bare minimal presence in "strategic" sectors-atomic energy, space and defence, transport and telecom, power, energy, coal, petroleum and minerals, and banking, insurance and financial services;
- The decision is to ***relinquish control*** of or shut down / hand over the public sector companies in all other sectors of the economy to the big business;
- Only a relatively small number of about ***60 Central Public Sector Enterprises (CPSE), remain out*** of the overarching policy to disinvest government stake and relinquish control in these enterprises.
- This implies that the government will retain control of only a small number of the 300 CPSEs.

- The government will implement National Monetisation Pipeline (NMP)-a massive programme of monetisation of assets controlled and operated by CPSEs and by its agencies such as the National Highways Authority of India and departmental undertakings, primarily the Indian Railways, DISCOMS, Telecom Towers, Oil and Gas Pipe Lines and many other such public assets.
- The Government expects to deploy assets across a range of sectors, ***estimated at just Rs. 6 lakh crores***, from which it hopes to mobilise revenues in the form of long-term lease rents.
- Monetizing done in the name of sustaining government's spending on the creation of infrastructure under PPP mode, welfare, development, governance and jobs.
- While Air India has been sold to Tatas, but money earned is invested by the government in Vodafone with Aditya Birla as a partner
- Central Electronics Limited to Furniture Seller in South Extension Life Insurance Corporation of India (LIC), a pioneer in the Indian insurance business, to be privatized through IPO, law changed via money bill in the last budget
- Bharat Petroleum Corporation of India (BPCL), an Indian public sector petroleum refiner with an extensive marketing reach, to be privatized,
- BEML, a defence and transport equipment major, the Shipping Corporation of India, the lone public sector presence in the shipping sector, and the steel companies Neelachal Ispat Nigam Ltd. (NINL) and Rashtriya Ispat Nigam Ltd (RINL).
- Alongside these developments, the government has also recently asked the ONGC to hive off 60 per cent of its participating interest in Mumbai High and Bassein fields to international players.
- The government plans to sell real estate assets and telecom towers of the two telecom companies, BSNL and MTNL, to the competitors- DOT / BSNL/MSNL being deliberately killed.

- Most CPSEs are profitable and well governed; Account for 9 per cent of the economy (GVA) or 45 per cent of Public GVA of 19.5 per cent, PSE Enterprises savings =Rs. 4.4 trillion (Rs 2.6+ Rs1.8)
- Compared to this Gen. Government negative savings of Rs. -1.5 trillion, General Govt GCF Rs. 5.79 lakh crores; PSE GCF (capital formation/investment) = Rs.4.85 trill (84 % of Govt GCF or 47 per cent of public investment); the public sector GCF is about 24 per cent of India's GCF

- **Net Profits by Profit making PSUs =Rs. 159.67 K cr; Dividends paid by profitable PSUs =Rs. 76.7 K cr; Losses of loss-making units = Rs. 34.80 K crores; of total losses CASH Losses = Rs. 19.3 K crores; Of total losses BSNL and Air India = Rs. 16.0 K crores**

  (*Source: Public Enterprises Survey 2018*)

Modi government abandoning cooperative federalism

Post-independent India's politics favoured joint planning between the State governments and the Union government. Although this did require strengthening of the institutions of cooperative federalism, participatory democracy, mutual aid and self-management, cooperation in production, public goods and services through state owned enterprises operating as commons and internationalist culture of trade and investment in technology, but cooperative production relations could not be developed to advance locally networked systems of production. Capitalist production strengthened the power of production systems embedded in non-local resources; petty producers were not directly upgraded and faced dispossession in rural as well as urban areas.

Post-independence period nationalist politics on technological change for self-reliant development was shaped without the focus on resource conservation, environmental protection and climate change. India can only be put on self-reliant development path through the multiple sources of initiatives. These initiatives will emerge through the cultivation of politics of knowledge commons and innovation democracy. A historical perspective on the nature of outcomes obtaining from the engagement of nation states of late industrializing countries with the idea of self-reliance is therefore crucial to the development of a critical understanding of how India should proceed for the path formation to realize the possibilities of transformative S&T in the near future.

Lessons from Japan and South Korea

Scholarly analyses suggest that the outcomes depended in late industrializing countries not only on how much the governments chose to prioritize public investment for the building of capabilities of local S&T institutions and get the domestic business groups to strategically couple promote manufacturing at home but also how far the affluent classes went on to accommodate and integrate the peoples' well-being related objectives and concerns in the policies, plans and programmes of national development.

Sources of success and non-success

Further the analyses of historical experience of the processes of "late industrialization" suggest quite clearly that even while the success in Japan and South Korea came through the pathways of rapid "catch-up" and "leapfrogging" but there was also the cost of this rapid success, and the cost was paid by the labour. The pathways fostered national monopolies. The path created immense suffering for labour, women and minorities. Democracy had to be fought for by the labour unions. Furthermore it also needs to be emphasized that favourable conditions for the implementation of programmes of self-reliant development could be achieved because their nation states chose not to follow the "Washington Consensus" prescriptions of complete freedom for capital[1].

[1] South Korea eliminated a barrier to import for capital goods and raw materials that are necessarily required to manufacture their own goods.

In Japan and South Korea, political leadership, bureaucracy and technocrats chose to adopt a "coordinated market economy" model rather than laissez faire political economy to develop their own countries productive structures in agriculture and industry[2]. Their nation states were compelled by the left and democratic movement to make a greater investment in the social reproduction of labour power of the Japanese and Korean people. The resistance of Korean people to the authoritarian and, sometimes, totalitarian regimes, resulted in land reforms and cooperatives development in agro-food industry[3]. Consequently a higher level of allocation of public resources for education and health did occur and institutions suited for the emergence of "development states" to harness nationalism could be developed for the capitalist restructuring process in South Korea and Japan. But the successive post-war political regimes and leaders of Japan and South Korea were authoritarian in social character.

Progressive politics can discipline nationalism

The processes of transformative change, the contribution of nationalism towards the development of favourable conditions in the social formations within these countries not only offered a higher level of relative autonomy for the growth of their own domestic business groups but also sought from them a definite contribution to technology absorption and assimilation at home which allowed the development of home market to a greater degree. The business groups had to perform in a disciplined way. In South Korea, there was the implementation of land reforms. When Japan and South Korea negotiated the WTO agreement in agriculture, they got special protection for the farmers to pursue cultivation of traditional rice varieties. In South Korea, the political leadership formed cooperatives to encourage the cultivation and processing of wheat to obtain food security, build domestic demand and raise farmers' incomes. In Japan, the sectors of textiles, steel and mechanical engineering based industries had space for labour intensive industrialization. Japan continued to follow very similar paths to absorb and assimilate chemical technologies and later electronic technologies.

Lessons from China

Chinese story has a bigger lesson to offer to India. In the new and emerging technologies including digitalization and renewable energy China has succeeded in strengthening the position of State owned enterprises (SOEs) after joining the WTO with even more stringent conditions than India was asked to accept. China is able to use the policy space available in

[2] While we are noting that the state managers played an important role in boosting the South Korean economy, yet, a unified pilot agency, whose economic strategy stemmed from Friedrich List's thoughts, never existed in South Korea.

[3] Of course, there was also contribution of the factor of fear of communist revolution; for example, it played a role in the support of US administration for the implementation of land reforms in South Korea. There was a contribution from the factor of a preferential treatment meted out by the US administration to the exports from South Korea to United States. There was also the contribution of struggle of Korean nationalism against Japanese fascism.

respect of investment rules in the World Trade Organization (WTO) in a way which is unparallel in the history of catch-up and leapfrogging and of strategic coupling and decoupling pathways. China has been following a path of greater self-reliance even when faced with less favorable conditions of the post-WTO trading system in place now globally for investment in technology and foreign trade.

China started with the SEZ model complemented by State Planning policy complemented by incentives to foreign firms, and is continuing with state coordinated initiatives and cluster development through Made in China 2025 plan. Ningbo a port city chosen as a first pilot city for the implementation of Made-in-China 2025 plan; 20-30 cities cohort planned to join Ningbo and to achieve diversity in development; it signals shift from the strategy of perusal of grand production workshop and the intention to become a world manufacturing power. China has a coherent strategy for the future in place: 2015-25, 2026-35, 2036-49: focus on improving the quality of products, creating their own brands, building a solid manufacturing base by developing cutting edge advanced technologies, researching new materials, and producing key parts and components of major products; priority development of ten industries-IT, high end numerical machinery and automation, aerospace and aviation equipment, maritime engineering equipment and high level vessel manufacturing, rail equipment, energy saving vehicles, electrical equipment, new materials, biomedicine and high performance medical devices and agricultural equipment.

China does not grant automatically market access to foreign investors. China has been able to negotiate favourable conditions for the absorption and assimilation of foreign technology in a number of new and emerging technologies[4]. Even in comparison to advanced capitalist world China is undertaking far greater public investment to obtain the strategic leadership in

[4] In China, Baidu, Alibaba, and Tencent (BAT) are contributing to self-reliant development. China has been able to exploit in a significant way multi-faceted datasets on individual consumers and users of data for systematic use in the development of artificial intelligence (AI) algorithms. The Chinese model allows a market of size that rivals Google, Apple, Facebook and Amazon (GAFA). AliGenie and Alexa, AI startups like Toutiau, which use AI algorithms to recommend news and websites to its users, have been able to get much space to grow in the domestic market. Baidu- analog to Google, began investing in AI in 2013, has established the Institute of Deep Learning, four internal labs, Baidu Cloud Baidu Brain supporting 370000 developers invoking its functions 2000 billion times a day; creating platforms in new fields-self driving platform Apollo and the customized AI operation system DuerOS, investing in self-driving mobility and speech interaction companies such as NIO and KITT. Alibaba, a Chinese Amazon analogue, built its strategy on the foundation of iDST, a pre-existing data centre established in Silicon Valley in 2014, and developed its cloud computing service which later evolved into ET brain artificial brain platform promoting AI use in all fields.

digitalisation and industrialization[5]. In contrast India is trying to rely on Google Amazon, Microsoft and Reliance. China has been consolidating its presence in technology business, using Internet of Things, Internet of Services, Internet of Media, and rapidly promoting diversity in the use of AI and broadening the range of various industries, mastering big data and data analytics, and building now its own digital silk road to strengthen the place of domestic firms in the home market as well as the regions coming under the OBOR[6].

Six areas in which China has shown amazing outcomes are: New energy-RET, aerospace equipment, e-business, mega length bridges, transportation network (high speed rail, tunnels) and supercomputers; China accounts for % of world total-personal computers (90), solar cells, air conditioners, energy saving lamps (80), mobile phones (70), ships (45). In all these examples, it is the Chinese Government leading the transformative process. Four national AI platforms have been identified for support, and BAT is exploring already these fields in a systematic manner. This strategy is allowing the transfer of capabilities developed in one sector to other-Baidu in speech and image recognition, Alibaba in data analytics, Tencent in interactive services.

China story does not contradict the historical experience based conclusion that the case remains strong for the pursuit of path of oppositional projects to market-based capitalist change. The Chinese state is committed to a socialistic version of nationalism. In India, the regimes of post reforms period abandoned the project of transformative STI. During the post-reform period India has experienced an atrophying of the initial socialistic aspirations that provided the social motivation and raison d'être to the first set of independent governments. In India, since the 2000s, particularly there is much evidence of the bad outcomes from the pathways formed for the integration of the policies for science, technology and innovation (STI) with the policies for socio-technical transitions.

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[5] In 2014, UNESCO established in China its International Knowledge Centre for Engineering Science and Technology at the Chinese Academy in Engineering in Beijing specializes in big data and knowledge services. From 2016 onwards AI labs and products such as AliGenie and CityBrain Alibaba have been shaped up through the vertical integration in AI hardware products such as DeePhi Tech, Cambricon. Tencent has no clear analog in the US or EU setting up several teams to proceed and compete with each other not only promoting games but medical imaging recognition and analysis; Tencent is making investment in NIO and Tesla requiring data and AI-based algorithms. JD.com B2C platform owns warehouses and logistics uses, DiDi ride-hailing platform like UBER/OLA and Meituan Dianping (MD) provides on-demand services accumulating data for design and production.

[6] At home state owned enterprises, quasi private sector firms and research institutions are developing AI 2.0-big data based intelligence, internet crowd intelligence, cross-media intelligence, human machine hybrid augmented intelligence autonomous intelligence systems. Benefits from AI 2.0 are being obtained from these developments in China in a systematic way for E-government, E-Commerce, Express Logistics, Intelligent communities, smart phones, televisions, household appliances, manufacturing and urban development. Institutional changes are pushing collaborative industry programmes and research plans, implementation of multi-regions, multi-sector plans of collaborative R&D to exploit diverse and complementary competences.

There are thus important lessons for the coevolving discourse on the idea of transformative frame from the Indian experience of integration of policies for STI with the policies for socio-technical transitions. In China, the political leadership consciously created favourable conditions through town and village enterprises for the emergence of multiple sources of initiatives for indigenous technology development, forward and backward linkages development and home market development. In fact our understanding is that the immediate post-colonial India story of integration of the needs and interests pursued the pathways somewhat similar to Japan, South Korea and China.

Lessons from India

In India, the progressive politics has been successful in using the ideas of joint planning, nationalization of resources, creation of public assets for strategic activities, public sector for manufacturing, national champions, public private partnerships with public purpose, academia-research institution-industry alliances for the production of knowledge, technology implementation and diffusion of innovations, involvement of unions in planning and decision making, cooperatives and community organizations in the management and services delivery and municipalization of resource control and the encouragement given to peoples' participation in management and planning and the involvement of state governments, local self governments, village assemblies (gram sabhas) for better and smoother governance.

Attempts at the integration of policies for science, technology and innovation (STI) with policies for socio-technical, socio-ecological and socio-economic changes have been about the achievement of autonomy, reduction of dependence and integration of non-market calculations and technology transitions. Even the analyses of the recent most experience of implementation of strategies of export promotion and of global integration of the domestic economy show that in those sectors where during the post-liberalization period the Indian policymakers chose to delay deliberately the implementation of external liberalization and selectively provided state protection and support the domestic economy gained and proved to be far more dynamic and successful with regard to the realization of aims and objectives of self-reliant development in India.

Challenge of post-COVID-19 India

India is back to a "country of mass poverty" after 45 years. Two hundred thirty (230) million people in India are below poverty line due to the cumulative shocks of demonetization, GST and lockdown. The unemployment crisis is intensifying– the recent job riots in the states of Bihar and Uttar Pradesh[7] offer a small indication of the seriousness of the unemployment issue. Unemployment rates calculated for rural and urban areas have more than doubled and are even officially 14.34% and 14.71% respectively. Inflation in essential commodities continues to accelerate. In the midst of a massive unemployment crisis, in the informal

[7] https://www.bbc.com/news/world-asia-india-60165825

economy where 90 per cent of people work about 400 million workers are at risk of falling deeper into poverty. 50 to 80% slum dwellers lost their primary source of income while their expenditures have increased. The reports of how there has been a reduction in fruit and vegetable consumption (rural 68.8%, urban 28.7%) and of cooking oil and pulses should be raising alarm bells in the offices of the governments, but that is yet to materialize.

The economy is experiencing the "longest economic slowdown since 1991". Weak employment generation, uneven development, large informal economy today characterise the features. Around 80 per cent of small and medium enterprises across India are "insecure" about their future. A survey of 81,000 self-employed and micro or small businesses (SMBs) found 78 per cent of them incurred losses. Loss of household income was 67.3% for rural areas and for urban areas 56.9%. The Oxfam Report[8] suggests that the pandemic has led to an 84 % decrease in household income. Poor take more loans from private lenders at high interest. Year 2020 saw more suicides among business people, than even farmers as per National Crimes Records Bureau (NCRB). Suicide deaths of businesspersons jumped to 11,716 in 2020 from in 2009 9052 an increase of 29 per cent. Farmer suicides stood at 10,677 for 2020, which is around 1,039 cases fewer than that of business people.

Children are under higher risk of death from common childhood illnesses such as diarrhea, pneumonia, and malaria. 189.2 million, 14% of population, are undernourished. 51.4% of women between 15 to 49 years are anemic. 34.7% of the children under five are stunted. 20% suffer from wasting. COVID 19 experience exposed to us how vulnerable the people felt on account of poor health infrastructure and limited access to health facilities and medicines. Education of a total of almost 320 million learners from 1.5 million schools remained adversely affected during the period of last two years. Not all could transition to e-learning. Only 15% of rural households have internet access and 42% urban. Only 13% in rural areas—8.5% females—could use the internet. Disaster facing children and youth of the future India would not get averted easily, it is clear.

World Leader Report Card

Global Index	2014	2021	Standing
Global Hunger Index	63	101	Declining
Global Gender Gap Index	114	140	Declining
World Happiness Index	111	139	Declining
Democracy Index	33	53	Declining
Press Freedom Index	140	142	Declining
Henley Passport Restrictions Index	74	90	Declining

Source: Trends map, October 2021

[8] https://www.oxfamindia.org/press-release/inequality-virus-india-supplement-2021

This assessment clearly shows that Vishwa Guru is stuck in inequality and poverty. The pandemic has not been an equalizer. Wealth and income inequality of India are among the worst in the world. As per the 'World Inequality Report 2022', India is among the most unequal countries in the world, with rising poverty and an 'affluent elite. The top 10% and top 1% in India now hold 57% and 22% of the total national income respectively. The bottom 50% share has gone down to 13%. The average annual national income of the Indian adult population is Rs 2, 04,200. Here, the bottom 50% of earns Rs 53,610 while the top 10% earns Rs 11, 66,520, over 20 times more. Public assets typically include public buildings housing administrations, schools, universities, hospitals and other public services.

The World Inequality Report 2022 was authored by Lucas Chancel and co-ordinated by renowned economists Thomas Piketty, Emmanuel Saez and Gabriel Zucman. The report goes on to say that over the past three years, the quality of inequality data released by the government has seriously deteriorated which has made it particularly difficult to assess recent inequality changes. The report notes that the share of public wealth across countries has been on a decline for decades now. The 'secular decline' in public wealth and rise in private wealth was only exacerbated by the outbreak of the corona virus pandemic.

The report says that emerging economies like India and China experienced faster increases in private wealth than wealthy countries after they transitioned away from regulated economies. In India, particularly, private wealth went up from 290% in 1980 to 560% in 2020. The super-rich have cornered most of the share of wealth created under the Modi regime by the Indian nation. According to the Economist, Mukesh Ambani and Gautam Adani's net worth increased by 350 per cent and 750 per cent between 2016 and 2020. India is characterized by extreme inequality after the implementation of three decades of economic reforms. (Source: The Economic Times Feb 25, 2022)

Inequality: Let us look at the latest numbers

Share of Wealth of Top ten (10) percent	The top 10% of the Indian population holds 77 % of the total national wealth.
Share of Wealth of Top one (1) percent	73 % of the wealth generated in 2017 went to the richest 1%, while 67 million Indians who comprise the poorest half of the population saw only a 1% increase in their wealth.
Rising Number of Billionaires & Millionaires	There are 119 billionaires in India. Their number has increased from only 9 in 2000 to 101 in 2017. Between 2018 and 2022, India produced 70 new millionaires every day.
Rising Fortunes of Rich	Billionaires' fortunes increased by ten times over a decade and their total wealth is higher than the entire Union budget of India for the fiscal year 2018-19, which was at INR 24422 billions.
Rising indebtedness due to poor access for citizens to healthcare	Many ordinary Indians are not able to access the healthcare they need. 63 million of them are pushed into poverty because of healthcare costs every year-almost two people every second.

Growing wage inequality	It would take 941 years for a minimum wage worker in rural India to earn what the top paid executive at a leading garment company earns in a year.

Source: India Oxfam Inequality Report, 2022

Going back in time, the report notes that income inequality in India under the British colonial rule (1858-1947) was very high, with a top 10% income share around 50%. After independence, due to socialism-inspired five year plans this share was reduced to 35-40 per cent. The report argues that the post economic reform policies have led to one of the most extreme increases in income and wealth inequality observed in the world. It states that while the top 1 % has largely benefited from these economic reforms, the growth among low and middle-income groups has been relatively slow and poverty persists. The average household wealth in India is around Rs 983010. The bottom 50 % of the nation can be seen to own almost nothing, with an average wealth of Rs 66280 or 6 per cent of the total pie. The middle class is relatively poor with an average wealth of Rs 723930 or 29.5% of the total. In 2021, the wealthiest 10 % of the population own 65 % of the total wealth, averaging Rs 63, 54070 and the top 1 % owns 33 %, averaging Rs 32449360. Gender inequality in India is also considerably on the higher end of the spectrum. The share of female labour income share in India is equal to 18 per cent which is significantly lower than the average in Asia (21 % excluding China) & is among the lowest in the world. (Source: The Economic Times: December 07, 2021).

Union Budget 2022-23 extends failed reforms

The Union Budget of 2022-23 has done nothing to stimulate demand for effecting an economic revival; the total budgeted government expenditure for 2022-23 is Rs 39.45 lakh crores, which is just 4.6 % higher than the revised estimate for 2021-22. This means that the increase is below the rate of inflation, entailing a drop in real terms, and hence also below the growth rate of real GDP projected by the Economic Survey, which is 8-8.5 per cent. Although in her budget speech, the Finance Minister claimed that there will be a sharp increase in capital expenditure driven by enhanced public investment, but this is not true. Rs. 62,114 crore (or more than 10 % of capex that year) for the Ministry of Civil Aviation to be transferred to Air India Asset Holding Limited “for servicing of loan transferred to SPV as a result of financial restructuring of Air India” cannot be counted as an increase in capital expenditure. In the projections for 2022-23, the capital expenditure figure quoted by the Finance Minister also includes Rs. 1.12 lakh crore of loans to state governments. This is definitely not capital spending by the Centre and is unlikely to be used fully even by the states to finance capital spending. One other provision in the budget for 2022-23 that is intriguing is a capital allocation of Rs. 53,033 crore to “other communications”.

The outlays for a whole range of schemes that provide relief to the poor have been slashed compared to the revised estimates for 2021-22. Thus the provision for the MGNREGS is just Rs 73,000 crores compared to Rs 98,000 crores in 2021-22 (RE) and Rs 1, 11,000 crores for 2020-21. The budget affects drastic cuts in social sector spending. There is a reduction in the devolution of resources to states. An increase in the devolution to states by 9.6 % in nominal

terms in effect means a fall in its share in GDP, to an estimated 6.25 % compared to 6.91 % in 2021-22 (RE). There is no real increase in the budget for health and family welfare. Far from increasing the allocation for health to 3 % of GDP over time as the government had promised, there is a reduction in allocation for health relative to the estimated GDP. In the allocation for education, there is an increase by 18.5 %, but much of it is for digital education; and even this increase would leave the share of education expenditure in GDP unchanged at about 3.1 %, a far cry from the objective of raising it to 6 %.

There is an urgent need for a strategy that promotes economic revival while providing relief to the poor, and contributing to an abatement of inflation. The strategy, of giving tax concessions to the rich in the expectation of stimulating private investment, and raising indirect taxes, notably on oil, to raise revenue to compensate for what is foregone, is an important cause of the emerging inflationary recession scenario. Although it is amply clear by now that private investment, far from getting stimulated by such tax concessions, shrinks because of the ensuing recession, even in the current budget this strategy is at work: fuel prices have been raised by Rs 2 per litre (for unblended fuel which is the bulk of India's fuel consumption) through an additional excise duty, while subsidies have been cut (which is analogous to arise in indirect taxes).

In order to correct the rising inequality with measures aimed at progressive direct taxation and reducing the share of indirect taxes that burden the people the Union Government must be forced to explore wealth, inheritance and higher corporate tax. In fact the best way of mobilizing financial resources is through Wealth Tax and Inheritance Tax. At a conservative estimate, the top 1 percent of the population owns 40 percent of total private wealth, about Rs 300 lakh crores. Even a 2 percent wealth tax on this would therefore yield Rs 6 lakh crores. Wealth tax must be complemented with an inheritance tax. Otherwise the rich will only divide up their wealth among progeny in order to escape wealth taxation. If only 5 percent of wealth by the richest 1 percent of the population is passed down every year to progeny, then an inheritance tax of one-third (33 1/3 percent), will fetch Rs. 5 lakh crores. These two taxes alone will thus fetch Rs 11 lakh crores per annum.

The central government has 8.9 lakh vacancies in its departments and ministry since March 2020. There are more vacancies in central PSUs, schools and colleges. The government could have prepared a consolidated list of vacancies and ordered filling of these vacancies on a priority basis to address the chronic job crisis. It could have appealed to state governments to do the same. It could have addressed growing poverty by giving direct income support to the poor - the bottom 40-60% of the population severely impacted by the pandemic. It is easy to identify them. The Ayushman Bharat uses the Socio Economic and Caste Census (SECC) of 2011 to identify the bottom 40% of its beneficiaries. The remaining 20% could also be picked from the same SECC. To raise income, the government could have also increased the minimum wages, stuck at Rs 176 for years. The Union Government should have raised the MGNREGA wages, which remains below the minimum wages at Rs 209.3 in FY22 and Rs 200.7 in FY21. These measures could have immediately raised the income levels of a large workforce to boost consumption demand in the economy.

A Quick check up of Make in India

Post-reform dismal performance of the organised as well as unorganized sector led processes of manufacturing and services tell us that jobless growth, economic slowdown, lack of knowledge and skill intensive manufacturing, premature de-industrialisation and manufacturing are interconnected. The Make in India programme needs to create decent jobs and develop forward and backward linkages and reduce import dependence. The main policy components of the "Make in India" campaign are: 1) ease of doing business, land acquisition, 2) creation of physical infrastructure, 3) establishment of Delhi-Mumbai Industrial Corridor (DMIC), 4) Special Economic Zones (SEZs), 5) luring foreign companies with incentives for the expansion of manufacturing, 6) union government using public procurement of defence equipment, 6) reform of labour law and practices, 7) dilution of environmental regulations, 8) encouraging foreign direct investment (FDI) without technology transfer, 9) sale of central public sector enterprises, 10) monetisation of public assets for transfer of control of infrastructure to private parties, 11) tax concessions to big business, 12) custom duty changes, 13) further liberalization of intellectual property rights (IPR) protection provisions, 14) transfer of control of education and training facilities to corporate sector, etc.

The Modi Government launched the Make in India policy in 2014. This policy is the latest attempt since 1991 to make India the centre of the global manufacturing supply chain. The government has now put all of its eggs in the basket of the Production Linked Incentive scheme of July 2020 (PLI). Thirteen sectors are covered by PLI schemes. The sectors include mobile phones, pharmaceutical products, automobiles, specialty steels, textiles, photovoltaic panels and advanced chemistry cell batteries. The PLI is valid for five years, ending in 2026-27. The minimum capital outlay is US$14 million with an exception for Indian micro, small and medium enterprises, for which US$1.4 million is the entry level investment. The PLI schemes aim to place India more firmly within the global supply chain. The attempt is to direct foreign direct investment and private domestic investment to manufacturing. Although there are claims from the side of the Union Government, but it is not clear how much the framework will actually encourage the investors to practice localization of production and help build India new manufacturing clusters and get supporting companies to follow manufacturers into India, or help to generate employment in India. While during the COVID period the importance of local manufacturing, domestic market and shorter and local supply chains undoubtedly grew for the Modi government, but the domestic value addition and technological autonomy could not improve through the framework of PLI schemes is quite clear.

Electronic manufacturing

Why do we say this? Take for example how "Invest India" has chosen to market PLI scheme in the case of electronics manufacturing to be a success story of the Modi government. The claim is that a significant increase in global demand for consumer electronics has given India an opportunity to attract foreign investments as well as encourage domestic manufacturers to focus on manufacturing consumer electronics in India under the flagship 'Make in India' initiative of the government. It is true that India's electronics exports have increased from US $ 9 billion to US 4 15 billion between 2014 and 2019. But it is also true that imports have

also grown. India's electronic imports stood at US 4 51 billion in 2019. There was an overall trade deficit of US 4 36 billion, out of which China accounted for US 4 19 billion. Top imported items (during 2019-20) were parts of smart phones, personal computers, data transmission machines,, parts of LED/LCD TVs, Integrated Circuits, cameras and servers. Assembly has been growing. There has been a shift from "semi knocked down" (SKD) to "completely knocked down" (CKD) level.

The ICRIER report (August 2021) characterised the performance of PLI scheme in electronics as well begun but barely done. The report suggests that there exists a multitude of existing and emerging constraints. Current tariff and tax policies neither meet the industry needs nor maximize fiscal revenue. The industry is caught in the vicious cycle of small scale and high costs. There is absence of complementary supporting policies. The FDI inflows to Indian electronics industry have been low, even from free trade agreements (FTAs) countries. There is a lack of skilled workforce needed to produce complex parts and components and specialised technical personnel. The global electronics value chains have been seeking further opening of trade and investment regime. The conditions are at odd with the policy of phased manufacturing programmes (PMP) considered to be necessary for the reduction of import dependence. It is difficult to believe that this situation can be considered as significant progress is far from clear.

Under the National Policy on Electronics 2019, which was introduced to position India as a global hub for electronics system design and manufacturing, the Ministry of Electronics and Information Technology (MeitY) introduced a Production Linked Incentive Scheme for large-scale Electronics Manufacturing with effect from April 1, 2020. PLI scheme extends an incentive of 4 per cent to 6 per cent on incremental sales (over base year) of goods under target segments that are manufactured in India to eligible companies, for a period of five years subsequent the base year (FY2019-20). The scheme was open for filing applications till 31.07.2020. Over the next five years, the approved companies under the PLI scheme are expected to lead to total production of more than INR 10,50,000 crore (USD 140.6 Bn). Out of the total production in the next five years, around 60 per cent will be contributed by exports of the order of INR 6,50,000 crore (USD 87 Bn). While the PLI schemes have been recently launched by the government in several crucial sectors of the economy, it is important to note the impact they are creating on the ground.

Automobile and Auto components

The Government of India (GOI) announced Production Linked Incentive (PLI) scheme for Automobile and Auto components sector to boost domestic manufacturing of Advanced Automotive Technology products and attract investment in the automotive manufacturing value chain with the highest total budgetary allocation of INR 25,938 crore. The industry contributes 35% of India's Manufacturing GDP. A study has estimated that top 12 import categories such as drive transmission, steering units, engines etc. account for 62% of total imports. While India remains competitive in some areas, there remain technologies and parts that are either not made in India or for which we haven't matched the global scale, prices, or quality. This PLI scheme will have to address the competitive gaps amidst the rapid technological shifts. Open for existing automotive companies as well as new investors, the

scheme is a ‘sales value linked’ scheme and has two components of Advance Automotive Technology products: Champion OEM Incentive Scheme on battery electric vehicles (EV) and hydrogen fuel cell vehicles (HFCV) of all segments and Component Champion Incentive Scheme. Eligibility criteria to apply under the schemes are as follows (INR in Crores) for existing automotive investor is 1)Minimum Global Group Revenue of INR 10,000 crores and INR 500 crores for OEM and Component manufacturer respectively and 2) Minimum Global Investment in fixed assets of INR 3,000 and INR 150 for OEM and Component manufacturer respectively. In addition to this, the Company will also have to meet the criterion of incremental cumulative domestic investment and determined sales target.

The Ministry of Heavy Industries (MHI) has prescribed the Advance Automotive Technology Vehicles eligible for Champion OEM Incentive scheme. Hydrogen fuel cell vehicle of all segments, Battery electric vehicles of all segments, which will have to meet the performance criteria of FAME-II scheme or as notified from time to time by MHI, are currently the targeted items. List of Advance Automotive Technology Components was notified on 9 November 2021. Fast-evolving automotive regulations on emissions, safety and energy efficiency, coupled with swift changes in consumer trends are the driving factors for technological shifts globally including shift towards electric vehicles and rising level of vehicle automation and connectivity. It is pertinent to note that since the guidelines mention that the list of eligible products can be amended from time to time depending upon technological developments there is much reluctance being shown from the side of the private sector investors. Further the scheme guidelines require a minimum of 50% domestic value addition. With this ambivalence in the list of eligible products, it might not be possible for applicants to reap benefit for the entire tenure of the PLI scheme. Further, for continuation of the PLI scheme benefit, an applicant may require additional investment for ever-changing uncertain eligible product criteria. Further, in case applicant is not able to achieve the turnover and investment criteria due to alteration of the list of eligible products, MHI may invoke the bank guarantee furnished by the applicant.

India relies heavily on import of Lithium batteries. About 58% of the world’s lithium reserves are in Chile and about 43% of rare earth mineral reserves are in China. Owing to this skewed concentration globally, India had to import lithium batteries in huge quantities. In 2019-20, India imported 450 million units of lithium batteries valued at INR 6,600 Crores. Lithium battery pack is the most expensive component in an electric car, costing between 30 to 40 percent of the vehicle’s total cost. In the case of Semiconductor chips, prices of semiconductors have been climbing since 2020 amid global supply crunch Chip lead time increased to 17 weeks from 12 weeks in 2020. This will result in rise in import input cost as India relies heavily on import of semiconductor chips. Such heavy reliance on imports of inputs such as lithium batteries, semiconductor chips, e-drive, circuits, transistor etc. which accounts about half of the vehicle’s cost, may pose a significant challenge for applicants to comply with 50% of minimum domestic value addition criteria. Successful execution of the PLI scheme would require considerable investment in the charging and other infrastructure to support the operation of EV and HFCV amongst consumers. Infrastructure challenge may also deter the desired sales of EV and HFCV and as a result complying with Y-o-Y growth in determined sales value will be dubitable. These are certain speed limiters for auto PLI

scheme, undermining the scheme at the current stage rather than by the results in the coming time would be imprudent.

Lessons for industrial and technology policy

Scholarly analyses of the successful examples of late industrialization as undertaken in Japan and South Korea have some clear lessons. Comparatively speaking, India's experience shows that the perusal of pro-service vision has also run India into premature de-industrialization. India is therefore having difficulty even in sustaining its competitiveness in the IT enabled service sector-ITES (ICT, finance and consulting). It has seemingly failed in increasing its public and private investment in services sector related R&D. The Indian experience is defined far more by the features of lack of successful efforts for the development of manufacturing, absence of symbiotic development of agriculture, industry and services, inconsistent with technological self-reliance and lack of commitment to the perusal of pathways of catch-up and leapfrogging on part of the political leadership.

Weaknesses of hardware sector and engineering education are impacting adversely on the creation of STI leadership for the development of manufacturing capabilities. These weaknesses are evident in the failures being experienced in respect of development of high value added IT products in the case of domestic companies. The share of foreign controlled companies has been growing in the higher value added segments of the ITES. India's ability to offer low-cost, high-quality IT-BPO services has made it a world leader in this industry. However, employment in services has not grown as quickly as output. The majority of India's jobseekers are low-skilled, but demand for workers is growing fastest in higher-skill industries. The supply of highly-skilled workers has not kept pace with demand, causing wages to increase faster for these workers than for lower-skilled ones.

Scholarly analyses indicate that the pursuit of catch-up and leapfrogging pathways have involved in these cases the nation states to undertake the following important changes: 1) a deliberate (planned) transformation of cognitive and productive structures that required the nation state to keep up with public investment in scientific, technological and educational institutions, 2) a balanced change in the share of agriculture, manufacturing and services (capacities), 3) pro-domestic manufacturing vision, 4) development of innovative enterprise, discouraged low road to export competitiveness, 5) augmentation of social capabilities, 6) development of user capabilities on the demand side to promote systemic and structural competitiveness and 7) building of developmental / entrepreneurial state apparatus.

The nation states chose to nurture as well as discipline to some extent the emergent social carriers in quite a few sectors in these countries. The state apparatus was far better placed in imposing on the business groups the obligation of systematic contribution to the processes of absorption and assimilation of new and emerging technologies. Thus, these nations have succeeded only because the states were able to undertake rent management quite successfully. The governments were able to create opportunities as well as withdraw incentives in a timely manner. Profitable investments were systematically encouraged. In the industrial and technological policies, the governments could incorporate the pro

manufacturing vision, symbiotic development of agriculture, manufacturing and services, technological transformation and overall social progress in the sphere of education and health. These steps allowed the nation states of these countries to steer and coordinate the emerging socio-technical transitions.

There was a major contribution from the deliberate, planned evolution of capabilities required for the development of the knowledge and technology intensive frontline sectors. The state of evolution of capabilities (new and emerging sectors) can be treated as a benchmark / criterion of success. Capabilities include not only education / human capital but also the capabilities associated with problem solving knowledge embodied in organizations and systems. The mere absence or presence of the market as an institution for resource allocation and mobilisation cannot explain success and failure to undertake sustainable industrialisation and digitalization in different types of socio-economic systems. It is clear that the late industrializing countries did not follow the policy of free market that the Washington Consensus prescribed and has been followed by the post mid-1980s political regimes and leaders to varied degree in one or other form in India.

Technological autonomy involves the accumulation of capabilities for technological learning. The processes of acquisition of the abilities of how to implement and eventually also how to generate new ways of producing and new products under conditions of dynamic increasing returns are critical to the achievement of success in technological learning. It is also well apparent that the benefit of production expansion accrued to the people of India only when there was focus on the implementation of indigenous innovation and the development of home grown innovative enterprises. Specific experience of implementation of the policies connected in the case of pharmaceuticals seems to suggest that achievements in respect of technological self-reliance were made possible with the help of the non-big business groups. As a social carrier of innovation young start-ups led by professionals with the help of public sector were willing to be subjected to some discipline.

The state could guide to some extent the growth process of pharmaceuticals in favour of the distribution of rents favourable to learning and indigenization. Of course, this happened also only up to a point; commitment of the policies after 1999-2002 was inconsistently followed and regressive in many ways. Even the phased manufacturing programmes / domestic content regulations could not be consistently implemented after a point in the sectors of automobile and renewable energy. Not only that phased manufacturing performance was not monitored rigorously by the state but also after growing in size the very same non-big business groups have also begun now to emulate the behavior of big business. Further the policymakers seem to be lacking in political will; they are not willing to discipline the firms in respect of their possible specific contribution to indigenous technology development. Analyses made have shown that in order to harness the gains of export promotion for technological learning in the post-World Trade Organization (WTO) conditions it was necessary for the Indian state to delay the process of external liberalisation and use the flexibilities available in the WTO Agreements for the development of pharmaceutical and auto sectors. It appears that this kind of selective protection would be essential whenever

the target is to undertake the perusal of import substitution and export promotion in a consistent way.

The conditions of global competition and catching up requirements have changed quite rapidly on account of the institutionalization of WTO Agreements and the changing strategies of transnational corporations that are originating out of the influence of transnational corporations on the governments of advanced countries. Both import substitution and export promotion strategies are now experiencing hurdles as the barriers are raised by the transnational corporates having an advantage of the protection of WTO Agreements. The activities of global businesses can no longer be the same as in the decades of seventies and eighties that allowed South Korea and Taiwan to catch up. While the area of manufacturing activities is still a critical activity for remaining competitive, global competitors have been able to move rapidly the grounds of competition to the innovation activities such as R&D, engineering design, standards, marketing, supply chain management while transferring the standard manufacturing activities to lower cost locations itself in many cases including China and India.

Internal liberalisation failure occurred on account of the problem of exhaustion of home market. Lack of sustained investment demand can be a recurring problem in the paradigm of import replacement and exports of mature goods. The challenge of introduction of major innovations like the absorption of electronics, biotechnology, renewable energy technologies and new materials can be addressed only through the active coordination of development of technology and market demand and not through laissez faire policies. As a result those industrial policies that could incorporate successfully the capacity for learning to innovate while expanding production capacity are likely to have a better success in late industrialization. The US had to resort to the perusal of the idea of entrepreneurial state in order to catch-up with Japan.

While there is a change in the conditions of catching up on account of 1) the acceptance of World Trade Organization (WTO) Agreements by the developing world, 2) the emergence of private financial, industrial and technological monopolies and 3) the openness to predatory competition under perusal by transnational corporations in respect of the constitution of international division of labour but it is possible to recreate the pathways to integration of policies for science, technology and innovation with policies for employment, environment and social justice friendly development to exploit the space available for state protection and promotion of autonomous development. However, it is also clear that the instruments of state intervention would have to be considerably reinvented to suit the new conditions of global competition under formation in the post-WTO world constrained by the power of private monopolies.

Economic reforms and Indian agriculture

Since the mid 1990s, when quantitative restrictions were removed from agricultural markets, four lakh peasants have committed suicide since the mid-1990s. The contribution of agriculture to the overall GDP fell from 51 percent in 1951 to 19 percent in 2011 and further to 14.8 percent in

Figure 1.1: Trends in Actual Government Expenditure on Agriculture
Source: CITATION Dem20 \l 1033 (PRS 2020)

2019-2020. However, the 55 percent of the population continues to be dependent on agriculture for their livelihoods (PRS 2020, Jha and Prasad 2020). India has been experiencing a decline in agriculture growth from the decade of the 1990s, and its cascading impact on labour absorption. Though the constraints of the green revolution strategy were evident from the mid-1980s onwards, the persistent depression in the sector was largely policy driven and has been marked by a significant decline in public investment, in all aspects of agriculture and recent estimates from successive budgets show that the allocations in agriculture remained at 2-2.5 percent of the budgetary allocations between 2015-16 and 2019-2020 (CBGA 2021, 38). The marginal rise in allocations is also due to the meager income support programme of the government of India. In all areas of infrastructural investment the expenditure of both departments of agricultural cooperation and farmers' welfare and agricultural research and education declined drastically and turned out to be in actual expenditure always even less than the allocated budget, thus impacting the cost of production in significant ways.

Figure 1.2: Number of regulated markets in India

Source: CITATION Raw201 \p 15 \l 1033 (Rawal, Patel and Pais 2020, 15)

In fact, declining incomes were also a result on the increasing deregulation of agricultural markets and the APMCs through which the State procured the produce of farmers. This discouraged monopolistic practices and provided at least an assured price for some varieties, especially those being produced in green revolution regions. The rate of growth in the number of regulated markets has fallen, (Figure 1.2). This had adverse impact on procurement of food grains by the State declined drastically for crops with minimum support prices; in 2019-20, only 43 percent of the total production for rice, 36 percent for wheat, 12 percent for pulses and 1 percent for food (PRS 2020a).

Further, as reported by the parliamentary committee on food and civil supplies, there has been severe loss of food grains because of the lack of storage space, and the dependence on private players for agricultural infrastructure. It is obvious that such a trend created the space for corporate led agri-businesses, both domestic and transnational. This resulted in falling farm incomes in the sector and greater dependence on contracts and wage labour.

Earlier the provisioning of cheap inputs for increased productivity was dependent on publicly funded R&D. The agricultural extension service provided both scientific advice, and certified inputs to farmers, at highly subsidized rates; the government provided crucial support to marginal and small landholders, and was a countervailing force against big private players. However, this underwent a significant change with the ascendancy of neo-liberalism. While the core government funding remained more stable in ICAR institutes

(83.8 %) than in state agricultural universities (SAUs), the share got reduced to 76.2% and had to undertake revenue generation to the extent of 23.8 percent. There was a gradual decrease in research funding and national innovations, and this declining trend continues as shown in the recent data.

During 2019-2021 the budgetary support for crop sciences declined by 3 percent, for agricultural education by 28 percent, and by 14 percent for animal sciences. Support to central agricultural universities declined by 7 percent and to Indian council of agricultural research by 3 percent in the same period; there was an overall reduction of support by 7 percent to the Department of Agricultural research and education. During 2018-2020, budgetary support to agricultural extension remained static at a mere INR 200 Crore (PRS 2020). Instead, National Agricultural Technology Program (NATP) both have large components devoted to developing research consortia with civil society and private partners encouraging private players to dominate R&D, and opening the door for transnational foundations.

This declining trend also resulted in the withdrawal of the state as a countervailing force, thereby reducing the power of small players in the agricultural market. Further, growing power of transnational corporations in R&D was evidenced through the tie-ups between large multinationals and other private companies. Recent estimates of mergers and acquisition by the six big corporate giants in agro-pesticides and seeds, between 1996 and 2015, in 26 countries of the global south reveal that around 406 companies have changed ownership with the aim of bringing about product and market integration, especially with respect to seeds and bio-pesticides. In India too, the process gathered momentum with the Bayer-Monsanto, and the DuPont Dow merger in 2018.

Even when the Indian State chose not to apply the remedies capable of compelling these combines to agree to share the rights to intellectual property on reasonable prices with the Indian competitors for the local market to be kept as competitive the local companies have had to fight their battle for the domestic markets individually with these companies. While the Indian patent law has the provision to issue compulsory licenses, this provision is neither being invoked by local industry nor by government. This situation has given global giants a technological dominance and structure the power dynamics with the markets for agricultural inputs.

Conditions for transformative S&T

In the post-reform period, it is apparent that the techno-politics of post-liberalization, privatization and globalization has resulted in greater import dependence and unsustainable development tendencies to accentuate in the Indian economy. Innovation systems building activities have been short of the explicitly stated expectations. The strategy of trickle down has not led us to realize socially, ecologically and economically sustainable outcomes in the case of late industrializing countries is quite clear. Particularly the factors that can be expected to play a definitive role in the success of policies, plans and programmes are one,

how narrowly or broadly the visions and strategies for S&T capability building and strategic coupling have got conceived, and two, how well the contradictions between explicit and implicit policies followed for the achievement of objectives of national development are being handled by political bureaucratic apparatus, academia, scientific and technological personnel and social movements.

What is the way forward?

In the post-COVID-19 world, it is quite clear that the instruments of state intervention would need a considerable re-invention. Conditions need to be prepared for the state governments being able to transfer resources to young start-ups, cooperatives, small and medium enterprises and such new business entities which are ready to contribute to structural learning and innovation making for the development of local, regional and national socio-economic requirements. Big business needs to be disciplined by getting its distinguished members to fall in line with the requirements of society and economy. In the post-WTO world, it is today still possible to transfer resources to domestic firms in the name of technology, R&D, environment and backward area development. In the post-WTO world, resource poor actors can be supported because the governments of advanced countries needed this policy space[9].

The following principles can be treated as essential ingredients for success: (i) an 'emulation philosophy' vis-à-vis the most promising technological paradigms; (ii) various measures safeguarding the possibility of 'infant industry learning', involving also the purposeful 'distortion' of market signals as they come from the international arena; (iii) explicit policies of capability-building directed both at education and training but also at nurturing and shaping specific corporate actors; (iv) a 'political economy of rent-management' favorable to learning and industrialization, while curbing the exploitation of monopolist positions; (v) measures aimed to foster and exploit a weak Intellectual Property Rights regime, especially with respect to the companies of the developed world; (vi) strategies aimed at avoiding the 'natural resource course'; (vii) 'virtuous' complementarities between industrial policies and macroeconomic management.

The new pathways of self-reliance should prioritize the stimulation of internal demand arising out of the crisis of agriculture, natural resources, energy, urban living and health

[9] Production structures set the stage of learning dynamics- because they help prepare human minds for the discovery of production possibilities. In India the narrative of promotion of manufacturing also revolves at present around the theme of how the sector of manufacturing needs to become an engine of job augmenting growth. There is a talk of how the manufacturing sector needs to grow by 12-14 per cent and create in the coming 15 years 100 million decent jobs. Our own understanding that the new and emerging sectors of manufacturing catering to rising demand need to be promoted with a view to meet the basic needs and to realise the job augmenting potential of manufacturing in the Indian economy.

need to become the priorities of employment guarantee, poverty reduction, infrastructure development and implementation of climate change related obligations. This would involve necessarily a shift away from the policy regime (s) focusing solely on the pathways of development offered by the strategies of import substitution and export promotion to the creation of a new policy regime which would diversify and focus also on the implementation of a new strategy of autonomous development bringing about the development of systems of local production and innovation by upgrading the local capabilities of peasants and artisans and their access to local resources and local markets to achieve self-reliance.

In order to upgrade the system of innovation the state will have to actively focus on the use of instruments that foster the development of horizontal networks, indigenous clusters and technological effort intensive like environments with a view to harness the opportunities arising out of the spill-over connected with the route of outward orientation in the cities attracting outsourcing investments. The strategy of leapfrogging would need developmental efforts not only to become inclusive and be geared explicitly to the reduction of poverty through welfare to safeguard their health, nutrition and education but also linked to the development of the capabilities of the poor and marginalized people as a part of the programmes for upgrading of their livelihoods in both rural and urban areas in a symbiotic way.

Basic needs of the urban and rural poor and productive apparatus upgrading requirements would now have to be met by the construction of “wider pathways of self-reliance” catering to the establishment of innovation development trajectories linked to the upgrading of local economies as systems in themselves which are competitive and effective in respect of improving the quality of life of the poor. Local economy systems would have to be built on the basis of technology configurations that value local resources, capabilities and markets rather than import replacement paradigm to meet the demand arising out of elite consumption and import dependent producers catering to imitative lifestyles.

It is important to recognize that how for the big business their interest in the idea of self-reliance was earlier completely contingent on the state’s ability to transfer resources to them for keeping their interest profitably intact in the project of industrial capital accumulation. Today their strategy is also directly focused upon encroachment of public sector resources through the processes of privatization, commodification and tax holidays. These groups have their eye on the land, water, forests, minerals and knowledge resources and their strategies are already in direct conflict with the interests of the poor and marginalized in the sense that all these resources are going to be needed by the rural and urban poor if they want to emerge as the social carriers of innovations in the construction of new pathways of pro-people development in India and these late developing nations.

Failure to articulate the growing importance of construction of new pathways for sustainable and just development is very much the main issue facing the advocates of adoption of self-reliance based strategy of development. We need to argue that there exist alternatives and these alternatives must be pursued at the local and state level in collaboration with the forces opposed to neo-liberal policies. Experience of the countries of Latin America shows to some extent a way ahead to the leadership of rural and urban poor in Asia. Most recent

experience of the left in India also suggests that the new pathways need to be articulated for a reinvention of the instruments of state intervention under the new conditions of post-WTO world.

Possibilities exist for the creation of new pathways of self-reliance if the political economy can be made favourable to the idea of self-reliance for ecologically and socially just development. It is noted that how the quality of strategizing is also going to matter in respect of creation of new routes to catch-up and leapfrogging. Whether the pathways pursued would be wider or narrower in terms of social conditions, innovative enterprise development and commitment to education and skill base formation is likely to be determined by political economy. Since the quality of strategizing efforts that the leadership of rural and urban poor need to show is crucial to the perusal of new pathways the challenge of policy alternatives is not an ordinary challenge.

Recent experience tells us that the failure to conceptualise alternatives is in fact becoming a question of survival of the progressive politics in India. The challenge is very much with regard to the design of appropriate pathways of symbiotic development of agriculture, manufacturing and services. Agro-ecological approaches provide an opportunity for not only agrarian transformation but also for rural industrialisation. Industrial development, renewable energy, sustainable urbanisation, water and waste management, provision of social determinants and resources for sustainable healthcare need to be promoted in an integrated way to create new niches in order to meet the aspirations for self-reliant, employment intensive, energy conserving, environment friendly and socially just development.

Where does our future lie?

Peoples' democracies are the way forward; the emerging opportunities for the strengthening of subjective conditions for their creation need to be recognized and supported systematically. There is an urgent need to harness the potential of new and emerging sciences and technologies (S&T) to tackle the challenges of socio-economic inequality and of growing vulnerability on environmental and climate change fronts. India is committed to attain sustainable development goals (SDGs) and meet the commitments made at the Conference of Parties for climate change, sustainable use and conservation of biodiversity and water. India needs to protect the policy space for at the World Trade Organization (WTO) to secure her economic and technological future. India has been allowed by the successive governments to be seen as a market to be used by foreign and domestic capital for their narrow extractive and exploitative ends.

The post-COVID-19 mechanisms of deliberation and participation should accommodate the diversity and plurality of opinions and initiatives-a distinctive feature of the post-independent Indian policy making apparatus for science, technology and innovation (STI). Recognition of the dilemmas and conflicts facing the path formation for the cultivation of science and politics of socio-technical system design is necessary for the way forward. It is a necessity which cannot be ignored anymore by the Indian state and the social movements

need to be treated as partners in the determination and implementation of real world experiments in all spheres of science, technology and innovation.

The current Indian polity does not recognize the imperative (s) of contestations and accommodate the multiple sources of initiatives. There is a need to reflect on the notions of self-reliance, social justice and modernity. For the realization of a higher level of the science and politics that needs to unfold now has to show reflexivity. Insights from the real world experiments need to be gathered. Experiments need to be encouraged by the government and social movements for the advancement of non-capitalist modern social formations within the womb of existing capitalist social formation.

The post COVID-19 contributions of self-reliance should 1) help develop regenerative agriculture and network systems of local economies capable of contributing to sustainable digitalization as well as industrialization, 2) help build universal basic infrastructure as commons to support livelihoods planning to be undertaken at the district and state level, 3) ensure the fostering of public services accessible to all to meet basic needs namely energy, school education, public health, nutrition and childcare, water, sanitation and waste utilization, 4) ensure the building of public digital creative universities capable of supporting the development of sustainable variegated models of local, regional and national economies and 5) help foster the development of cooperatives and group enterprises acting in socially responsible people friendly ways.

We need to recognise that the constraints exist at not only the level of labour surplus but also at the level of socio-ecological problems. Alternate pathways of industrialization and capability building should be thus constituted using alternate socio-technical frames for indigenous innovation. Institutions required for the steering and coordination of the efforts required for the development of socio-technical systems and policy regimes would have to be developed to suit our own challenges, and we cannot rely on the imitation of others to achieve success.