CHAPTER - 24

ACHIEVEMENTS, CHALLENGES AND WAY FORWARD

24.1 Karnataka@2030

Karnataka has been a Top 5 state in India, and post-COVID-19, needs to reorient its strategies keeping in view its demographic character, its ability to grow and growth drivers which will accelerate socio-economic development. Future growth will be led by technology which is disrupting all industries. India will experience high economic growth along with lower population growth in the next decade as the country aspires to break through the USD 10 trillion ceiling, which only two countries have so far-the US and China. Karnataka has a significant role to play in leading the states with a structured and strategic economic initiative to achieve this aim.

Further, Karnataka is a welfare state; citizens' welfare is the prime objective of all levels of governments. Citizens' welfare implies that everyone has the necessities of life, nobody suffers on account of poverty, there exists a social security net to protect vulnerable sections, investment in education, particularly higher education,so all young people have assured access irrespective of means, and health security so all citizens can access quality medical care when in need. After welfare, availability of jobs is top priority. Adequate investment must be directed towards infrastructure and fast-growing areas so high-quality jobs are available to all citizens, especially for young people.

To direct the appropriate social and economic strategies, one must start by studying and projecting the demographic characteristic of the state for the decade, as analysed in Table 24.1. Today, Karnataka has a fertility rate of 1.7 and a population of 6.66 crore, with the share of population over 60 years estimated to be 10%. By 2030, the population is estimated to reach over 7 crores with 15% of the population over 60 years of age and fertility could plummet to 1.5-1.6.

Table 24.1: Karnataka's demographic parameters in 2021 and projected to 2030

Parameter	2021	2030 (Projections)
Fertility	1.7	1.5*
Population (crore)	6.66	7.06
18-23 population (lakhs)	67.8 (10.2%)	62(8.7%)
60+ population (lakhs)	76.6(11.5%)	105.9(15%)
Number of children born (lakhs)	11.1*(1.7%)	10.2*(1.4%)
Number of deaths	6.3*(1%)	11.6*(1.6%)

Source: NFHS-5, MOSPI, AISHE, CRS.

** Denote author estimates based on CRS data for analytical purposes.*

The broad implications of such demographic dynamics are:

1. The number of children being born has stagnated and will decline soon, possibly at the rate of 1% per year.

2. The number of people ageing and passing away is increasing at the rate of 7% per year andmay exceed the number of children bornby 2030.

3. The working age group will decline; the 18-23-year-old population is decreasing at the rate of 1% per year. The state will soon have a large ageing population supported by a shrinking workforce.

4. The number of 60+ people may increase to over 1 crore, many of whom may depend on the government for a social security net.

5. Women have done exceedingly well. Almost all girls are in school, and women dominate higher education with Gross Enrolment Ratio having jumped 10 points from 22.7 in 2011-12 to 32.7 in 2019-20, against 24.9 to 31.2 for men in the same period. Women's enrolment growth rate is 3.3% CAGR, more than double that of men's at 1.4%, which implies women's enrolment in absolute terms will overtake that of men soon. This is encouraging considering Karnataka's gender ratio at birth is 978 (per 1,000 males) and gender ratio of total population is 1,020 (per 1,000 males).

6. There is significant technology disruption with automation happening around the world, of which Karnataka is at the forefront in India. The state hosts the largest and most diverse tech ecosystems in the country. Technology disruption has significant bearing on job creation and skilling for the future.

24.2 USD 1 Trillion Vision

The Government of India announced a bold vision of maturing into a USD 5 trillion economy by 2025. With the COVID-19 recessionary impact in FY 21, the USD 5 trillion goal may be set back to 2026 or 2027. Regardless, every growing economy needs an ambitious goal, one that all stakeholders can align to and focus on. Looking past USD 5 trillion to the significant goal of USD 10 trillion: only two countries have grown beyondUSD 10 trillion—the US, now USD 22.94 trillion, and China, now USD 16.86 trillion in GDP. India is poised to be the third economy to break through this ceiling, with favourable tailwinds in demographics, domestic consumption, and technology development and adoption. With a focused agenda, India could join the USD 10 trillion economy club by 2031-32.

To reach this vision, we must first take stock. As shown in Table 24.2, in FY 22, India's nominal GDP is estimated to reach INR 232.15 lakh crores or USD 3.1 trillion (at INR 75 = 1 USD) at 17.5% over nominal GDP of INR 197.5 lakh crore in FY 21. 17.5% annual growth is not normal, and is a result of the 3% decline over FY 21 due to the pandemic followed by the economy coming back on track in FY 22. If India grows at a CAGR of 12.7% for the next four years starting at USD 3.1 trillion - in constant currency of INR 75 = 1 USD, - the USD 5 trillion goal by FY 26 is well within reach. Similarly, to reach USD 10 trillion by FY 32, India must grow at 12.2% CAGR in dollar terms from USD 5 trillion in FY 26 - in constant currency of INR 75 = 1 USD. Putting aside considerations like the depreciation of the INR, the critical issue is, can India sustain 12.7% growth p.y. over the next decade?

Table 24.2: Projections of India's Economic Growth to 2026 and 2032			
India - Gross Domestic Product Growth (Nominal)			
FY	**INR (lakh crore)**	**USD (trillion)**	**CAGR Needed**
2021-22	232.15	3.10	-
2025-26	375.00	5.00	12.7%
2031-32	750.00	10.00	12.2%
Source:MOSPI (Estimated by authors based on MOSPI data)			

To answer this, we must look at our past growth. When India's economy opened up in 1991, GDP was USD 275 billion or INR 5.32 lakh crore; reaching USD 3.1 trillion today translates to a growth of 8.4% per year in dollar terms—despite the recessionary effect of the pandemic. 8.4%p.y. growthin dollar terms for 30 years is phenomenal growth and a testimony to the healthy growth drivers India possesses. This translates to 13.4% in rupee terms, the difference stemming from the USD-to-INR conversion dynamics and inflation. Given India's strong 30-year history and capacity for growth, it is possible for India to grow at the 12.7% in rupee terms required to meet its USD 5 trillion and USD 10 trillion targets this decade, but only with a focused agenda and rebalancing of investment and resources.

In a time when the role of the Centre is increasingly being limited, and spending by all states is growing, Karnataka can demonstrate how states must lead future growth. CanKarnataka grow its economy to USD 500 billion, in nominal terms, when India aims for USD 5 trillion in FY 26? Can the state grow to USD 1 trillion, in nominal terms, when India aims for USD 10 trillion in the 2030-2032 timeframe? These goals in the context of India's mean the state will contribute 10% to the national economy by 2026, up from the current 8.8%. This means Karnataka has to accelerate growth higher than India to hit its target.

Table 24.3: Projections of Karnataka's economic growth to 2026 and 2032			
Karnataka - Gross State Domestic Product Growth (Nominal)			
FY	**INR (lakh crore)**	**USD (billion)**	**CAGR Needed**
2021-22	20.5	273.3	--
2025-26	37.5	500	16.3%
2031-32	75.0	1000	12.2% (from USD 500 bn in FY 26)
			13.8% (from USD 273.3 bn in FY 22)
Source: MOSPI (Estimated by authors based on MOSPI data)			

Karnataka's nominal GSDP in FY 22 is estimated to reach INR 20.5 lakh crore which translates to USD 273.3 billion at a conversion of INR 75 = USD 1. As shown in Table 24.3, for Karnataka to reach USD 500 billion in FY 26, when India meets the USD 5 trillion target, the state has to grow at a CAGR of 16.3%. It has to grow faster than India at 12.7% because it aims to become 10% of the national economy from the current 8.8%.

For Karnataka to grow to USD 1 trillion nominally in a decade by 2032, the state has to grow at 12.2% CAGR from the USD 500 billion in FY 26. Alternatively, from USD 260 billion in FY 22, Karnataka must grow at 13.8% YoY to reach USD 1 trillion in FY 32 when India reaches USD 10 trillion. The state has demonstrated an appetite for rapid growth in the recent half-decade itself; for example, in FY 17, the state's GSDP grew by 15.5%. Karnataka's GSDP grew by 11.2% CAGR between FY 17 and FY 22, including the pandemic year FY 21 where it lowered to 7.2%. Considering this, a growth rate of 13.8% in nominal terms is feasible.

The dream of USD 1 trillion by 2032 is within the realm of possibility for Karnataka, based on historical growth and the course-corrections it will have to undertake. To achieve these growth targets as well as attain the SDG targets, Karnataka must pursue focused socio-economic strategies. Particularly post the COVID-19 pandemic, a reorientation of strategies might be required.

24.3 Karnataka's Achievements

Karnataka is among the Top 5 states in India and has demonstrated strong growth over the years. Its per-capita GSDP of INR 3.05 lakhs is the highest among the Top 5 states as shown in Chapter 1. A standout feature of the state economy is it has the highest share of services in the Gross State Value Added (GSVA) of 66.1%—the highest among all states, a product of its robust IT services industry and other technology-based areas. Karnataka is also a major job producer, having produced 10% of the formal jobs per EPFO data in the country while contributing 8.8% to the national Gross Domestic Product (GDP) and constituting less than 5% of the population. Unemployment rate is 3.9% in the 15-59 age group. Considering the Sustainable Development Goals (SDGs) 2030, Karnataka ranks third among states in the efforts to achieve the SDGs.

Karnataka has certainly done well in the past but now, post the COVID-19 pandemic and the resulting recessionary effect, there is a need to re-orient its strategies by studying the particular needs of its citizens, its demographics, and its sectoral composition. Every state must do this now. Karnataka also has a significant advantage with its comprehensive technology ecosystem and advanced capabilities in data analytics. It can apply these capabilities to build technology-first growth engines. Karnataka can be a leader to demonstrate to other states how a high-growth strategy can be formulated based on data analysis and technology.

24.4 Karnataka's Challenges

All states have their own set of strengths and challenges, unique to their capabilities, sectoral compositions, workforce distributions, and demographics. Karnataka's challenges are as follows:

1. **Large disparity between North and South Karnataka:** The northern districts in the state, on average, have lower per-capita incomes and larger populations than their southern neighbors. The ten poorest districts, from Kalaburgi to Chitradurga, as discussed in Chapter 1 are all in the north and had a population-weighted average of INR 1.32 lakhs per-capita income in FY 20—more than INR 1 lakh lower than the state average. These populations largely depend on agriculture and other rural economic activities which suffer from lower value-add and growth, exacerbated by the higher population and workforce dependence..

2. **Low incomes in agriculture and rural economy:** Rural populations do not have access to enough high-growth and value-add opportunities. 41% of the workforce—and by extension, the population, depends on agriculture with per-capita income of INR 82,176. The state's average per-capita GSVA is nearly three times higher at INR 2.33 lakhs. While people who are able to access a good education leave to work in Bengaluru and other urban opportunity-filled areas, most rural citizens cannot emigrate. Instead, they need opportunities to be set up near their hometowns and villages, in the form of labour-intensive industries, infrastructure development projects and services-based employment. This will usher in a rebalancing of the workforce—if the agricultural workforce is reduced from 41% to, say, 20-25%, it will stop the overdependence on the agriculture sector and allow the remaining agri-workforce to improve productivity and increase their incomes.

3. **Inadequate spending in industry and services sectors:** 86% of Karnataka's GSVA comes from the services and industry sectors supporting a combined 59% of workforce—and by extension, the population. The services sector grew at 11.6% CAGR from FY 17 to FY 22, whereas industry grew at 6.1% in the same period. Both sectors are not adequately invested in. The industry sector, particularly, is lagging due to inadequate impetus. While it is undoubtedly important to support the rural economy with a large budget and other support, the other sectors and the urban economy also require an equal impetus which will allow them to grow faster and become globally competitive. The state's investment will also be an important signal to entrepreneurs that Karnataka means business.

4. **Human capital and resource development is laggingcompared to other southern states:** Karnataka's higher education GER, at 32.2, lags behind other southern states who all have GERs over 35. Tamil Nadu's GER is 51.4. Higher education and specialization will increasingly become more important for innovation and knowledge creation—both crucial in the knowledge economy-led growth over the next decade and beyond. The state also requires massive skilling and vocational training programs that can help rebalance the workforce from over-dependence in agriculture towards other sectors.

5. **Ageing state with declining fertility:** Karnataka is an ageing state with the number of citizens over 60 years of age rapidly increasing, and the number of children being corn as well as the 18-23-year-old population rapidly decreasing. When the population downturn comes where the large ageing population must be supported by a gradually shrinking workforce, Karnataka must be ready with having developed a highly productive workforce that can sustain and grow socio-economic output without the demographic advantage. For this, the young population must be highly skilled in different areas of technology and other drivers.

6. **Technology disruption and automation will impact service jobs in many sectors:** Much like the rest of the world, Karnataka, too, faces the challenge of technology disruption and automation which may render current skilled groups redundant. It is important to understand where automation may have the greatest impact and use it to the state's advantage while skilling its population in other areas where human capital will be necessary.

24.5 Way Forward

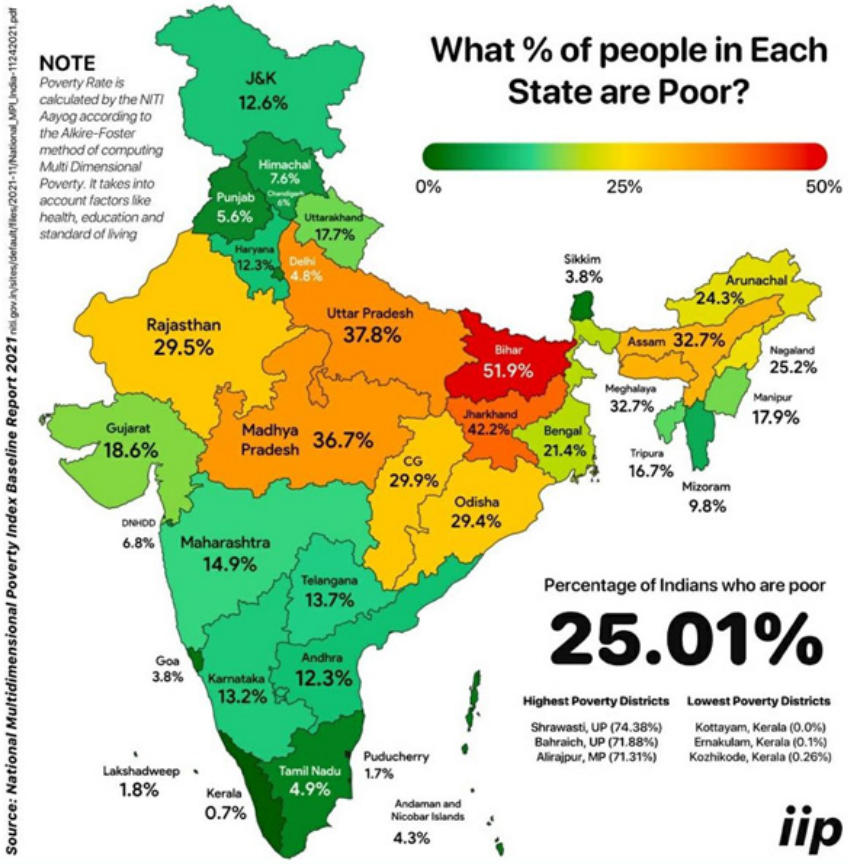
Karnataka must focus on instituting the policy frameworks, arranging for investment in growth areas and continual easing of excessive regulations in major growth areas. The following growth drivers can accelerate growth and enable the state to reach USD 1 trillion in this coming decade. The state will need a combination of social and economic strategies that accelerate current growth and build engines for future-oriented growth.

24.6 Social Strategies

The state must embark on the following measure to provide the social framework required to protect against Karnataka's challenges:

1. Create a social security net to protect all vulnerable sections and ensure everyone has food on the table, a roof over their head, water in the tap, internet and unimpeded access to digital platforms, power in their switch, toilet in the house, education for their children, gas in the stove and other basic necessities. All these factors are today largely supported by Central Government funding. Karnataka must set up a mission group to ensure these facilities are disseminated to all its citizens by 2025, thereby effectively eliminating poverty. As per NITI Aayog's 2021 report on the Multidimensional Poverty Index which is based on NFHS-4 data from 2015-16, 13.2% of Karnataka's population is multidimensionally poor; the state must aim to reduce this below 1% by 2030.

Figure 24.1: National multidimensional poverty index baseline 2021



2. Karnataka must focus on a comprehensivesocial security net for vulnerable sections of the society and the population above 60 years. A pension system for different groups—old age pension, widow pension, and others—can be consolidated and disseminated from one program. Healthcare can be assured through Ayushmann Bharat in which it is important to enroll everyone. The state must also work with civil society to ensure old age care is woven into the fabric of the society, and this segment can have a reasonable existence with dignity. With the population declining, the rise of nuclear families and increased mobility of younger age groups, this could become a daunting issue if the net isn't instituted soon.

3. Education will be key to maintaining a productive workforce when the population declines. Data conclusively shows the number of school children is stagnating and will possibly reduce substantiallyby 2030. There will be a greater reduction of government school enrolment against private school enrolment, based on the reductions analysed in Chapter 1. This being the case, the phenomena of children gravitating to private schools will further accelerate. This is driven by parents' desires to get their children a good education, provide their children the best shot they can for succeeding in life and for them to master English, the world's business language. While government schools provide adequate education, resources must be put into increasing the brand equity of public schools and ensure it is on par with private schools. Quality parameters must be given priority; currently, the percentage of students in class 8 achieving a minimum proficiency level in nationally defined learning outcomes to be attained by pupils is 83.5% versus a target of 100%, as tracked in SDG4 under Quality Education. Adequate infrastructure has already been built up and the focus must now shift to quality by strategically reorienting the school department. At the same time, the private sector must be allowed to grow so parents have the choice. Government must guarantee education for all up to Class XII; currently, Karnataka's GER in Classes XI and XII is only 44.4%, as tracked in SDG4 under Quality Education. This must be available across all districts; a comprehensive study must be undertaken of schools in every district to ensure all districts are on par by 2025.

4. Government has three roles to play in education. First, that of a policymaker to ensure quality, access and affordability. Second, that of instituting acompetent accreditation agency and regulator independent of government to regularly accredit schools and ensure their quality is elevated continuously and poor-performing schools are given the resources to deliver better quality. Anindependent accreditation agency needs to place the same standards on public and private schools. The National Education Policy 2020 also provides for such a structure. Third, the education department can be restructured to deliver higher quality—independent of the policymaker and accreditation agency. In FY 20, 56.6% of all school children in Karnataka were enrolled in private schools, up from 48% in FY 13. The education department must be held to the same standard as private schools and colleges, with no compromise since the government spends an enormous quantum every year in the school sphere.

5. Higher education to nurture specialization and human capital development is exceedingly important in the knowledge economy.Karnataka's GER in FY 20 was 32, with women's GER at 32.7 having overtaken men's at 31.2 for the first time. While this is 5 points above the all-India average of 27.1, Karnataka is lagging behind other southern states, who are all above 35. Tamil Nadu (51.4) leads and is the only state with GER over 50, followed by Kerala (38.8), Telangana (35.6) and Andhra Pradesh (35.2)

(Table 24.4). The goal is to target a GER of atleast 50 by 2030, but Karnataka could aim for 60. With the current enrollment 8-year CAGR of 2.75%, projected enrolment in FY 30 is 28.7 lakhs. The 18-23-year-old population projects to 64.1 lakhs in FY 30 at a CAGR of -0.8% **(Table 24.5)**. With these two projected values, GER currently projects to 44.4 by 2030. Increasing it to 60 implies enrolment will have to reach 28.7 lakh in FY 30 with a CAGR of 5.8%. This effort will require active state facilitation.

Table 24.4: Gross Enrolment Ratio (GER) in higher education for India and major Indian states

State	GER	State	GER
West Bengal	19.9	Karnataka	32.0
Gujarat	21.3	Maharashtra	32.2
Rajasthan	24.1	Andhra Pradesh	35.2
Madhya Pradesh	24.2	Telangana	35.6
Uttar Pradesh	25.3	Kerala	38.8
All India	27.1	Tamil Nadu	51.4

Source: AISHE

Table 24.5: Projections of higher education enrolment and GER, and 18-23-year-old population Karnataka

Parameter	2011-12	2019-20	8-year CAGR	Projected 2029-30
Enrolment	17,60,964	21,87,892	2.75%	28,69,922
18-23 population	74,01,674	69,42,880	-0.80%	64,09,170
GER	23.8	32	-	44.8

Source: AISHE (projected by authors based on AISHE data)

Table 24.6: Karnataka college composition in 2019-20

College type	Number	Percentage
Private	2,793	70.3%
Private with aid	471	11.9%
Government	707	17.8%
Total	3,971	100.0%

Source: AISHE

In particular, the focus must be on all districtshaving high quality institutions, either private or public.In FY 20, 70.3% of the 3,971 colleges in Karnataka were private unaided, while 11.9% were private aided and the balance 17.8% were government (Table 24.6). Since a majority of Karnataka's colleges are private, the state can start a comprehensive scholarship program to ensure no student is denied access because of a lack of means. The number of colleges and quality can be driven up by strengthening the Higher EducationCouncil (HEC) which has done seminal work in ensuring a common academic calendar across the state and improving access.

Care must also be taken that all social groups are included in this growth driver. The social composition in Chapter 1 shows the Muslim community has the lowest enrolment (6.3%) compared to the population composition (13%), because of reported greater poverty in the community. A large-scale program for enrolling Muslim youth in college supported by scholarships is required so they can also satisfy their dream of a college education, as demonstrated by the community having the fastest growing enrollment rate among all groups at 7.75% compared to the 2.35% average. The elevated growth rate shows the hunger and needs to be supported. Other sections have done well, this strength is expected to continue. By 2030, if this trend continues and with help from the Muslim community, all groups will reflect their share of population in colleges. Access must be ensured through capacity and quality expansion.

6. In FY 20, Karnataka had 14,988 PhD scholars enrolled—7.4% of India's total, and 2.4 lakh post-graduate scholars enrolled—5.5% of India's total. The state must focus on driving these numbers higher and increasing its share by promoting institutes in STEM and social sciences subjects. More Institutes of National Importance and other eminent institutions must be started and supported, building deep specialization and subject focus. The state must also provide more scholarships for Masters and PhD scholars to incentivize its brightest, and others around the country, to study here than going abroad. A tenfold increase by 2030 must be targeted as this will drive research, knowledge creation and dissemination—valuable growth drivers in the knowledge economy. A dedicated corpus for research is also important; the budget shows the state only spends INR 30-60 crore a year on this which is inadequate to build a comprehensive research portfolio. Karnataka must enhance this to INR 250 crore in FY 23 and possibly INR 500 crore by 2025 and INR 1,000 crore a year by 2030.

Colleges and universities, public and private, can apply to this corpus for grants on a competitive basis for STEM and social sciences research. This corpus can become an important machine to foster research and innovation ecosystem, which is the single largest driver to drive human capital. Top universities in the state must all be provided adequate funding. Possibly, the system of block grants can be done away with, and a new system based on number of students and quality can be inducted. Students can be empowered to attend the college of their choice, and universities will have become student-centric and be subject to critical appraisal every year rather than get a block grant without appraisal. The HEC must improve accreditation and develop frameworks. It can pick ten institutes of eminence and high quality like IISc, Manipal, UVCE and work with them to enhance the quality of education and achieve a GER of 60. With declining 18-23 age group, the state must ensure access to high-quality education, make it globally competitive and train a workforce that can work across multiple industries across the state. The startup and IT industries combined will possibly need 15-20 lakh more employees over the next 5 years itself, and Karnataka must train and position its young population to capture these opportunities.

7. Regardinghealth, Karnataka currently scores 78/100 in SDG3 on "Good health and well-being" and ranks fifth in the country by state, behind Goa (86), Maharashtra (83) and Tamil Nadu (81). India's score is 74. The target for trained medical personnel (physicians, nurses and midwives) per 10,000 population is 45 while Karnataka hasbuilt adequate capacity at 70. India is below target at 37. Maternal mortality ratio (per 1 lakh live births) is 92 versus a target of 70 set in SDG3, while the under-5 mortality rate (per 1,000 live births) is 28 against a target of 25. India's numbers at 113 and 36, respectively.

94% of children in 9–11-month age group are fully immunized in the state against a target of 100 and 99.9% of deliveries are institutional deliveries—India is at 91% and 94.4%, respectively. Karnataka is well on its way to securing its citizens' health and wellbeing.

The state needs more infrastructure, particularly in the rural areas, with adequate access of primary, secondary and tertiary facilities. Of the 30 districts, many may require a large 500-bed multidisciplinary hospital that can cater to the needs of the community. These hi-tech facilities will also attract doctors and medical staff to work in small towns instead of moving to large cities in search of good hospitals. The state also needs primary health centres in every taluk/tehsil. The district hospitals and primary centres can be attached to medical colleges in the surrounding areas so medical students can rotate through the hospital and provide the required services. Today, rural citizens travel needlessly for tens of kilometres to access basic healthcare. Primary facilities can cater to the basic needs while the district hospital can attend to the more significant cases. Alongside infrastructure capacity,comprehensiveenrolment in the Ayushmann Bharatinsurance program is required so everyone can access secondary and tertiary care.

24.7 Economic Strategies

The economic needs of the hour are to rebalance the workforce, provide the population with high-growth and -income opportunities, improve the infrastructure and the ease of doing business. Over the last twenty years, roughly 1% of the agricultural workforce shifted to industry or services every year in India – reducing from 60% in 1999 to 43% in 2019, per World Bank. We must accelerate this to at least 2% per year amounting to 8% more Indians shifted by 2030. Agricultural production can manage and streamline with a lot fewer people, like China does.

A study of the Gross Value Output (GVO) by agriculture sub-sector presented in Chapter 1 clearly demonstrates that the contribution of cereals, and crops in general, to the GVO has reduced from 39.5% in FY 12 to 33.8% in FY 19. The crops sub-sector is growing at 7.6% CAGR while other sub-sectors like livestock, fruits & vegetables, and fishing & aquaculture are growing at higherCAGRs of 11.2%, 9.8% and 9.2%. Government must ensure that these farmers and agriculture producers, who are not supported by Minimum Support Price (MSP), accrue higher value add for their products thereby increasing their incomes. Karnataka's economic profile indicates only 20% of the workforce in agriculture maybe sufficient—with strategies to improve their value-add and incomes. The remaining agriculture workforce can be shifted to industry and services.

While shifting workforce, the following factors can be considered:

1. High value-add to the state economy comes from services sectors like IT and financial services, and high-value-added manufacturing like hardware chip systems design, pharmaceutical manufacturing, automobile engineering, electronics manufacturing, and others

2. Harnessing high value-add growth requires a skilled workforce for which states must focus on human capital development

3. The low-skilled or semi-skilled population is most effectively employed in labour-intensive manufacturing like garments, automobile and electronics assembly, and others. These industries can drive per-capita income, economic growth, and volume-export capabilities of the state.

It is clear that investments by the GOK in each of these three strategies – services, manufacturing, and construction – will yield highly beneficial second and third order consequences in jobs and earnings potential. This is further fuel for the urgency with which the GOK must aggressively pursue large-scale investments that will directly benefit its most vulnerable citizens.

While framing strategies here, it is useful to see the best-in-class models in each of the major sectors.

24.7.1 Best-in-class models

To accelerate Karnataka's growth to reach the USD 1 trillion target by 2032, growth across several sectors must be accelerated. Let us examine the best in-class in India. In these studies, only CAGRs between FY 15 and FY 18 of larger states have been presented with models that can be replicated in Karnataka. While several small states like in North-East are showing high growth in some sectors, their context is very different.

1. **Services:** Karnataka's services sector CAGR is 14.3%. India's top services states based on CAGR are Telangana at 14.9%, Karnataka at 14.3% and Andhra Pradesh at 14.2%. The average of these three states is 14.5%.Karnataka is already a Top 3 state in this sector (Table 24.7).

Table 24.7: Top 3 states in Services sector CAGR

Sectoral Gross State Domestic Product - Services (INR lakh)			YoY Growth
States	**2014-15**	**2017-18**	**3-year CAGR**
Andhra Pradesh	2,15,23,018	3,20,37,984	14.2%
Karnataka	5,17,91,812	7,73,44,374	14.3%
Telangana	2,86,01,072	4,34,66,868	14.9%

Source: RBI

The services sector includes (1) Trade, repair, hotels & restaurants, (2) Railways, (3) Transport (exc. railways), (4) Communication and broadcasting, (5) Storage, (6) Financial services like banking and insurance, (7) Real estate, ownership of dwellings & professional Services - which includes IT services, (8) Public administration, and (9) Other services.

The MOSPI CSO report indicates value-add for the sub-sector 'Real estate, ownership of dwellings & professional Services' is 70.6. IT services is subsumed under this head, and is largely responsible for a value-add of 70.6 - indicating that investment in growing IT services will pay off tremendously as value-add to the economy. This is because IT services has the advantage of mass employment of specialized workers with high pay. There is urgent need to track IT services separately given its contribution to the nation's GDP and potential for growth.

Share of Karnataka's IT services exports to India's IT exports is 38%. This is the reason Karnataka and Telangana have impressive CAGRs in services - because of the IT services sectors, and other technological drivers, centred in Bengaluru and Hyderabad.

Financial services like banking and insurance is another major growth driver for Karnataka. Banking and insurance is tracked separately, and growth in the sub-sector can be studied in detail.

2. **Banking & Insurance:** Under services, banking and insurance (or financial services in general) has large scope in Karnataka. The state's banking and insurance sector CAGR is 11.5%. India's top states based on CAGR are Rajasthan at 11.83%, Karnataka at 11.49% and Gujarat at 10.45%. Karnataka is already a Top 3 state in this sub-sector.

Table 24.8: Top 3 states in Banking & Insurance Sector CAGR

Sectoral Gross State Domestic Product - Banking & Insurance (INR lakh)			YoY Growth
States	**2014-15**	**2017-18**	**3-year CAGR**
Gujarat	44,81,687	60,38,097	10.5%
Karnataka	41,93,233	58,10,671	11.5%
Rajasthan	19,07,759	26,68,125	11.8%

Source: RBI

Given Bengaluru's growing position in the world's innovation and technology development ecosystems, with increasing incoming investment, this sub-sector has immense growth potential. The value-add for financial services, per MOSPI CSO, is a whopping 72. Karnataka can harness this to boost GSDP.

3. **Industry:** Karnataka's industry sector CAGR is 9.4%. India's top states based on CAGR are West Bengal at 13.58%, Gujarat at 13.28% and Telangana at 12.69%. The average of these three states is 13.2%.

Table 24.9: Top 3 states in Industry Sector CAGR

Sectoral Gross State Domestic Product - Industry (INR lakh)			YoY Growth
States	**2014-15**	**2017-18**	**3-year CAGR**
Karnataka	2,04,43,889	2,67,34,007	9.4%
Telangana	1,04,36,581	1,49,37,116	12.7%
Gujarat	3,87,49,839	5,63,27,116	13.3%
West Bengal	1,47,76,587	2,16,53,765	13.6%

Source: RBI

Industry sector includes sub-industries like Mining and quarrying, Utilities (electricity, gas, water supply, others), Manufacturing, and Construction. Manufacturing and construction have large potential to grow and boost the industry sector.

4. **Manufacturing:** Karnataka's manufacturing sector CAGR is 13.6%. India's top states based on CAGR are Telangana at 17.95%, Uttar Pradesh at 16.7% and West Bengal at 16.5%. The average of these three states is 17%.

Table 24.10: Top 3 states in Manufacturing Sector CAGR			
Sectoral Gross State Domestic Product - Manufacturing (INR lakh)			YoY Growth
States	2014-15	2017-18	3-year CAGR
Karnataka	1,20,08,490	1,76,14,475	13.6%
West Bengal	71,62,103	1,13,17,504	16.5%
Uttar Pradesh	1,05,12,538	1,67,02,625	16.7%
Telangana	54,53,348	89,48,830	17.9%
Source: RBI			

5. **Construction:** Overall, India's construction sector is growing slowly due to lack of urbanization and infrastructure development. MOSPI data indicates value-add of the construction sector in India is only 37.5. Karnataka's construction sector CAGR is 1.7%. India's top states based on CAGR are West Bengal at 11.5%, Andhra Pradesh at 7.35% and Maharashtra, at 5.36%. The average of these three states is 8%.

Table 24.11: Top 3 states in Construction Sector CAGR			
Sectoral Gross State Domestic Product - Construction (INR lakh)			YoY Growth
States	2014-15	2017-18	3-year CAGR
Karnataka	61,37,487	64,52,670	1.7%
Maharashtra	1,01,15,122	1,18,31,838	5.4%
Andhra Pradesh	45,32,380	56,07,400	7.4%
West Bengal	53,68,490	74,40,023	11.5%
Source: RBI			

Looking for better construction sector models elsewhere, China is a great case study. China rapidly urbanized from 26.4% in 1990 to 59.2% today. Urbanization significantly boosted the construction industry which grew at an average annual growth rate of 16.6 percent, according to the **National Bureau of Statistics (NBS) website**.

a. The value-added output of the industry reached 5.57 trillion yuan (about $816.6 billion) in 2017, compared with only about 13.9 billion yuan in 1978.

b. The value-added output of the industry accounted for 3.8 percent of the country's GDP in 1978, while the proportion rose to 6.7 percent in 2017

c. In 1978, China only had 52,000 km of railways in operation. The length increased to 127,000 km by the end of 2017, including 25,000 km of high-speed railways.

d. China has 130,000km of highways, the largest in the world, exceeding even the United States. It has been steadily adding 10,000km every year since 2011

Karnataka can follow China's construction model to great benefit. It has great scope to boost GDP. The construction industry has highest backward-linkage in terms of metal consumption, mass employment, and generation of taxes. Focusing on the construction industry will feed-forward into other sectors as well.

6. **Agriculture:** Karnataka's agriculture sector CAGR is 11%. India's top states based on CAGR are Madhya Pradesh at 20.6%, Andhra Pradesh at 13.4%, and West Bengal at 12.6%. The average of these three states is 15.5%.

Table 24.12: Top 3 states in Agriculture Sector CAGR			
Sectoral Gross State Domestic Product - Agriculture (INR lakh)			YoY Growth
States	2014-15	2017-18	3-year CAGR
Karnataka	1,08,95,900	1,49,19,900	11.0%
West Bengal	1,01,71,379	1,45,20,957	12.6%
Andhra Pradesh	78,89,822	1,15,11,734	13.4%
Madhya Pradesh	1,30,94,566	2,29,68,000	20.6%
Source: RBI			

Based on the best-in-class models, the following strategies can be applied in Karnataka's context to drive economic growth across all three major sectors.

With these best-in-class models, some of the key economic strategies that can accelerate Karnataka's growth are:

24.7.2 Boost agriculture sector via tech, branding, marketing and exports

While farmers growing cereals accrue 80-90% of the market price due to the government's MSP program, producers of non-cereal, non-MSP segments accrue much lesser of the value add—reportedly only 30-35%. This is because of the poor market linkages available to the farmer. If farmer realization in these non-MSP segments increases even by 20%, then one can estimate a significant improvement in their livelihoods and turnover.

Exports are another major expansion area for farmers. To put this in context, in 2021, the world economy was USD 94.8 trillion whereas India was USD 2.95 trillion. By orienting our agriculture sector towards exports, farmers have the opportunity to capture the world market—leading to a significant 32x expansion opportunity, compared to the domestic economy of USD 3 trillion. Agricultural exports from India today are around USD 50 billion. Karnataka's export of flowers through the auction centre and KIAL airport has grown well. Karnataka must create a brand for fruits, vegetables and other products in global markets and create the necessary supply chains. This requires backend investment to train farmers in aggregation, grading, sorting, packaging, creating the required trust mark, and finally linking the products to the export market. These linkages include certification agencies to ensure organic produce which obtains a higher price globally is accepted and trusted by overseas consumer markets. The export orientation effort can also involve agri-tech platforms, which are have proven their ability to multiply farmer earnings. Karnataka needs a comprehensive Agriculture Export Strategy that accounts for all these factors.

Technology offers great solutions to increase market linkages, and in branding and marketing to (a) increase the overall visibility and market reach of the sector and value add of agricultural products, and (b) connect the farmers and producers directly to the consumer market so they can accrue a higher value add.

Some technology-enabled strategies are

1. **Invest in Agri-tech to connect farmers directly to markets:** Over the last 5-7 years in Bengaluru and other cities, 500+ agri-tech companies have formulated and validated tech-enabled strategies for farmer empowerment. These platforms encompass real-time market intelligence, post-harvest intervention and storage capabilities, price forecasting, D2C offerings, competitive financing and insurance, and market linkages. Their use has resulted in 20%-25% more income for farmers, instant payment via COD and UPI, low wastage, and other significant benefits. GOK can consider an INR 1,000 crore fund to invest in 500+ agri-tech companies that develop platforms and tech-enabled strategies to connect farmers all across the state to markets and supply chains.

2. **Use of technology platforms to deploy strategies at scale:** Apart from agri-tech platforms, the government can deploy technology stacks to improve the growth and value add of the agriculture sector. Export-orientation will require grading, sorting, quality control, efficient harvesting, access to markets and supply chains, and the ability to realise competitive prices. Here, technology and real-time information platforms are foremost enablers to train farmers and give them the tools to perform these functions effectively. Further, with the agriculture profile rapidly changing, farmers can diversify their products to increase income, mitigate risk, and access export markets. This will require training on multiple crop inputs, growth cycles, supply chains, farm management, quality assessment, and other crucial factors. It is no longer viable to have one agri-policy for a whole state or even a district. Each taluk must have a differentiated plan based on climate and crop conditions, storage facilities, and market linkages, and every farmer must be empowered to pursue a differentiated strategy driven by technology.

3. **Specific export strategies like Flower Market in Bangalore:** Just like the successful Flower Market export vertical, Karnataka needs to create 100-500 morespecialized export strategiesdriven by its agriculture produce profile.

4. **Create a global brand for Karnataka Agriculture to improve realization:** Karnataka needs a massive, recognizable brand makeover that capitalizes on existing food trends all over the globe. For example, Thailand has a well-known national brand. Thai restaurants all over the world subscribe to this brand and procure unique spices, vegetables and rice from the motherland exclusively. Likewise, Karnataka can build a cohesive brand that can fuel its exports and increase its standing as an exporter of unique Indian products.

5. **Food processing for higher value add:** Top Agri-export economies like the USA, European countries like Germany and the UK, and China balance their exports of natural produce with processed products that are higher value add. These products are efficient to make in mass, are less perishable than produce and fetch higher prices. Karnataka needs more investment in food processing to capture local and

global markets. The Mega Food Parks initiative in India based on a cluster approach aims at maximizing value and minimizing waste. More investment is required to enhance the capabilities of the currently-operational food parks and to build more in Karnataka.

24.7.3 Boost manufacturing and exports via labour-intensive industries

Labour-intensive industries (LIIs) are the best way to provide gainful employment to a large transitioning rural population. With focused skilling programs, LIIs will offer excellent income opportunities to the incoming population. Even a lower wage than cities will go a long way towards quality of life, especially since living costs are lower in towns. Women, who are not as mobile as men, can also now find employment near their villages and towns, commute and earn a living. Karnataka's manufacturing employment as a percentage of total employment is only 11.74% and can be increased rapidly with a suitable LII mission.

China has successfully used LIIs to boost its economy and exports while providing mass employment to its large population. Reports indicate China shipped USD 2.591 trillion worth of exports in 2020[1] around the world to various markets. This translates to per-capita export of USD 1,850 for each of China's citizens in its large population of 1.4 billion. A majority of these exports come from China's LIIs, where China has successfully provided mass employment to its large population.

An analysis of China's top ten exports in 2020 valued at USD 2.591trillion gives us an indication of which industries to set up and cater to global demand, and capture market share: (% of total exports)

1. Electrical machinery & equipment: USD 710.1 billion(27.4%)
2. Machinery including computers: USD 440.3 billion (17%)
3. Furniture, bedding, lighting, signs, prefab buildings: USD 109.4 billion (4.2%)
4. Plastics, plastic articles: USD 96.4 billion (3.7%)
5. Optical, technical, medical apparatus USD 80.2 billion (3.1%)
6. Vehicles: USD 76.3 billion (2.9%)
7. Miscellaneous textiles, worn clothing: USD 75.6 billion (2.9%)
8. Toys, games: USD 71.5 billion (2.8%)
9. Articles of iron or steel: USD 71.1 billion (2.7%)
10. Clothing, accessories (not knit or crochet): USD 62.3 billion (2.4%)

1 https://www.worldstopexports.com/chinas-top-10-exports/

Since China's living costs are skyrocketing, so are the labour costs. Industries like garments are slowly starting to shift elsewhere in Asia. Currently economies in South and Southeast Asia like Bangladesh, Vietnam and Indonesia are capturing this shift. Karnataka must build excess capacity and boost exports to capture the markets vacated by China.

Karnataka possesses the geographical trade advantage here as well. Its proximity to the Suez Canal, and access to high-volume markets like Europe and East Coast of the USA – compared to Southeast Asia – means with excess capacity, it can easily capture these markets. The Mangalore port is the deepest inner water harbor on the west coast and can be developed to handle large trade volumes to complement the growing industry ecosystem. The Karwar port can be developed to supplement capacity. By focusing on the right type of industries, this move will boost Karnataka's manufacturing sector GVA and export capabilities:

a. Garments
b. Fabrication
c. Electronics assembly
d. Automobile assembly
e. Electrical machinery & equipment
f. Machinery including computers

Industry clusters can be developed throughout the state, and connected to Bengaluru and the coastal ports via high-speed railways and road transport facilities. The clusters can be centred largely in North Karnataka to provide the populations there with high-growth mass employment opportunities and facilitate the workforce shift from agriculture to industry. The state already has a strong MSME base of 70,000 registered companies with a 17,000-strong factory and heavy engineering base.

Karnataka was the first state to produce a Labour-Intensive Industry policy, which must now be backed with implementation heft and targeted objectives to reach the 2030 goals. The Invest Karnataka group can be activated and developed to deploy resources, much like the Economic Development Board of Singapore.

24.7.4 Boost construction sector via increased infrastructure spending

The construction industry in Karnataka was INR 96,354 crore in FY 22, contributing only 4.7% to GSDP. Even in a pre-pandemic year of FY 20, the construction industry was INR 81,929 crore, contributing 5.1% to GSDP. It is a highly underutilized growth driver, not just in the state but all over the country, and has great scope to boost economic growth. The construction industry has highest backward-linkage in terms of metal consumption, mass employment, and generation of taxes. Focusing on the construction industry will feed-forward into other sectors as well, like manufacturing and production, export and trade. The China model highlighted above can be deployed in Karnataka.

Karnataka's infrastructure spending must increase massively. This could include:

a. **Suvarna Karnataka 8-lane expressway:** A state-of-the-art 8-lane expressway from Bidar to Bengaluru, with access to the Mangalore and Karwar ports, and a high-speed railway line in the middle will transform Karnataka's economy. It will increase the

speed of passengers and goods, can connect all the industrial clusters to Bengaluru and the ports, and massively improve Karnataka's EoDB.

b. **Rural road connectivity:** Central funding and loans from large-scale development banks can be utilized more for connecting all of Karnataka with high-quality roads. This will boost urbanization, industrialization and exports as well by connecting the hinterland with markets.

c. **Railways and freight corridors:** Building a solid railway network with increased carriage speed will improve carriage of goods and people across the state.

d. **Public transportation like Metro and bus services:** Metro and other public transportation can be a big infrastructure spend with the highest return-on-investment. Apart from increasing Metro footprint in already crowded cities like Bengaluru, the key is to get ahead of the game in smaller towns all over Karnataka and start building the Metro there right now since more and more people are heading to urban areas in search for opportunities. A combination of Metro and buses, preferably EV, can be designed in small towns.

e. **Ports:** Karnataka has 320km of coastline. The Mangalore port is the deepest inner water harbor on the west coast and can be developed to handle large trade volumes to complement the growing industry ecosystem. The Karwar port is also functional and can be developed further along with other ports to help Karnataka boost its trade capabilities. Its proximity to the Suez Canal, and access to high-volume markets like Europe and East Coast of the USA, can be used to better position itself as a global trading hub.

f. **Seaside living spaces:** Many coastal stretches of Karnataka are empty. Building lovely seaside living spaces with parks, public spaces, cultural venues, housing complexes, and so on, will give transform the local economies. Shanghai has done this successfully with its riverfront spaces on both the Shanghai and Pudong sides.

g. **Infrastructure for tourism:** Karnataka has many historical and cultural places that can be developed as tourism magnets – Hampi, Belur, Halebeedu, Mysuru, and several along the coast. Developing a structured tourism network around these places, and networking them with roads, railways and airports will also boost the tourism industry.

h. **Airports:** The Bengaluru airport, KIAL, is processing record numbers of both passengers and cargo. While the second terminal is under construction, it would be prudent to plan another expansion soon with multiple terminals and runways. The air traffic to Bengaluru will only rise, and facilities must keep pace. Development of smaller airports around the state, like Mangaluru, Belagavi and Kalaburgi will help divert traffic from Bengaluru and assist in the expansion of the state's capacity for passengers and cargo. Looking at China, many major airports have received the go-ahead to build a third runway and increase seating capacity by forecasting the demand to 2030. In parallel, new airports are being commissioned all over the country to provide additional capacity using forecasting beyond 2030. Major US airports have at least 3-4 runways, with Chicago and Dallas at 7 runways each.

i. **Low-cost housing:** Housing is one of the biggest spend areas under infrastructure. It can have the highest multiplier effect – economically, socially, and culturally. There is huge scope for growth in this area.

Increasing infrastructure spending and commissioning projects all over the state also has the advantage of providing mass employment in the construction sector in the state.

24.7.5 Systematic urbanization

Urbanization aggregates human activity - aggregation leads to specialization, specialization to increased productivity; enabling greater availability of goods, delivery of services, increased wages, and job opportunities. Karnataka, at 38% is above the 31.1% average urbanization in India; other states are aheadlike Tamil Nadu at 48.5%, Kerala at 47.7%, Gujarat at 43% and Maharashtra at 45.2% (on the basis of 2011 census). Today in 2022, it is possible the state is 43-45% urbanized. The world on average is at 55.3% while India lags at 34%, as shown in Table 24.13. Karnataka could harness more potential by systematic urbanization and development of these urban areas into engines of growth.

Table 24.13: Percentage of urban population from regions around the world

Region	Urban Population %
USA	82.3%
Europe	74.5%
China	59.2%
World	55.3%
Africa	42.5%
Karnataka	38.0%
India	34.0%

Source: World Bank

Let's examine India's development model. India has been slow to urbanize because of the fixation on being a village-based society. Most planners still look to Gandhiji's sentiments on this topic – 'The future of India lies in its villages', he said in 1947. This is no longer true - complexity has increased, people's economic needs and aspirations have grown, and it is impossible to supply adequate resources to India's six lakh villages. Keeping India's population in villages while being unable to meet their economic needs has resulted in high inequity.

As shown in Chapter 1, the income differential in India is very high, the ratio being 1:2.2:3.5 for the average wages of dependents on agriculture to industry to services. Karnataka's skew is even higher, at 1:2.6:5.1. Left unaddressed, this large group of agricultural dependents will always be condemned to a sub-aspirational existence - with increasing distress and perpetually dependent on subsidies from the Government. The income differential is also causing large-scale migration towards India's few engines of growth, like Bengaluru.

Though Karnataka is ahead of the curve here, 2011 census indicates there are 29,390 total villages in Karnataka out of which 27,028 villages are inhabited. 2,362 villages are

abandoned, presumably due to migration towards Bengaluruand other areas of growth and employment. Moreover, it is unsustainable to provide adequate resources to 27,000 villages. Instead, Karnataka could benefit from systematically shifting more people from rural to urban areas.

In Karnataka, the 2011 census indicates there are 281 towns/cities housing 38% of the population. Of these, 22 towns have a population over one lakh and only 1 city of over ten lakhs. On subtracting these, the remaining 258 towns must have significantly lesser populations than the average. The upcoming 2021 census will inform us of the current situation.

Census town data must be used to suitably identify around 200 smaller towns all over Karnatakaand develop them to absorb the rural-to-urban shift sustainably. GoI's Smart Cities initiative has identified 7 cities in Karnataka so far, focusing on roads, solar, water, and control centres. Development of towns in poorer districts can be connected to a dedicated Aspirational District Program as well. Both Central and State funding must focus on expanding to 200 towns, while incorporating four critical aspects:

a. **Infrastructure and connectivity:** While developing the 200 towns, From the planning stage, it is essential to prioritize providing infrastructure like roads and airport access, internet connectivity, and other amenities. Not only is state-of-the-art infrastructure crucial for quality of life, it also provides the logistical backbone for a productive industrial environment. Infrastructure development has been discussed above.

b. **Labour-intensive industry (LII) clusters:** Creating many LIIs in and around the 200 towns is the best way to provide gainful employment to the transitioning rural population. It is more competitive to have industries in rural areas than in urban cities where capital and skilling costs are very high. This point is discussed above.

c. **New sustainable technologies:** While urbanization improves delivery of services, it poses several challenges like congestion, restricted mobility, high waste production, and pollution. These are solved problems, however, in many parts of the world. Karnataka must invest in a specialized workforce to study state-of-the-art technologies and implement them. The newly developed towns will have the advantage of getting sustainable infrastructure - renewables like solar panels and wind turbines, planned tree cover, water treatment facilities based on plant-based technologies, integrated recycling, EV infrastructure, and public transportation with last-mile connectivity - integrated from the planning stage itself. Older cities will need careful planning to incorporate new technologies into unwieldy city plans.

d. **Planning for capacity:** Karnataka is already attracting significant incoming population – both specialized and blue-collar workers. The state has a large internal population already. It is necessary to plan projects for sewage treatment, airports, roads, and so on with at least a 20-30-year forecast with provisions for future expansion. Again, China paves the way – many major airports have received the go-ahead to build a third runway and increase seating capacity by forecasting the demand to 2030. In parallel, new airports are being commissioned all over the country to provide additional capacity using forecasting beyond 2030.

24.7.6 Aspirational District Program

There is significant variation between the incomes of Karnataka's districts, as demonstrated in Chapter 1. By accelerating growth of the weaker districts with special programs, their drag on the economy can be reduced. In this manner, overall growth will accelerate because these districts can grow faster than the rest of the state and contribute more.

NITI-Aayog's Aspirational District program (NAADP) is a great model to implement in the state The NAADP has picked 115 Aspirational Districts across the country and has built a system to track 49 key performance indicators across five broad sectors - health and nutrition, education, agriculture and water resources, financial inclusion and skill development, and basic infrastructure. The districts are allocated across NITI Aayog, the Home Ministry, and 12 other ministries, highlighting the importance of inter-ministry collaboration to develop these districts. Another highlight of the program is the collaboration of program partners to provide ground level support like the Tata Trust, Piramal Foundation, ITC, and L&T, as well as the Bill & Melinda Gates Foundation and IDinsight to conduct surveys. NAADP is already tracking significant progress in 17 districts.

Karnataka can launch a CM Aspirational District program based on NITI-Aayog's winning strategy. Since Karnataka is one of the most prosperous states in India, only 2 of 115 districts in NAADP are from Karnataka – Raichur and Yadagiri. With Karnataka's CM Aspirational District program, the strategy can be as follows:

a. Set up the program focusing on the 10-15 poorest districts

b. Ensure inter-ministry collaboration so each ministry can contribute according to their strengths

c. Use the NAADP structure to track progress

d. Collaborate with partners on the ground

e. Migrate useful learnings to develop the next 10 poorest districts

f. Accelerate infrastructure development, connectivity, and creation of labour-intensive industries to provide mass employment in these districts

24.7.7 Specialized hi-tech industries to drive high value-add manufacturing and exports

Labour-intensive industries and exports are valuable for providing mass employment and developing volume export markets.

This must be complemented with specialized hi-tech industries that have the advantage of higher value-add. These include a significant innovation and R&D component, which Karnataka already has a commendable install base of. Focusing on innovation spending like the US and China have will feedforward into growing new manufacturing capabilities, and domestic and export markets.

Some industries worth investing in are:

a. Electronics component design

b. Hardware design and manufacturing

c. Chip design and semiconductor fabrication

d. Genomics, biotechnology and bio-manufacturing

e. Renewable energy innovation, development and infrastructure

f. 3D printing

g. Robotics

h. Defence parts manufacturing

i. Medical devices

j. New materials innovation that can feed into construction, 3D printing, renewables, semiconductors, and others

A large corpus for research and productization of research is required. Karnataka must create a giant Fund-of-Funds (FoF) to incentivize research and start-ups in specialized industries. An INR 2,000 crore FoF per year over ten years will amount to a total of INR 20,000 crore. This is not large considering that technologyconstitutes 25% of GSDP. This investment will support building research laboratories and other auxiliary facilities with state-of-the-art infrastructure and equipment. Centres of Excellence (CoEs) for each of these industries can act as nodal centres. Finally, manufacturing facilities to make the products have to be built. The value of the investment will multiply thousand-fold.

24.7.8 Bengaluru: Global Hi-Tech City

Bengaluru is the jewel in the crown of Karnataka making up a significant component of GSDP, paying the majority of the taxes, and with the highest per-capita income amongst India's cities. The ecosystem ranks as one of the Top 5 in the world for innovation, technology development, research and development, and human capital. The city is India's IT capital, biotechnology capital, science capital, avionics capital, space capital and, in essence, the Hi-Tech and Innovation capital of India. It is imperative to develop the city and allocate the necessary resources for Bengaluru to achieve its potential as a global hi-tech city.

Currently, there are 2 lakh+ overseas citizens in Bengaluru, attracted by the opportunities the city provides. Bengaluru is home to 450+ research laboratories and 400+ of the Fortune 500 global companies have a presence in the city. It has an estimated 1 lakh+ PhDs across many specializations, attracted by the research and specialization opportunities. 2.5 lakh+ chip designer and testers work in 250+ companies, providing a human capital concentration for India's semiconductor initiative like no other. It also houses 30,000+ automotive software engineers and 15,000+ aeronautical engineers.

Atleast 2,500 companies in Bengaluru utilize artificial intelligence and machine learning to build indigenous platforms. Bengaluru is also a globally recognized biotechnology hub with world-class biotech accelerators, and IT hub housing some of the world's largest IT companies. The city has built a concentration of exciting, frontier technologists and engineers, and has culminated into the world's third-largest startup hub.

Increasing prosperity has led to severe infrastructure challenges. Due to high-income employment opportunities, Bengaluru has significant immigration, and the population is now 1.1 crore—the fourth largest in the country. The infrastructure development has not kept pace with the population growth, and this is stunting Bengaluru's potential as a global hi-tech hub on par.

The government must focus on improving Bengaluru's infrastructure with:

1. Improvement of the current roads
2. A fleet of 10,000 electric buses for public transport
3. 120 km of elevated roads to relieve traffic
4. 100km of peripheral ring roads
5. Build a total of 250km of Metro to increase the capacity to 30 lakh people per day
6. Suburban rail to complement the other public transport modes
7. Expand research hubs

This investment will pay off a hundred times when the productivity of Bengaluru's workforce accelerates as a result. With this, Bengaluru can produce 15 lakh high quality jobs over the next five years, increase its software exports to USD 100 billion by 2027, and overtake Silicon Valley as the world's largest pool of software talent amongst other specializations.

24.7.9 IT Services

IT services is a sector with one of the largest value-adds. MOSPI data indicates the value-add in 2017-18 was 70.6. IT services is another level with massive feedforward effect. India today exports USD 170 billion worth of software.

Karnataka already has a top IT services sectors, that can be carefully expanded to improve value add to GDP as well contribute more to the India's IT export capabilities. Today, Karnataka contributes a whopping 38% to India's IT exports of USD 170 billion, amounting to USD 65 billion alone, growing at 10-12% p.y. It has created 21 lakh jobs in Bengaluru alone as of date. Over the next five years, the industry combined with the startup ecosystem can create 2.5-3.5 lakh high-skilled jobs.

While building a robust formal education pipeline, Karnataka can bring focus to IT-related education streams. By following training models laid out by Infosys and other IT giants, the students in these courses must be trained to global standards. Industry participation here is crucial.

In addition, the world of IT is changing rapidly with advancements in multiple interdisciplinary fields. Karnataka could take the lead here in building Centres of Excellence in all these areas, with state-of-the-art laboratories, resources and top talent. Some fields where CoEs will change the landscape of the state's IT services are:

a. Artificial intelligence

b. Machine learning

c. Blockchain

d. Cybersecurity

e. Internet-of-Things

f. Enterprise automation

g. Agri-tech, and others

This will ensure the state's success in IT for decades to come. China and US are both great models here – both countries have invested a significant amount to ensure they hold the research pipeline in all these areas. This investment is adding to their intellectual property portfolios as well as attracting top talent from around the world.

24.7.10 Invest in start-up Ecosystem

The future is in the innovation-driven knowledge economy, led by start-ups. India is witnessing the meteoric rise of a robust start-up ecosystem. The country is home to the third largest start-up base in the world. Today, India has 60,000+ start-ups, having raised a cumulative USD 112 billion between 2014 and 2021—of which USD 40+ billion was raised in 2021 alone. The ecosystem has a collective value of USD 450+ billion today. India has the third-largest number of unicorns (companies with over USD 1 billion in valuation) in the world—85, of which 42 reached that valuation in FY 21.

It is estimated that by 2025 or 2026, India will have 100,000 start-ups and employ 3.25 million people. With these numbers, India will stand at number 2 after the US. These start-ups have the potential to reach a market value of USD 500 billion in 2025 and the ecosystem is on track to yield 100 Unicorns or USD 1 billion+ companies.

India already has a robust private investment ecosystem with 250+ accelerators and incubators, 500+ institutional investors, and 2,000+ active investors. However, Indian capital is a small percentage of the total investment, with foreign giants increasingly coming in to capitalize on India's exponential growth. 10% of the total inbound capital is estimated to be domestic. With foreign players owning most of our data and platforms, there is urgent need for more Indian capital to be infused into the system. This is where governments like Karnataka's can change the game.

Karnataka is already the leading state in the ecosystem. With its strengths in finance, IT services and other high value-add areas, start-ups in these areas are quickly growing into market leaders in the state and country. They are even making their mark globally.

Bengaluru constitutes a whopping 40% of the Indian startup ecosystem. It is a top destination for seed stage funding, for growth stage funding and for the largest number of unicorns, at 34 (of India's total of 85). In FY 21, the city processed 551 deals raising a cumulative of USD 21.3 billion (half of India's USD 40 billion). It also houses the largest number of Venture Capital funds, beating both the national capital Delhi and the financial capital Mumbai to become the indisputable Innovation Capital of India.

Karnataka must create a Fund-of-Funds (FoF) to invest in and grow start-ups. An INR 5,000 crore FoF will provide a solid foundation for Indian start-ups to grow. Some focus areas for the FoF can be:

a. FinTech start-ups

b. IT start-ups

c. Enterprise Tech

d. Deep science start-ups in health, water, agriculture, semiconductors, etc.

e. Logistics and supply chain

24.8 Conclusion

Karnataka is one of the foremost states and can decisively lead India towards its vision of USD 10 trillion in the 2030-32 timeframe. It is a resource rich state, has a robust revenue base, has prudent fiscal management and political stability. Bengaluru is a top technology hub in the country and amongst the Top 5 in the world. Karnataka has certainly done extremely well in the past.

What Karnataka needs now is a focused strategy based on its unprecedented demographic changes. It must invest in developing the skilled citizenry required for the technology-led knowledge economy-driven growth this decade and beyond. The state has to deploy strategies and investment in enhancing the income of its farmers, in the socio-economic growth of it poorest districts,and in ensuring every citizen has a good quality of life and social security. The state must build state-of-the-art infrastructure for the future centered around innovation, research and development which are the fundamental blocks for the next fifty years of strong growth.

Bengaluru is the jewel in the crown of Karnataka. It has the highest number of technologically trained people as a percentage of its population. To realize its full potential, the city requires massive investment to improve quality of life and productivity, and to take its rightful place as a foremost tech and research centre in the world.

The state is also in the midst of a significant urbanization process which needs to be accelerated with investment in smaller cities. Karnataka has to reorient and reimagine itself, to reach the USD 1 trillion economy vision by 2032. The dream should be, with the accelerated socio-economic growth trajectory,every citizen has a good quality of life, good income and good access to jobs and every young person has access to quality education so they may seek suitable employment.