STRENGTHENING EXPORTS FROM KARNATAKA

Working Paper No: 99

India Exim Bank

EXPORT-IMPORT BANK OF INDIA

WORKING PAPER NO. 99

STRENGTHENING EXPORTS FROM KARNATAKA

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March 2021

CONTENTS

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LIST OF EXHIBITS

LIST OF TABLES

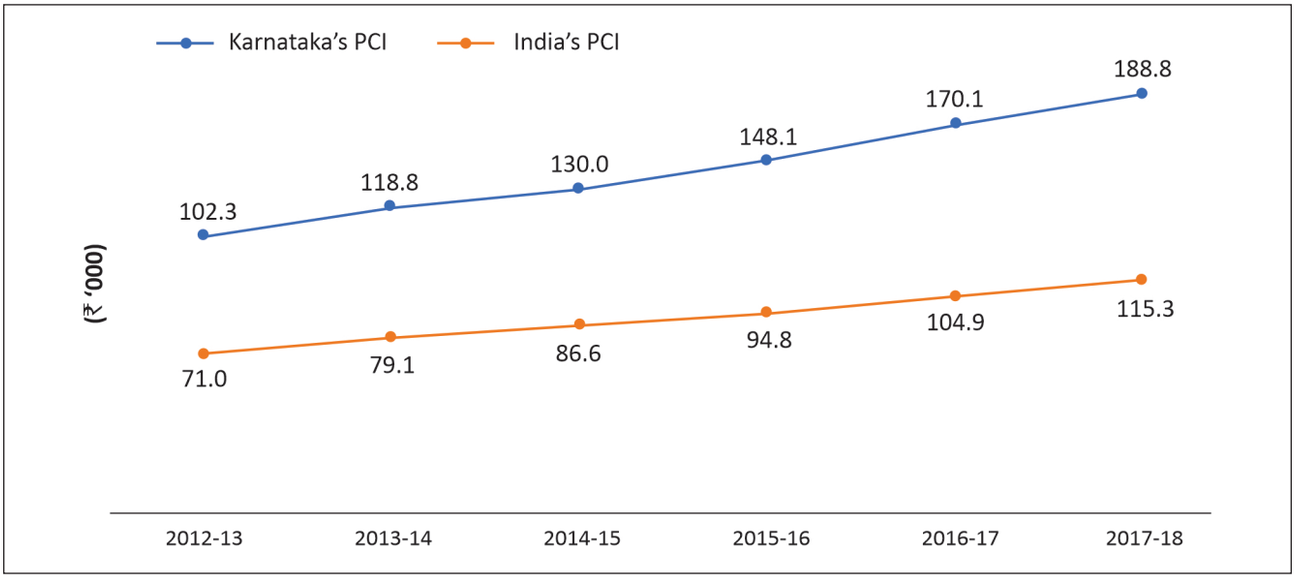
LIST OF BOXES

EXECUTIVE SUMMARY

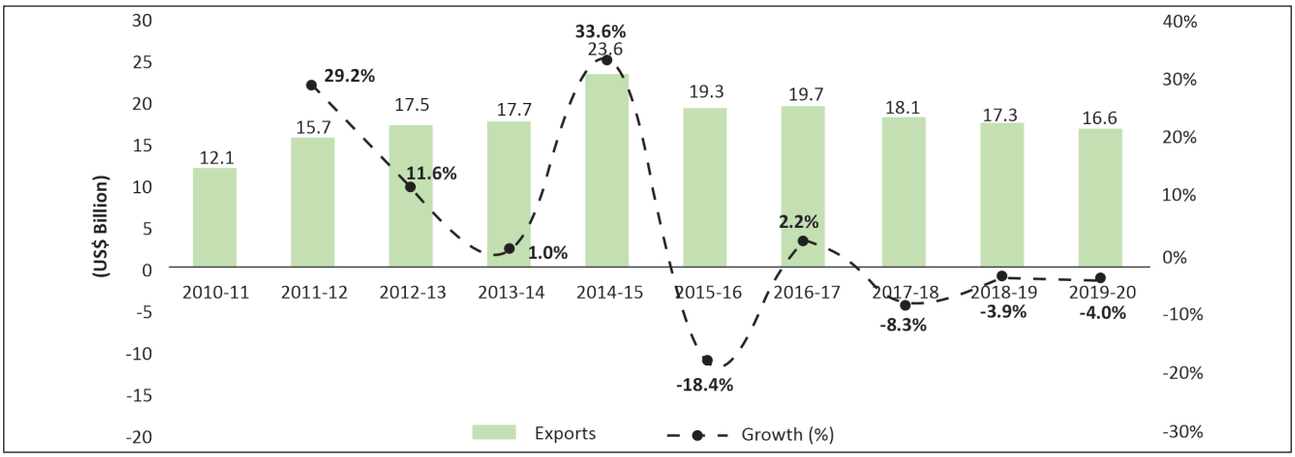
Over the last few decades, the State of Karnataka has been on the forefront of India's economic growth, transitioning from a primarily agrarian State to emerge as the Silicon Valley of India. With a share of 8% in 2018-19, Karnataka was the fifth highest contributor to India's GDP of ₹ 140.9 trillion, after Maharashtra (14.5%), Tamil Nadu (8.6%), Uttar Pradesh (8.4%) and Gujarat (8.1%). Remarkably, the per capita income in Karnataka has not only risen, but has also exceeded the national average during the period 2011-12 to 2019-20.

Karnataka has emerged as a technology, services, and knowledge hub of the country drawing a niche for itself. This largely gets explained by the plethora of job opportunities in the State, leading to migration of labour from across the country to Karnataka.

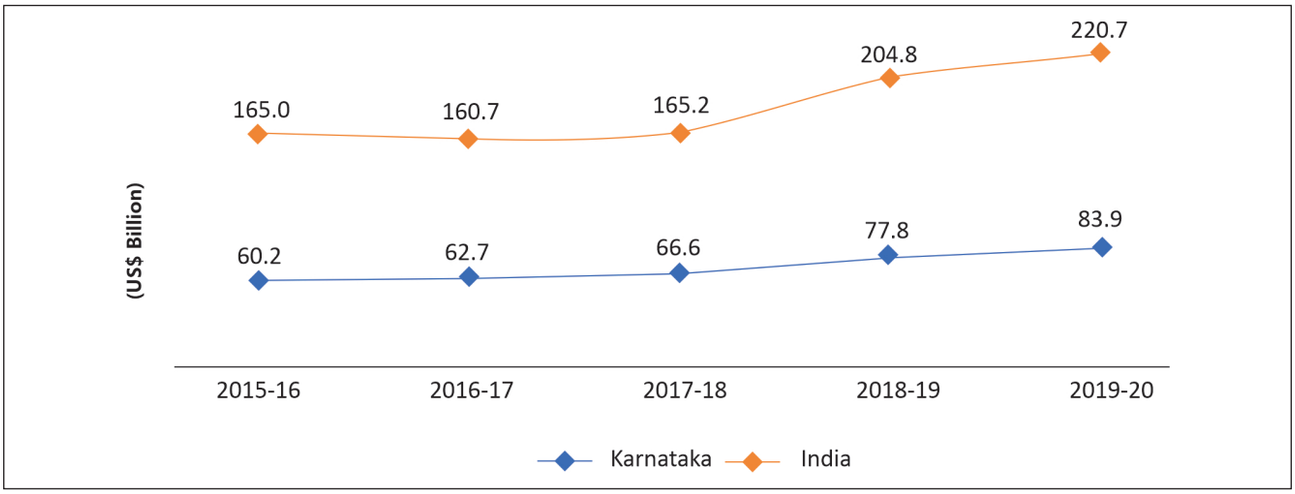
Karnataka's Per Capita Income (PCI) has remained higher and grown faster than that of India's during 2011-12 and 2019-20



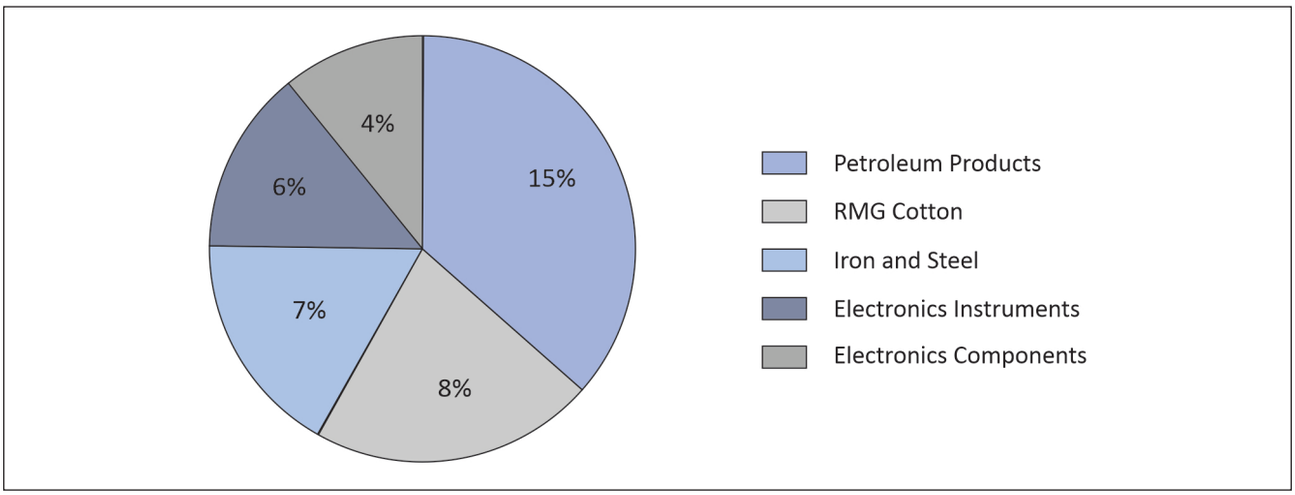
Karnataka's merchandise exports have registered a negative year-on-year growth during 2018-19 to 2019-20, after a modest recovery in 2017-18



At 38%, Karnataka has grown to have the highest share in India's Software and Services Exports



Share of top-five export items in Karnataka's total merchandise exports was about 40% in 2019-20, as against 60% in 2018-19



Source: DGCI&S; India Exim Bank Research

As regards foreign trade, in the last two decades, Karnataka has emerged as a key player in the export of electronic and computer software, engineering goods, readymade garments, petrochemicals, gems and jewellery, agro and food processing products and chemicals, apart from its traditional exports of coffee, silk, spices and handicrafts.

Merchandise exports from Karnataka in 2019-20 were valued at US$ 16.6 billion, a year-on-year decline of 4.04% from US$ 17.3 billion in 2018-19. Among the services sector, software services constituted a major share in Karnataka's exports. During 2019-20, while the share of Karnataka's merchandise exports in the national exports constituted around 5.3%, the share of software exports was recorded at 39%. It may be noted that even though the merchandise exports during the five-year period, 2015-16 to 2019-20, registered a negative AAGR of (-) 3.5%, there is room for achieving substantially higher growth through optimal utilization of the State's resources across the domains in which the State enjoys better competence and a relative comparative advantage.

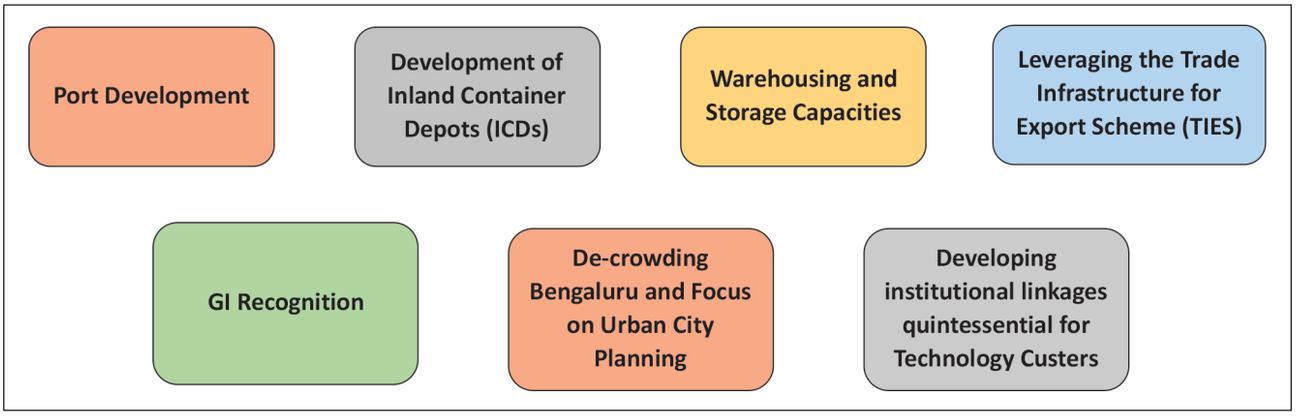
This Study also provides a holistic outline for enhancing trade competitiveness, identifying focused sectors and products for attracting investments and for promoting exports, and strengthening the institutional capacity for exports, among others, towards catalyzing export led economic growth in the State. It may be noted that both the merchandise and services exports cumulatively contributed to about 40% of the Karnataka's GSDP in 2019-20, largely driven by the exports of electronic, computer software and biotechnology.

The State's vast and diversified resource base has enabled it to become a reputed destination for investors worldwide. A few State-specific factors that have made Karnataka a preferred choice for both domestic and foreign investors include abundant availability of skilled manpower, knowledge output and diffusion, connectivity within the State and outside, and an entrepreneurial and innovative spirit.

Karnataka attracted FDI inflows worth US$ 8.9 billion in 2019-20, which was 17.9% of the total FDI inflows in India during the year. In fact, the State was the second highest recipient of FDI inflows in India next to Maharashtra which received FDI of 10.8 billion.

A well-developed and resilient export infrastructure in the State, by improving regional connectivity helps in reducing the logistics costs significantly, and thereby facilitate exports. Apart from making the State's own exports more competitive in the international markets, development of export infrastructure can play a crucial role in re-routing the foreign trade flows of neighbouring states via Karnataka. Going forward, following are the key areas that could be worked out for creation of new facilities and upgradation of existing export infrastructure in Karnataka.

Improving Export Infrastructure



Source: India Exim Bank Research

The Study sets an export target ranging from US$ 21 billion to US$ 35.3 billion by 2024-25, for merchandise under different scenarios, with the base level exports being US$ 16.6 billion in 2019-20. On the other hand, the software and services exports from the State can reach up to can reach up to US$ 150 billion by 2024-25, as per the target set by the Karnataka Government, up from US$ 83.9 billion in 2019-20 (as per the Karnataka Digital Economy Mission).

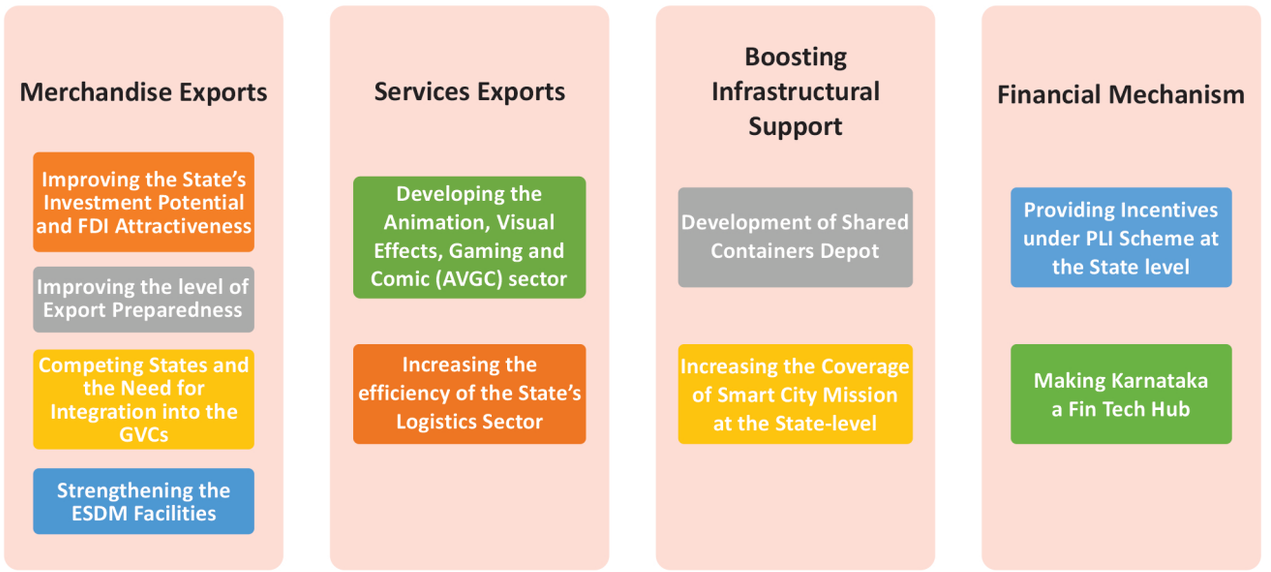
Export Targets for Karnataka: 2024-25

Merchandise (i) Possible Scenarios	Merchandise (i)		Software and Services (ii) Possible Scenarios	Software and Services (ii)		Overall Projections (i + ii)
	(US$ Billion)	Required CAGR (2019-20 to 2024-25)		(US$ Billion)	Required CAGR (2019-20 to 2024-25)	(US$ Billion)
Actual	**16.6**	**–**	**Actual**	**83.9**	**–**	**100.5**
If the State's merchandise exports continue to grow at its AAGR of last 10-years (2010-11 to 2019-20)	21.0	4.8%	If State's software and services exports continue to grow at the same 5-year AAGR 2019-20	127.3	8.7%	148.3
Should India's merchandise exports reach US$ 666 billion, and Karnataka retains its 5.3% share in India's merchandise exports	35.3	16.3%	Should Karnataka's software and services exports reach US$ 150 billion by 2024-25, (as targeted in the State's Digital Economy Mission)	150.0	12.3%	185.3
India achieves US$ 500 billion of merchandise exports and Karnataka retains its share in India's merchandise exports	26.5	9.8%	Karnataka to achieve US$ 100 billion of software and services exports by 2024-25	100.0	3.6%	126.5

Source: India Exim Bank Research

Going forward, following are the suggested measures for enhancing Karnataka's exports of goods and services.

Strategies for Enhancing Karnataka's Exports



Source: India Exim Bank Research

Merchandise Exports

Improving the State's Investment Potential and FDI Attractiveness

It is suggested that the share of development expenditure in the State's total expenditure must increase to attract investments. In 2018, while the share of development expenditure[1] in Karnataka's total expenditure was reported at 69.7%, the same was much higher in States like Chhattisgarh (100%), Rajasthan (98%), Telangana (78.2%), and Haryana (81.4%). As has been noted previously, an investment friendly ecosystem is likely to invite more FDI and motivate the firms to manufacture and export globally from Karnataka.

With the FDI inflows worth US$ 8.9 billion in 2019-20, Karnataka is ranked second among Indian states; however, the state has received just half of that received by Maharashtra, during the same year. Further, while Karnataka retained its overall ninth rank in the NCAER's State Investment Potential Index 2018 (N-SIPI), the State lagged behind under the land and infrastructure pillar. In fact, under the land pillar, Karnataka's score was lower than India's average in 2018. The primary reason for the relatively lower score in the land pillar was the difficulty in getting land approvals in the State.

According to the N-SIPI industrial survey, the percentage of respondent firms facing moderate to severe difficulties in land approvals were the highest in Karnataka as compared to other states.

Improving the level of Export Preparedness

With a score of 55.17 in the Export Preparedness Index (EPI) of NITI Aayog, Karnataka ranked at ninth position. Even though the State ranked third in the category of coastal states, Karnataka's overall score was significantly lower than some of the competing states like Gujarat (75.19), Maharashtra (75.14), Tamil Nadu (64.93), and Odisha (58.23), among coastal states, and Telangana (57.43) and Haryana (56.03) among non-coastal states.

[1] NCAER's State Investment Potential Index 2018: Development expenditure comprises of expenditure on education, sports, arts and culture, food, storage and warehousing, relief on account of natural calamities, and rural development. The parameter is used to indicate state economic activities and efforts of the state government in promoting sustainable economic development across all strata of the society.

Out of the four pillars taken into consideration to arrive at the overall index of export preparedness in the EPI 2020, Karnataka scored the least in the Export Performance Pillar , indicating relatively lower growth of exports and lower export diversification. Going forward, apart from focusing on the overall export growth from Karnataka, it is also crucial to monitor other parameters, like the number of exporters in the State, and the export to GDP ratio, that have underperformed in comparison to other ten Indian states with similar per capita GSDP.

Further, it may also be noted that Karnataka lagged in terms of R&D infrastructure, as per the EPI 2020. At a sub-segment level, the State scored relatively low across crucial indicators, like presence of inspection agencies, NABL labs, and research institutes in the State, when compared to rest of the country. In addition, Karnataka was reported to have been faced with other challenges, viz., power availability and trade support provided by the Government.

Competing States and the Need for Integration into the GVCs

This Study proposes that with the inherent advantage Karnataka has across the sectors, e.g., semiconductors, electronics, and textiles, integrating into the global value chains would be as important as addressing the exports of final goods from the State. Such an approach would not only enable the manufacturers of the State to specialize across various stages of production, it also would well-position the State on the global trade map. It is to be noted that apart from enhancing the overall efficiency, GVCs provide the opportunity for technology transfer or spill over to developing countries through local learning.

Strengthening ESDM Facilities

The rapidly growing Electronics System Design and Manufacturing (ESDM) sector in Karnataka offers immense opportunity for domestic value-addition and integration into critical GVCs. Going forward, Karnataka's ambitious i4 policy, along with the current Karnataka's ESDM Policy 2017-22, could also be leveraged to boost investments along the various stages of value-chains of the ESDM sector in the State, thereby increasing the domestic value-addition in manufactured exports.

It is suggested that focus should be laid on engaging more extensively in stages that involve relatively higher value addition, like design and manufacturing, as against the low-end assembly lines. In addition, organization of mega electronics events like "Electronics Telangana", as envisioned in Telangana's ESDM Policy 2016, could be initiated in partnership with the industry.

As a part of the initiative, the Government of Karnataka could encourage investments through viability gap funding and marketing activities, apart from providing assistance to industry players through designated liaison officers as point of contacts to simplify the investment processes.

Karnataka may also consider introducing a focused dimension in its ESDM Policy, taking inspiration from Madhya Pradesh's Analogue Semiconductor Fabrication Investment Policy (FAB Policy), which is targeted on the development of FAB units in the State. As per the MP's FAB Policy, an investment benchmark of ₹ 30 billion has been set for enterprises to qualify as a FAB unit, which are then entitled to a host of benefits and incentives like free government land, reimbursement for the cost of building the shell (building) of the manufacturing unit, round the clock power supply from two separate power grids and quality water supply at the doorsteps of the FAB units at an internationally competitive price fixed for ten years.

Services Exports

Developing the Animation, Visual Effects, Gaming and Comic (AVGC) sector

Within the Media & Entertainment industry, the Animation, Visual Effects, Gaming and Comic sector (AVGC) has been recognized as a sunrise sector, growing at an average rate of 9%. Interestingly, more than 65% of the AVGC sector's revenue comes from the services rendered to the global markets. This is indicative of the potential gains that might arise on further integration of India's AVGC sector with the global supply chain for AVGC production.

It may be noted that Karnataka, being India's hub for animation services, VFX services and game developers, has a competitive edge over other states to cater to the growing demand for outsourcing of animation technology to India and support the "Make in India, Show the World" initiative.

Going forward, to achieve the State's goal of achieving the share of exports to more than 75% of the total revenue generated from the AVGC sector, it is suggested that the State Government could exempt the levy of entertainment tax for animation films. In this regard, the State could learn from the Maharashtra's IT and ITeS policy for the AVGC sector, which has committed to provide capital subsidies in the AVGC sector.

Increasing the efficiency of the State's Logistics Sector

As per the LEADS index, Karnataka ranked seventh in 2019, down from the fourth rank in 2018. Amongst the key determinants that held back Karnataka from ranking better on the index were availability of logistics infrastructure and its quality. In particular, the LEADS index survey reported inefficiencies at the Whitefield ICD terminal and rail connectivity.

In this regard, it is suggested that the Government of Karnataka could develop a dedicated logistics park policy, as has been done in Maharashtra and Chhattisgarh, besides focussing on widening and maintenance of the existing road network (especially the ones connecting various industrial estates to the New Mangalore Port). In doing so, the State would be better positioned to achieve its objective of becoming a leading logistics hub of the country, as envisaged in the Karnataka Industrial Policy 2020-25. As a part of the State's Logistics Policy, the Karnataka Government could encourage setting up of Multi-Modal Logistics Park (MMLP) in the State via PPP mode, besides upgradation of existing logistics parks in the State. Additionally, along the lines of Chhattisgarh's Logistics Park Policy 2018, investments into the new logistics parks in Karnataka could be accorded the industry status to attract more investments, thereby significantly lowering the costs of setting up units in the State.

Boosting Infrastructural Support

Development of Shared Containers Depot

Given the large presence of SMEs in Karnataka (especially across sectors like automobile, electronics and consumer durables), importing firms could collectively harness the benefits of the Direct Port Delivery model by using shared container depots. This will enable start-ups and small importing firms to significantly reduce the turnaround time without investing substantially in establishing their own storage facilities. Depending on the location and size, such shared container depots could be set up under the aegis of Trade Infrastructure for Export Scheme (TIES). Further, for relatively large-scale projects, PPP models could be used to develop competitive export infrastructure in the State.

Increasing the Coverage of Smart City Mission at the State-level

The State of Karnataka, in coordination with the Central Government, could expand the coverage of the Smart City Mission and increase the number of statutory towns in smart cities as a percentage of total in the State. By increasing the access to potential markets for businesses, this is likely to attract investments across Karnataka. In 2018, the percentage of statutory towns in Karnataka's smart cities was 4.9%, as against 11.3% in Telangana, 8.6% in Maharashtra and 7.7% in Andhra Pradesh.

It may be noted that the development of smart cities can be instrumental in boosting investments and thereby, exports from the State, through a hub and spoke model. Each smart city could act as an urbanized hub and encourage the growth in the neighbouring satellite towns, the way Delhi being the hub has exemplified the urban growth through its spokes - the NCR towns of Noida, Greater Noida, Ghaziabad and Gurgaon. Similarly, development of urban hubs in the State under the Smart City Mission would bolster the investment flows which in turn can be channelized to boost the exports from the adjoining regions of the smart cities, as well.

Financial Mechanisms

Providing Incentives under Production Linked Incentive Scheme at the State level

The sectors identified for the PLI Scheme like telecom & networking products, pharmaceuticals drugs and electronics are sunrise and promising sectors, but they may need support in the initial stage which is lacking. There is a growing demand in the world for diversification in supply chains and Karnataka, for that matter, has a reasonably good potential. The Karnataka State Government may take a leap forward to provide additional incentives to the exporters who, through increased investments, are able to create additional capacity to export. It may be noted that select niche sectors wherein Karnataka enjoys a relative competitive advantage over other States, like aerospace and medical devices should be given a priority in terms of the additional incentives offered at the State level.

Making Karnataka a FinTech Hub

Making Karnataka a FinTech hub could significantly alter the lending scenario and thereby the ease of doing business for the MSMEs in the State.

It may be noted that fintech companies operating in trade finance typically focus on cost-reduction initiatives such as digitization and automation, including blockchain and alternative lending options (for example, peer-to-peer lending). Against the backdrop of SMEs struggling to obtain conventional sources of financing, emerging financial technological innovations need to step up to bridge the funding gap. In this regard, digital lending by fintech players can significantly benefit MSMEs in Karnataka to gain access to quick capital.

Apart from P2P lending, amongst the key offerings by the FinTech firms that can bolster the growth of Karnataka's MSMEs include point-of-sale transaction-based lending, bank and fintech partnership models, invoice discounting exchanges, marketplaces and captive models.

Conclusion

Karnataka has a huge potential to grow and contribute significantly to India's growth story. According to India Exim Bank's paper, given the State's current export scenario, there exists a potential for the exports (merchandise and services combined) to reach US$ 185.32 billion by 2024-25 from US$ 100.5 billion in 2019-20.

The ten tailored strategies outlined in the Study shall help enhance trade competitiveness, promote innovation, bolster availability of export finance, enhance value addition in the production cycles, while enabling the State to lead India's integration into the Global Value Chains.

While the State is endowed with quality manpower and confluence of people from across the country to pursue their studies, the availability of services infrastructure further adds to existing manufacturing prowess of the State. The State is also experiencing significant growth in start-ups and fintech solutions, which enable the State to become a powerhouse replicating leading regions and States, like California in the USA. Put overall, Karnataka is likely to remain on the forefront of India's exports, both in goods and services.

CHAPTER 1:

A MACRO-ECONOMIC INTRODUCTION

Overview

Karnataka, which is India's seventh largest State by area, is also one of the fastest growing States in India. Karnataka came into being in 1956 and has grown from a primarily agrarian state to becoming the home to Silicon Valley of India. At 8%, in 2018-19, it was the fifth highest contributor to India's GDP of ₹ 140.9 trillion, after Maharashtra (14.5%), Tamil Nadu (8.6%), Uttar Pradesh (8.4%) and Gujarat (8.1%)[1].

With 6% of the country's area, the state is divided into four regions viz., the Coastal Region, the Malnad Region, the Northern Maidan and the Southern Maidan. The population of the State, as per the 2011 census, was estimated to be 61 million, decennially growing at an average rate of 17% during 1991 and 2011 and accounting for almost 6% of the country's population.

Table 1: Karnataka's Demographic Status

	2000	2010	2017
Birth Rate	22.0	19.2	17.4
Death Rate	7.8	7.1	6.5
Infant Mortality Rate (per 1000 live births)	57	38	25

Source: Data assessed from Economic Survey of Karnataka 2019-20

In 2011, around 40% of the population in Karnataka was found to be staying in the urban area, compared to 33%, ten years ago. The significant rural to urban migration in the State has largely been a result of upsurge in higher educational prospects and employment opportunities across all sectors, especially IT and ITeS.

With regards the demographic conditions, while the birth rate has gone down from 22 in 2000 to 17.4 in 2017, the death rate and infant mortality rate, too, have registered a notable decline during the same time – thereby exhibiting a trend towards an old age population. According to the data collated during the 2011 census, the demographic dividend, or the percentage of population aged between 15 and 59, of the State stood at 64.29%. However, the literacy rate was recorded at 75.36%, lower than that of Karnataka's competing states like Maharashtra (83%), Tamil Nadu (81%) and Gujarat (78%).

[1] RBI Handbook of Statistics on Indian States

Macroeconomic Profile

The Gross State Domestic Product (GSDP) is considered to be the closest proxy to ascertain the economic development of a State and it serves as an important tool to gauge the impact of structural changes in the State economy. In 2019-20, Karnataka's GSDP was estimated at ₹ 12 trillion, up by ₹ 766.1 billion from the previous fiscal[2]. During the period 2011-12 to 2019-20, the GSDP at constant prices in Karnataka grew at an AAGR of 9% against the average growth of 6.6% registered for the Indian economy as a whole during the same period.

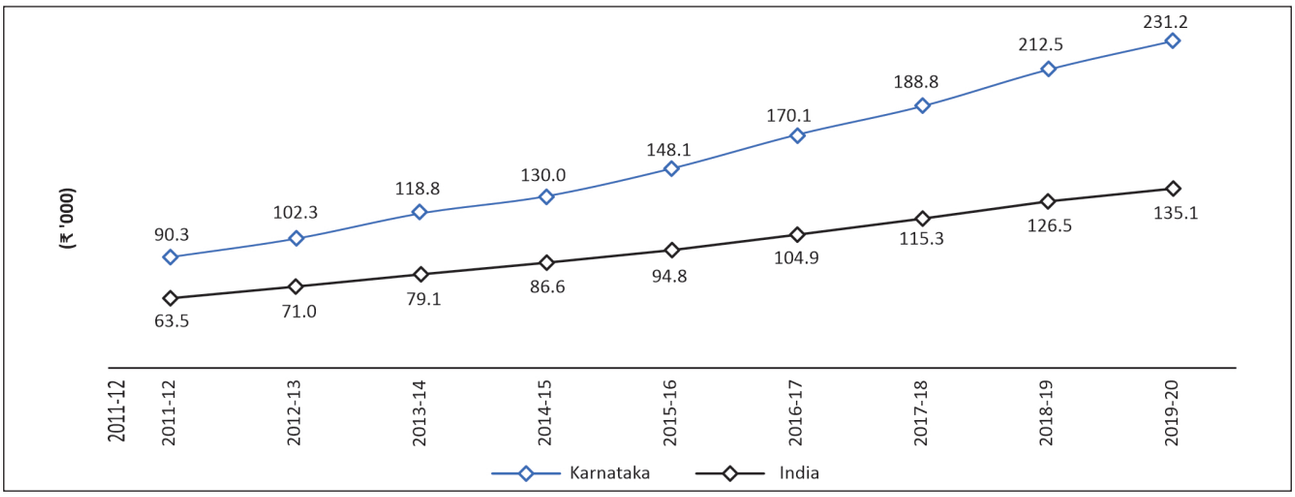
Table 2: GSDP of Karnataka at Current and Constant Prices (2011-12)

	GSDP (Current Prices) (₹ Trillion)	Growth (%)	GSDP (Constant Prices) (₹ Trillion)	Growth (%)	Per Capita GSDP (₹ '000)	Growth (%)
2011-12	6.1		6.1		90.3	
2012-13	7.0	14.8%	6.4	6.1%	94.4	4.6%
2013-14	8.2	17.4%	7.0	9.6%	101.9	7.9%
2014-15	9.1	11.9%	7.5	6.2%	105.7	3.8%
2015-16	10.5	14.4%	8.3	11.1%	116.8	10.5%
2016-17	12.1	15.7%	9.4	13.3%	131.3	12.4%
2017-18	13.6	12.3%	10.4	10.8%	143.8	9.6%
2018-19	15.4	13.8%	11.2	7.8%	153.3	6.6%
2019-20	17.0	10.0%	12.0	6.8%	161.9	5.6%

Source: Data assessed from RBI Handbook of Statistics on Indian States; India Exim Bank Research

The State, in terms of economic growth, has performed fairly well as compared to the country as a whole. In fact, in the context of the Net State Domestic Product (NSDP) at factor cost at constant prices, the State of Karnataka has been consistently among the top ten States of India. In 2019-20, the State stood at the fourth position with NSDP of ₹ 15.5 trillion, registering an annual growth of 10.0%.

Figure 1: Per Capita Income of Karnataka vis-à-vis India

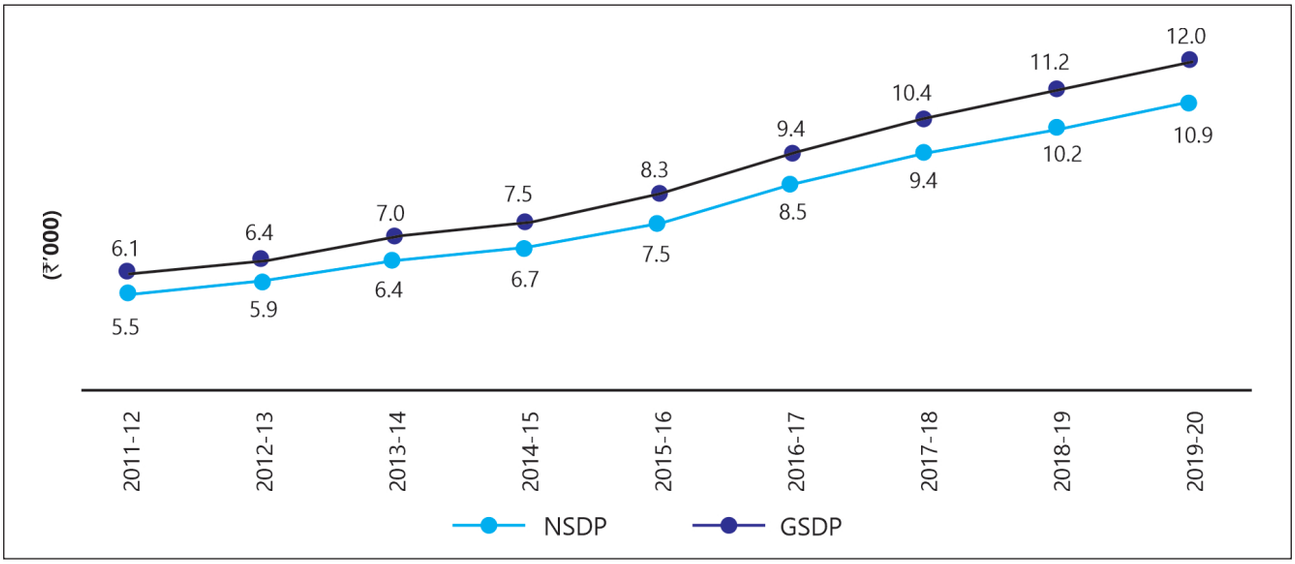


Source: Economic Survey of Karnataka 2019-20

[2] RBI Handbook of Statistics on Indian States

As can be seen from Figure 1, the per capita income in Karnataka has not only risen, but has also exceeded the national average during 2011-12 to 2019-20. It is worth noting that during these years, Karnataka's per capita income registered an AAGR of 12.5% against the 9.9% for the country.

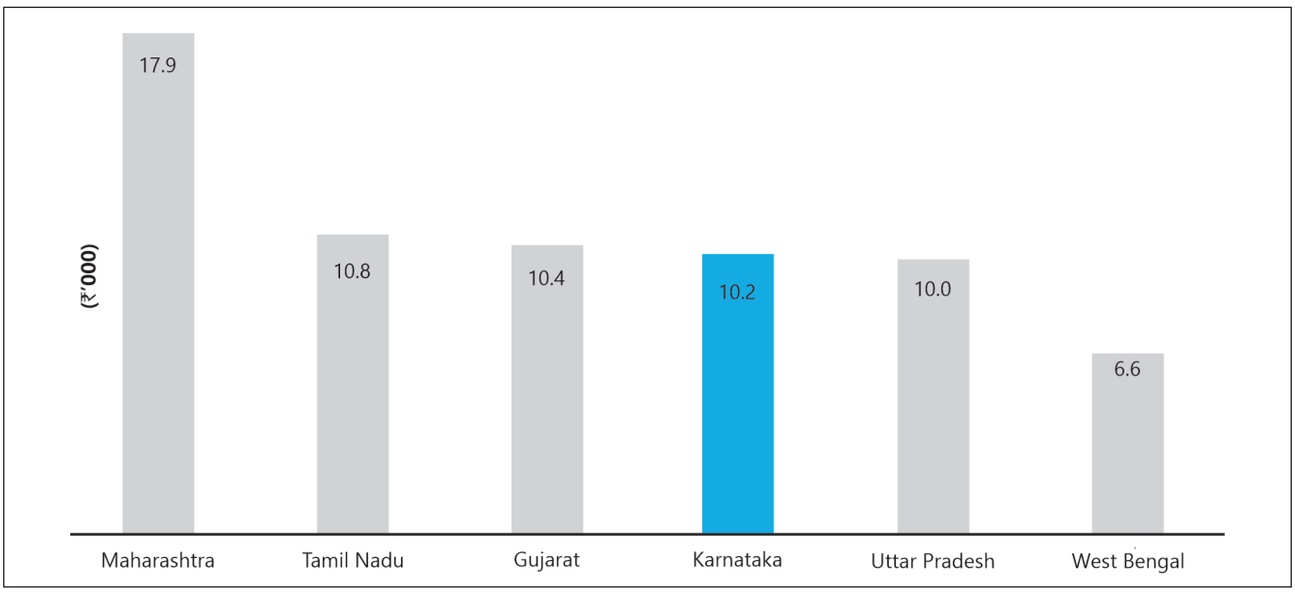
Figure 2: GSDP and NSDP of Karnataka at Constant Prices (2011-12)



Source: Data assessed from RBI Handbook of Statistics on Indian States; India Exim Bank Research

As can be seen from Figure 2, the gap between GSDP and NSDP in Karnataka has grown wider in the last decade. During the period 2011-12 to 2019-20, while the GSDP registered an AAGR of 9% to reach ₹ 12 trillion, the AAGR for NSDP was marginally lower at 8.8%. The key difference between GSDP and NSDP is depreciation. With the shift in investment towards information technology assets with relatively short service lives, the share of depreciation in GSDP has shown an increase, globally, with the GSDP growth invariably exceeding the NSDP growth[3].

Figure 3: NSDP at Constant Prices – Karnataka and Competing States (2018-19)



Source: RBI Handbook of Statistics on Indian States; India Exim Bank Research

[3] "Why Net Domestic Product Should Replace Gross Domestic Product as a Measure of Economic Growth", Roland Spant

It is to be noted that even though Karnataka has outperformed most of the States in India, its' NSDP in 2019-20 was estimated to be ₹ 10.2 trillion, almost the half of Maharashtra's, and marginally lesser than that of Tamil Nadu and Gujarat.

Broad Economic Activities

The services sector in Karnataka has been the key driver of economic growth, accounting for 66.19% of the GSDP in 2019-20. While the share of services in GSDP marginally increased from 65.1% in 2018-19, a corresponding decline in the share of agriculture from 11.18% in 2018-19 to 10.97% in 2019-20 was observed. Further, according to the State Economic Survey of Karnataka 2019-20, the services sector is projected to grow by 7.9% during 2020-21 compared to a growth of 9.8% witnessed during 2019-20[4].

Table 3: Sectoral Share in Karnataka's GSDP

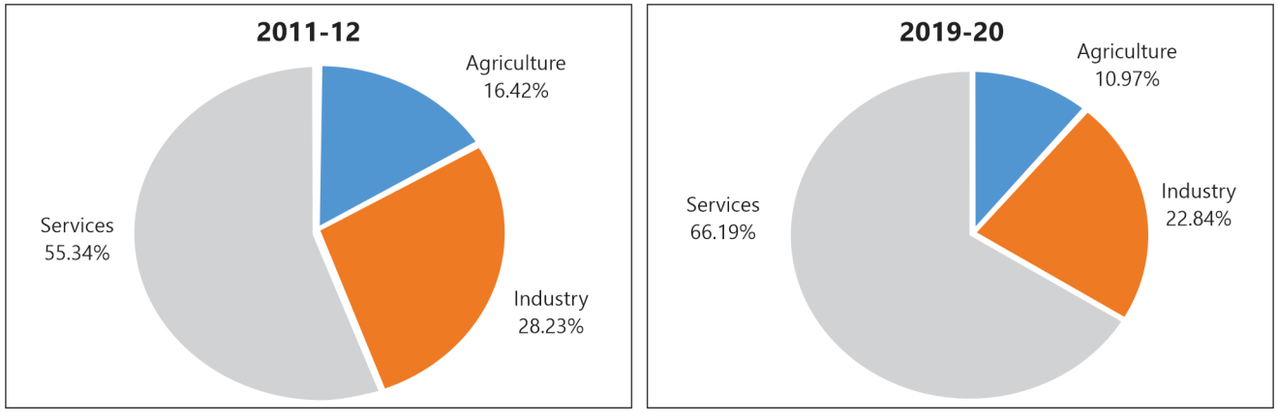
Sector	2019-20 (AE)
Agriculture and Allied Sector	**10.97%**
Manufacturing	15.32%
Construction	5.51%
Mining and Quarrying	0.55%
Electricity, Gas, Water Supply and Remediation Services	1.46%
Industry	**22.84%**
Communication	1.19%
Trade and Repair Services	9.51%
Financial Services	4.67%
Real Estate, Ownership of Dwellings and Professional Services	35.31%
Public Administration	2.55%
Other Services	12.96%
Services	**66.19%**
Total GSVA at Basic Prices	**100.00%**

Source: Economic Survey of Karnataka 2019-20; India Exim Bank Research

The contribution of Agriculture & Allied activities and the Industry sector to the overall GSDP (from 16.42% to 10.97% and 28.32% to 22.84%, respectively) saw a notable decrease in 2019-20 as against 2011-12. Evidently, during the last few years, services sector has emerged as the largest contributing component to the GSDP in Karnataka.

[4] Economic Survey of Karnataka 2019-20

Figure 4: Sectoral Composition of Karnataka's GSDP (2011-12 vs 2019-20)



Source: Data assessed from RBI Handbook of Statistics on Indian States; India Exim Bank Research

Agriculture

The agriculture sector plays a vital role in the State's economy and continues to be the highest employment generating sector. However, as noted above, contribution of agriculture to Karnataka's GSDP marginally declined from 11.18% in 2018-19 to 10.97% in 2019-20. The GSVA growth rate of agriculture sector increased to 3.9% in 2019-20 compared to (-) 1.6% de-growth in 2018-19 on account of increase in production of food grains from 128 lakh tonnes to 136 lakh tonnes, oilseeds production from 51 lakh tonnes to 56 lakh tonnes.

In 2018-19, the gross cropped area was estimated to be 119.94 lakh hectares, including 20.98 lakh hectares area sown more than once, amounting to 121% cropping intensity. Around 16.13% of the area was covered under forests, 7.88% area was under non-agricultural uses, 4.16% land was barren and uncultivable land, and 2.10% land was cultivable waste.

Horticulture covers an area of 20.63 lakh hectares in the State with production of 185.20 lakh MT in 2019-20. Emerging as an important component of the economy of the State, it has contributed more than one third share to the economy of agriculture and allied sectors. The share of horticulture produts in total GSDP of the State stood at 3.39% in 2019-20.

Industry

Karnataka has been on the forefront of high-technology industry and has pioneered in the hi-tech areas of electrical and electronics, information & communication technology (ICT), biotechnology and, more recently, nanotechnology.

The industrial structure of Karnataka presents a blend of modern high-tech capital goods and knowledge intensive industries on the one hand, and traditional consumer goods industries on the other, putting the State in an eminent position on the industrial map of the country.

Micro, Small & Medium Enterprises (MSMEs) form an important and growing segment of Karnataka's industrial sector. During 2017-18, around 48,482 MSME units were registered in the State with an investment of ₹ 115 billion, providing employment to 440 thousand persons. As compared to 2016-17, there was a 19.2% increase in the number of units registered, 9.30% decrease in investment and 15.54 % decrease in number of persons employed during 2017-18.

It is noted that the overall organized industrial sector of Karnataka registered 2.55% growth in 2017-18 as compared to 2016-17. Within the organized industrial sector, while the manufacturing sector showed the highest growth of 2.64% followed by the electricity sector at 2.06%, mining sector registered lowest growth of 1.81%. As a result of this, a moderate growth of 2.55% was observed in the General Index.

Services

The main reason, the State of Karnataka has been able to stay abreast of both – the competing States and the nation - has been the rapid growth of its services sector, which grew by an average of 7.9% annually during 2019-20. The services sub-sectors registering the highest growth during the year were services incidental to transport (11.2%), computer related services (10.7%) and trade & repair services (6.5%).

Way Ahead

Exports contribute about 40% of the Karnataka's GSDP with electronic, computer software, and biotechnology contributing a major portion of the exports. Karnataka accounted for about 39% of electronics and computer software exports from the country. The Economic Survey of Karnataka 2019-20 acknowledges that the State's economic growth can be accelerated further with a continued emphasis on promotion of private investment and enhancement of industrial competitiveness.

India Exim Bank's Study examines the State's competencies across sectors and sub-sectors and seeks to bring out a strategy to boost exports from the State of Karnataka. An attempt has been made to dig deeper into the trends in foreign trade to set a vision for both the direction and value of exports for the next five years.

Benchmarking of the State's performance across parameters like economic growth, export performance, comparative advantage and FDI attractiveness has also been done with respect to four other economically competing states – namely, Maharashtra, Tamil Nadu, Gujarat and Haryana.

Further, the Study also provides a holistic outline for enhancing trade competitiveness, identifying focused sectors and products for attracting investments and for promoting exports, and strengthening the institutional capacity for exports, among others, towards catalyzing export led economic growth in the State.

Whilst doing so, the Study has underlined the importance of setting a medium-term export target for Karnataka which could help the State to assess its performance and take timely corrective actions in case of under-performance.

CHAPTER 2:

MERCHANDISE TRADE SCENARIO

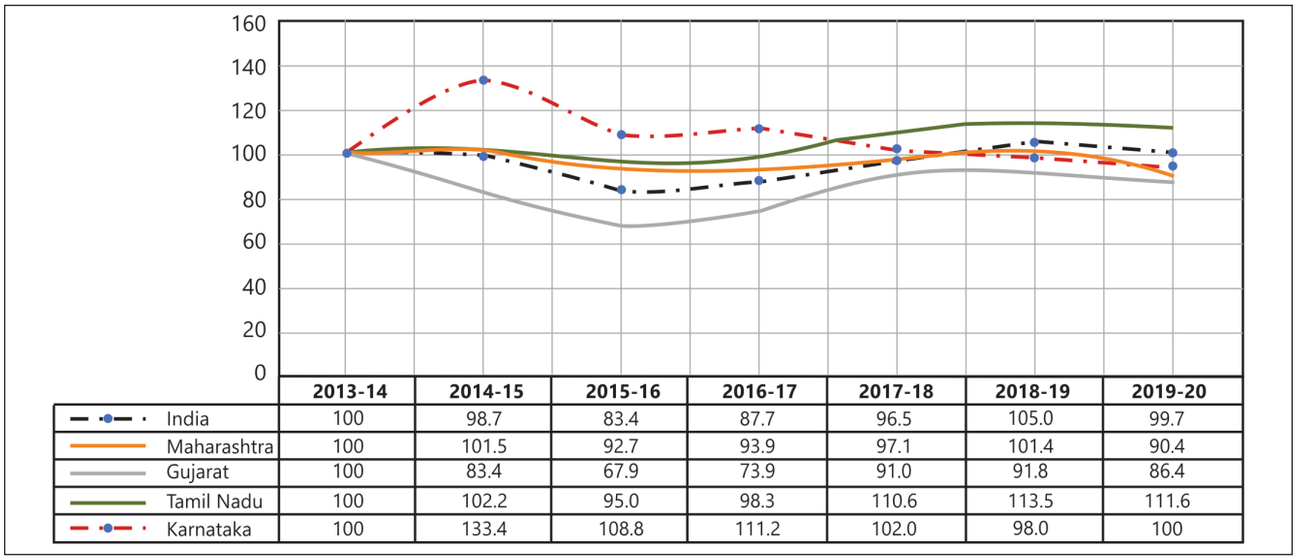
In the last two decades, Karnataka has emerged as a key player in the export of electronic and computer software, engineering goods, readymade garments, petrochemicals, gems and jewellery, agro and food processing products and chemicals, in addition to its traditional exports of coffee, silk, spices and handicrafts. These years have been an inflection point, redirecting the State to carve out a niche for itself in the global marketplace as the knowledge and technology capital of India.

Merchandise exports from Karnataka in 2019-20 were valued at US$ 16.6 billion, a year-on-year decline of 4% from 2018-19. During the year, while the share of Karnataka's merchandise exports in the national exports constituted around 5.3% and the share of software and services exports was recorded at 39%. Even though the merchandise exports registered a negative AAGR of (-) 3.5% during 2015-16 to 2019-20, there is room for a substantially higher growth through optimal utilization of the State's resources across the domains in which it enjoys better competence and a relative comparative advantage.

Trade Scenario

Karnataka's contribution to the merchandise exports from India stood at 5.31% in 2019-20, marginally up from 5.25% recorded in 2018-19. However, it continued to be amongst the top five merchandise exporting states of

Figure 5: Indexed Growth of Merchandise Exports from the Top Exporting States



	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
India	100	98.7	83.4	87.7	96.5	105.0	99.7
Maharashtra	100	101.5	92.7	93.9	97.1	101.4	90.4
Gujarat	100	83.4	67.9	73.9	91.0	91.8	86.4
Tamil Nadu	100	102.2	95.0	98.3	110.6	113.5	111.6
Karnataka	100	133.4	108.8	111.2	102.0	98.0	100

Source: Data assessed from DGCIS; India Exim Bank Research

India, after Maharashtra, Gujarat and Tamil Nadu. Indexing the growth of merchandise exports of four states – Maharashtra, Gujarat, Tamil Nadu and Karnataka, against that of India, as a whole, during 2013-14 to 2019-20 suggests that even though Karnataka fared better than the other aforementioned States during 2013-14 to 2016-17, it witnessed a decline both in absolute and relative terms from 2017-18 onwards.

Merchandise export growth from Karnataka registered a substantial decline in relation to the other three states after 2016-17. The index was recorded at 93.8 in 2019-20, lower than both, the initial benchmark of 100 in 2013-14 and the India's overall index of 99.7 in 2019-20. While a part of this trend can be attributed to the differences in efficiency and other state-specific factors, a substantial part can also be explained by the fact that Karnataka also lost some of its export business to other competing states.

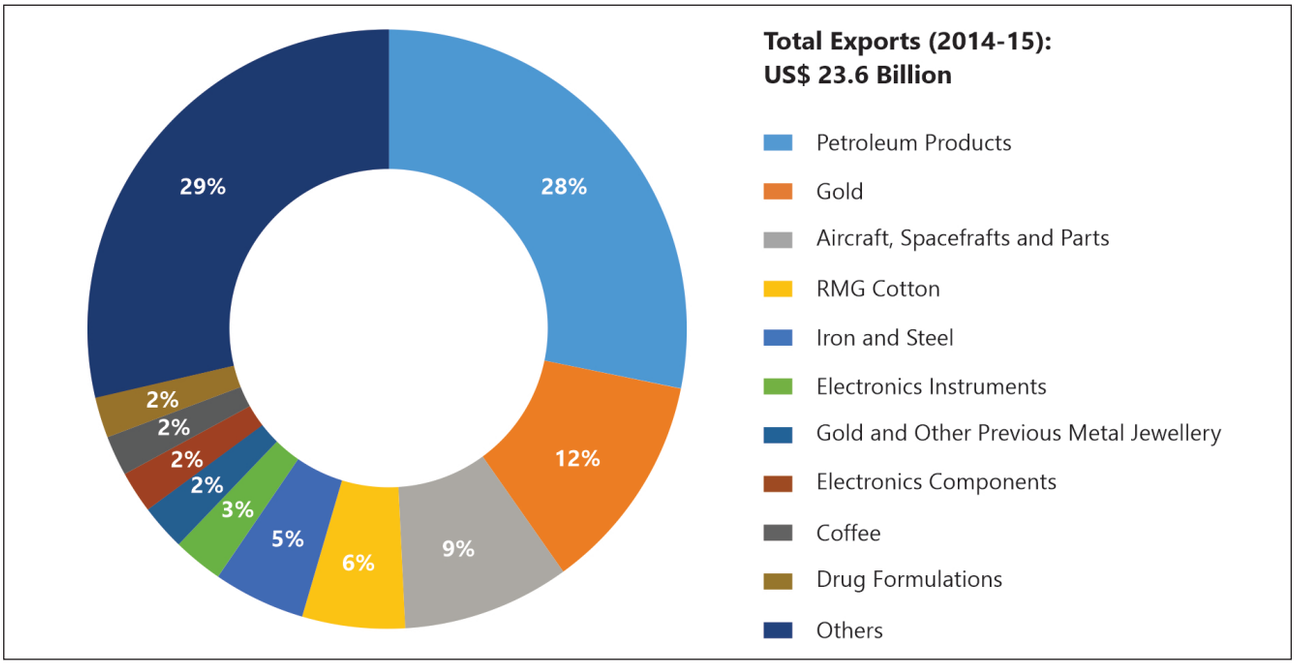
Exports

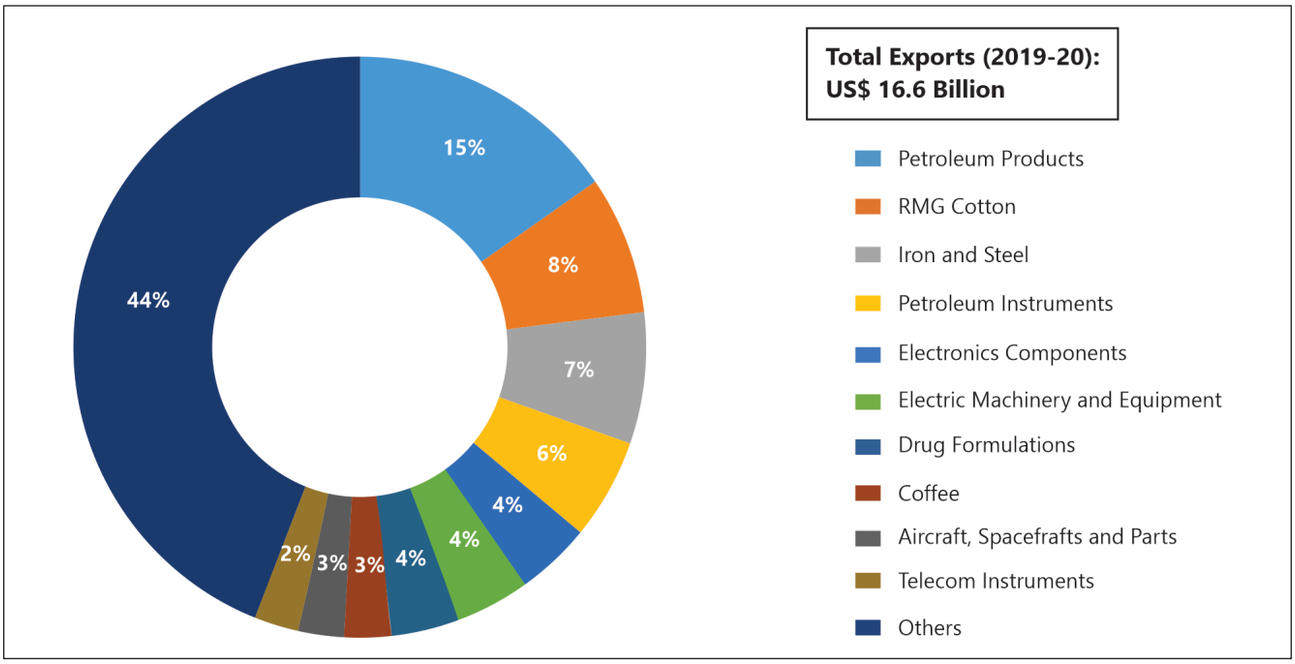
Merchandise exports from Karnataka stood at US$ 16.6 billion in 2019-20, registering AAGR of 4.8% during 2010-11 to 2019-20. Further, the top ten principal items from Karnataka contributed to around 56% of the State's total exports in 2019-20, as against 71% in 2014-15.

The top exported principal item was 'petroleum products' with a contribution of 15% in the total exports in 2019-20. This was followed by 'RMG cotton' (8%); 'iron and steel' (7%); 'electronics instruments' (6%); and 'electronics components' (4%).

It may be noted that 'telecom instruments' with a contribution of 2% in 2019-20 did not feature in the list of top ten exported principal commodities in 2014-15. At the same time, while 'Gold' contributed to around 12% of the total exports in 2014-15, it did not feature in the list of top ten principal items in 2019-20.

Figure 6: Composition of Karnataka's Exports: Principal Item-wise (2014-15 vs 2019-20)





Source: Data assessed from DGCI & S; India Exim Bank Research

While the top ten principal items contributed 56% to the total exports of Karnataka in 2019-20, the top ten exported products at HS 6-digit level constituted 32% of the State's total exports, reflecting the narrow base of its exports. The highest exports at HS 6-digit were recorded for petroleum products[5] at US$ 2.3 billion, with a share of 13.9% in the State's total merchandise exports, followed by static convertors[6] (3.0%), flat-rolled products of steel[7] (2.4%), and coffee[8] (2.3%).

Table 4: Composition of Karnataka's Merchandise Exports at HS- 6 digit

HS Code	Description	Exports (US$ Million)	AAGR of Exports (2015-16 and 2019-20)	Share in Karnataka's Total Merchandise Exports (2015-16)	Share in Karnataka's Total Merchandise Exports (2019-20)
271019	Medium oils and preparations, of petroleum or bituminous minerals, not containing biodiesel, n.e.s.	2314.6	15.0%	8.6%	13.9%
850440	Static converters	502.0	20.4%	1.3%	3.0%
720839	Flat-rolled products of iron or non-alloy steel, of a width of >= 600 mm, in coils, simply hot-rolled, not clad, plated or coated, of a thickness of < 3 mm, not pickled, without patterns in relief	396.9	574.6%	0.0%	2.4%
090111	Coffee (excluding roasted and decaffeinated)	390.4	-3.5%	2.5%	2.3%

[5] HS 271019 : Medium oils and preparations, of petroleum or bituminous minerals, not containing biodiesel

[6] HS 850440 : Static converters

[7] HS 720839 : Flat-rolled products of iron or non-alloy steel, of a width of >= 600 mm, in coils, simply hot-rolled, not clad, plated or coated, of a thickness of < 3 mm, not pickled, without patterns in relief

[8] HS 090111 : Coffee (excluding roasted and decaffeinated)

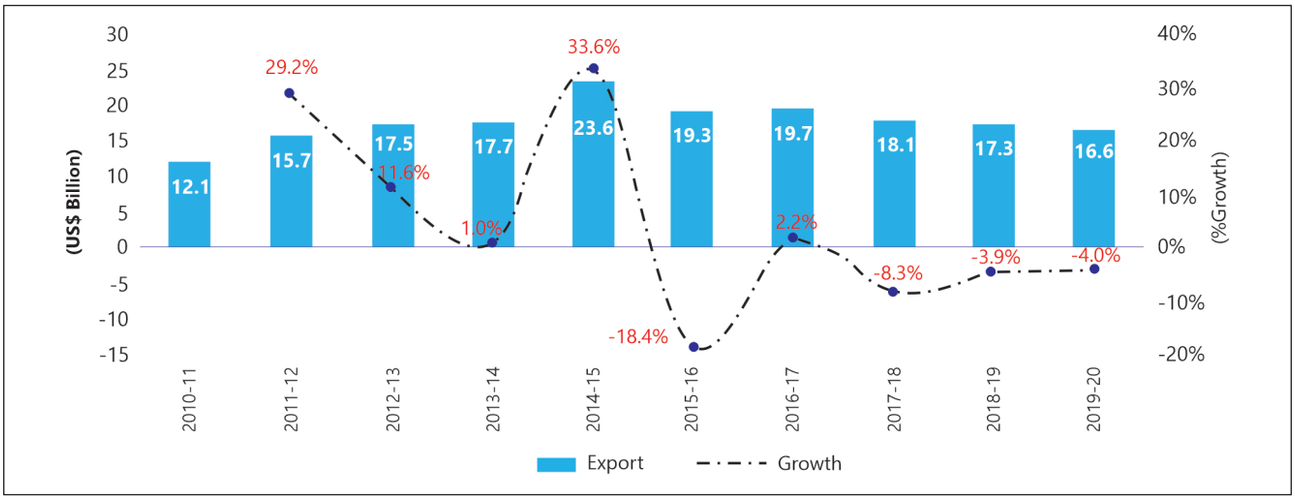
HS Code	Description	Exports (US$ Million)	AAGR of Exports (2015-16 and 2019-20)	Share in Karnataka's Total Merchandise Exports (2015-16)	Share in Karnataka's Total Merchandise Exports (2019-20)
300490	Medicaments consisting of mixed or unmixed products for therapeutic or prophylactic purposes, put up in measured doses "incl. those in the form of transdermal administration" or in forms or packings for retail sale (excluding medicaments containing antibiotics, medicaments containing hormones or steroids used as hormones, but not containing antibiotics, medicaments containing alkaloids or derivatives thereof but not containing hormones or antibiotics and medicaments containing provitamins, vitamins or derivatives thereof used as vitamins)	374.9	15.9%	1.1%	2.3%
620520	Men's or boys' shirts of cotton (excluding knitted or crocheted, nightshirts, singlets and other vests)	361.7	-2.7%	2.1%	2.2%
880330	Parts of aeroplanes or helicopters, n.e.s. (excluding those for gliders)	345.1	19.5%	1.6%	2.1%
851712	Telephones for cellular networks "mobile telephones" or for other wireless networks	271.2	185.7%	0.0%	1.6%
620342	Men's or boys' trousers, bib and brace overalls, breeches and shorts, of cotton (excluding knitted or crocheted, underpants and swimwear)	267.5	6.1%	1.1%	1.6%
260112	Agglomerated iron ores and concentrates (excluding roasted iron pyrites)	226.7	12.3%	0.0%	1.4%

Source: Data assessed from DGCI & S; India Exim Bank Research

It is noted that during 2015-16 to 2019-20, the composition of Karnataka's top ten merchandise exports has undergone significant change. During 2019-20, the highest share in the State's total exports was of HS 271019[9] at 13.9%, following which, there was no export item with a share of more than 3%, making the export basket relatively diversified. Given the fact that greater diversification in exports makes any economy less susceptible to trade shocks, the State of Karnataka stands at a distinct advantage when compared to other States like Maharashtra and Tamil Nadu, where the top export items at the HS 6-digit level comprised of 28% and 25% of the total merchandise exports in 2019-20. It is to be noted that such diversification of exports typically leads to relatively stabilized export revenue, which has a significant role to play in the State's finances.

[9] HS 271019 - Medium oils and preparations, of petroleum or bituminous minerals, not containing biodiesel

Figure 7: Merchandise Exports from Karnataka



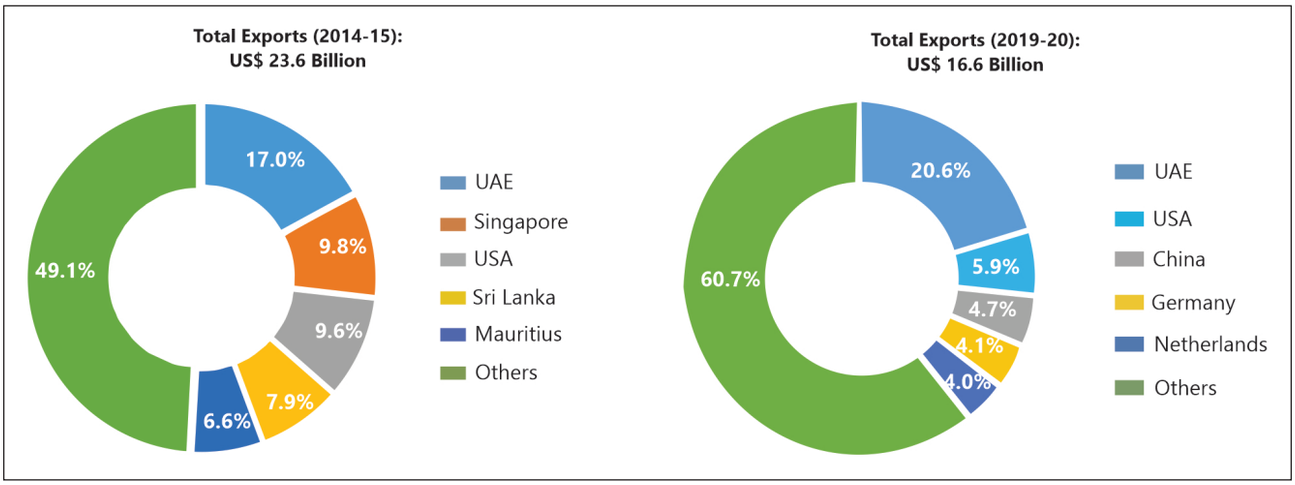
Source: Data assessed from DGCI & S; India Exim Bank Research

After a sudden plunge in the State's merchandise exports in 2015-16, even though there have been signs of slight recovery, the year-on-year growth has remained subdued and in the negative territory for four straight years. The performance of State's exports in the recent years, therefore, demands a thorough scrutiny to identify the reasons arresting the overall exports from the State much beyond its potential. In order to do so, this Study focuses on the areas of core competency in the State and highlights the sectors which are capable of reversing the export trajectory towards sustainable growth.

Export Destinations

The top five export destinations for merchandise exports from Karnataka in 2019-20 represented around 40% of the total merchandise exports from the State. These were the USA (20.6%), UAE (5.9%), China (4.7%), Germany (4.1%), and the Netherlands (4.0%).

Figure 8: Karnataka's Top Export Destinations (2014-15 vs 2019-20)



Source: Data assessed from DGCI & S; India Exim Bank Research

It is noted that diversification in terms of the State's export destinations increased from 2014-15 to 2019-20, with the top five export destinations accounting for 50% of the total merchandise exports in 2014-15 as against 40% observed in 2019-20.

Port-wise Exports from Karnataka

Karnataka has 27 ports including one major sea-port at Mangalore. During 2019-20, Bangalore Airport accounted for the highest exports from the State with a share of 27.1%, followed by New Mangalore Sea at 22.4% and ICD Bangalore at 18.3%.

Table 5: Port-wise Exports from Karnataka (2019-20)

Port	Export (US$ Million)	Percentage share in Karnataka's Exports
Bangalore Airport	4513.0	27.1%
New Mangalore Sea	3721.7	22.4%
ICD Bangalore	3048.6	18.3%
Mangalore SEZ	704.9	4.2%
Biocon Ltd SEZ	148.5	0.9%
Karwar	75.9	0.5%
KIADB Aerospace SEZ	42.9	0.3%
Others	4384.0	26.3%

Source: Data accessed from DGCI & S, India Exim Bank Research

Major export destinations for the merchandise exports from Bangalore Airport in 2019-20 were the USA (28%), Germany (8%), France (7%), the UK (7%), and China (4%). Further, during the year, the top items exported were electronics components (12%), telecom instruments (9%), electronics instruments (9%), electric machinery and equipment (8%) and aircraft, spacecraft and parts (7%). Going forward, development of minor ports like Karwar, Tadri and Haldipur for handling a wide range of items will be critical to the merchandise export growth from Karnataka. Further, to be able to receive large sized vessels, deepening the draft at the ports would be required.

Export Product Concentration Index

This Export Product Concentration Index (EPCI) measures the degree of concentration of goods exported by a country. It is used to ascertain if a large share of a country's exports is accounted for by a small number of items or, on the contrary, if its exports are well distributed among many products. Therefore, it can be used as a warning sign of low export diversification or an indicator of the exporter's vulnerability to trade shocks. A higher index indicates that exports are concentrated in fewer sectors, whereas a country with a completely diversified portfolio will have an index close to 0.

This indicator is defined as a normalized Herfindahl-Hirschmann index of the product concentration of merchandise exports at the country level. It is calculated according to the following formula:

$$H_{i} = (\sum (x_{ik} / X_{i})^{2} - 1/n_{i}) / (1 - 1/n_{i})$$

Where H_j is the product concentration index of exports of state 'i', X is the total value of exports from the State, x is the value of exports of product k from the State, and n is the number of products exported by the State.

This index ranges from zero to one, with a larger value denoting a higher concentration of exports. For example, a value of H_j equal to one indicates that all exports of the State come from a single item, while a value of zero means that the State's exports are homogeneously distributed among all products.

According to India Exim Bank's analysis, Karnataka's EPCI was valued at 0.03 for the merchandise exports from the State during 2019. Further, the EPCI for Maharashtra, Gujarat, and Tamil Nadu was recorded at 0.08, 0.01, and 0.05 respectively. This shows that with in the three competing states, Karnataka's export product concentration was only higher than that of Gujarat.

RCA Analysis and Karnataka's Competitiveness

Revealed Comparative Indices are used to identify categories of exports in which an economy has a comparative advantage by way of comparison of the country's trade scenario with the world scenario. The basic assumption underlying the concept of revealed comparative advantage is that the trade profile reflects the inter-country differences in terms of relative costs as well as non-price aspects. As per Balassa's (1965) measure, index for country 'i', commodity 'j' is:

$$RCA_{ij} = (x_{ij}/X_{it}) / (x_{wj}/X_{wt})$$

Where,

x_{ji}: exports of commodity j from country 'i'

X_{it}: total exports from country 'i'

x_{jw}: total exports of commodity 'j' from world

X_{wt}: total exports from world

The RCA index ranges from 0 to infinity, with 1 as the break-even point. That is, an RCA value of less than 1 means that the product does not have a comparative advantage, while a value above 1 indicates that the product has a comparative advantage.

The Normalized Revealed Comparative Advantage (NRCA) index has been demonstrated capable of revealing the extent of comparative advantage that a country has in a product more precisely and consistently than other alternative RCA indices in the literature. NRCA can be defined in the following manner

$$NRCA_{ij} = (RCA_{ij} - 1)/ (RCA_{ij} + 1)$$

NRCA ranges from -1 to 1 with 0 as the breakeven point. That is, an NRCA value of less than 0 means that the product has no export comparative advantage, while a value above 0 indicates that the product has a comparative advantage. The extent of comparative advantage/disadvantage can be gauged from the proximity of the NRCA values to the extreme data points, viz. +1 and -1.

The export competitiveness of Karnataka has been mapped with respect to the global demand. This has been undertaken with a view to outline a market specific approach for exporters. An overarching analysis has been attempted in order to identify products for which the State has existing capabilities to export. The current markets for these exports and the key competitors which India faces for these products in such markets have also been analyzed. These products and markets are the potential export growth drivers for Karnataka and need to be suitably targeted. The section also attempts to identify the products where Karnataka could focus on, to realize potentially higher values, especially while considering that the State already possesses manufacturing capabilities for these products. The objective is to construct a product market matrix for products in demand along with the major demand centers (importers), and the key exporters to these regions (competitors).

Product Classification and Focus Products

In order to classify the products based on their competitiveness, the four-quadrant analysis has been undertaken based on the HS Code classifications at 6-digit level, whilst calculating their NRCA and mapping them against the AAGR of global imports of all products. The analysis in this section considers two major determinants of the Karnataka's export performance at a granular level, namely the NRCA for products for Karnataka and AAGR for global imports in the last five years. Based on these considerations, a four-quadrant matrix is prepared for focus product identification.

The quadrants are drawn by comparing the overall AAGR of global imports for all products during 2015-19 (which was 3.8%), to the NRCA of the products during the same period. This exercise aims to identify products whose imports over the period 2015-19 has performed better than the global average for all products during this period, implying that the share of such products in the world import basket has witnessed an increase, a reflection of their rising demand and dynamism.

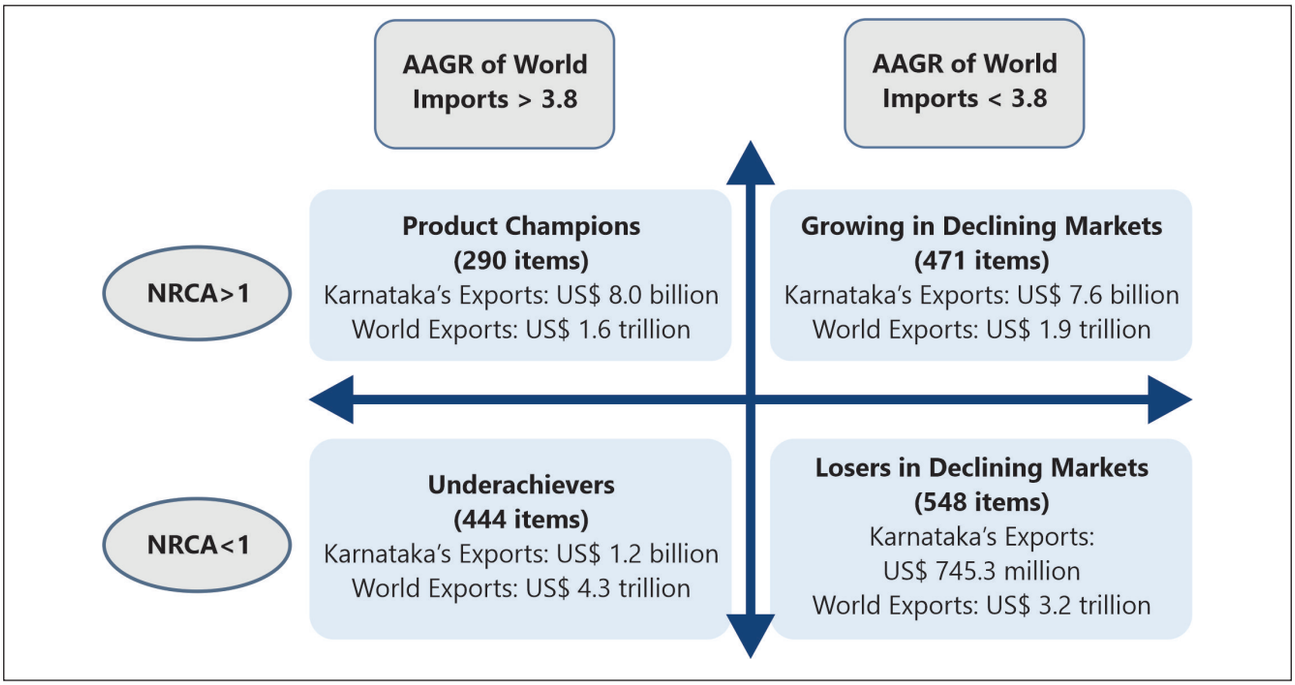
The four quadrants imply the following:

Product Champions (Product AAGR > World Import AAGR; Positive NRCA): These products have the maximum potential, as the world import demand for these products has shown robust AAGR over the period 2015-19, while Karnataka's exports of these products to the world are also competitive, reflected in positive NRCA values for such products.

Underachievers (Product AAGR > World Import AAGR; Negative NRCA): Karnataka does not have competitiveness in these products, although their import demand has grown significantly over the period under consideration, globally. The State can strive towards increasing competitiveness in these markets for the identified products.

Growers in Declining Sectors (Product AAGR < World Import AAGR; Positive NRCA): Karnataka has competitiveness in these products, even though the world import AAGR for these products has been less than the AAGR of global imports of all products.

Figure 9: Product Classification based on Competitiveness



Losers in Declining Markets (Product AAGR < World Import AAGR; Negative NRCA): Karnataka does not have competitiveness in these products, and these sectors have also registered weak global import growth during the period under consideration.

Based on the aforementioned methodology, analysis of 1,753 items at HS 6-digit level of classification reveals that 290 items can be classified as Product Champions from Karnataka. The combined exports of these items from the State were recorded at US$ 8.0 billion in 2019. Next, 471 items are categorized as 'Growers in Declining Market' with exports of US$ 7.6 billion from Karnataka in 2019. The remaining two categories, i.e., 'Losers and Declining Markets' and 'Underachievers' comprised of 548 and 444 items, respectively. Collectively, Karnataka's exports of items from these two categories amounted to US$ 1.9 billion in 2019.

Sub-categorization of Product Champions

It is to be noted that 227 out of the 290 product champions saw an increase in export competitiveness, as reflected by value of NRCA index, 2019 vis-à-vis 2015. Amongst the key items that witnessed an increase in the level of competitiveness in the foreign markets were HS 271049[10], HS 720839[11], HS 850440[12], HS 260112[13], and HS 720838[14].

Further, out of the 290 items classified as Product Champions, the top 30 represent 77% of the total exports from the category during 2019. An attempt is made to obtain a comprehensive picture of the export performance of these 30 items during 2019, both from the state of Karnataka and India as a whole.

Table 6: List of Product Champions and their Major Export Destinations for Karnataka (2019)

HS Code	Description	Karnataka's Exports (US$ Million)	Karnataka's Major Export Destinations	World Imports (US$ Billion)	AAGR in World Imports (2010-19)	Major Importers	India's Share in World Exports	Karnataka's Share in India's Exports
271019	Medium oils and preparations, of petroleum or bituminous minerals, not containing biodiesel, n.e.s.	2800.6	Netherlands (14%), Mozambique (13%), UAE (11%), Malaysia (11%), Mauritius (11%)	431.4	2.7%	USA (8%), Singapore (7%), France (4%), Germany (4%), UK (4%)	6.8%	9.5%
720839	Flat-rolled products of iron or non-alloy steel, of a width of >= 600 mm, in coils, simply hot-rolled, not clad, plated or coated, of a thickness of < 3 mm, not pickled, without patterns in relief	486.4	Vietnam (61%), UAE (14%), Nepal (7%), Italy (5%), Malaysia (4%)	15	1.1%	Vietnam (14%), Turkey (8%), Italy (7%), South Korea (7%), Malaysia (4%)	10.5%	35.8%

[10] HS 271049: Medium oils and preparations, of petroleum or bituminous minerals, not containing biodiesel, n.e.s.
[11] HS 720839: Flat-rolled products of iron or non-alloy steel, of a width of >= 600 mm, in coils, simply hot-rolled, not clad, plated or coated, of a thickness of < 3 mm, not pickled, without patterns in relief
[12] HS 850440: Static converters
[13] HS 260112: Agglomerated iron ores and concentrates (excluding roasted iron pyrites)
[14] HS 720838: Flat-rolled products of iron or non-alloy steel, of a width of >= 600 mm, in coils, simply hot-rolled, not clad, plated or coated, of a thickness of >= 3 mm but < 4,75 mm, not pickled, without patterns in relief

HS Code	Description	Karnataka's Exports (US$ Million)	Karnataka's Major Export Destinations	World Imports (US$ Billion)	AAGR in World Imports (2010-19)	Major Importers	India's Share in World Exports	Karnataka's Share in India's Exports
850440	Static converters	467.6	USA (48%), Netherlands (12%), France (12%), UAE (4%), China (3%)	61.7	3.3%	USA (16%), China (11%), Germany (7%), Hong Kong (6%), Mexico (4%)	1.9%	40.7%
260112	Agglomerated iron ores and concentrates (excluding roasted iron pyrites)	223.6	China (42%), Oman (33%), UK (10%), South Korea (5%), Qatar (4%)	16.9	2.9%	China (23%), Japan (11%), Germany (8%), Egypt (5%), UAE (4%)	6.7%	17.7%
853710	Boards, cabinets and similar combinations of apparatus for electric control or the distribution of electricity, for a voltage <= 1.000 V	163.5	USA (31%), Japan (17%), South Korea (10%), Netherlands (8%), China (4%)	60.9	8.5%	USA (21%), Germany (12%), China (9%), Mexico (3%), UK (3%)	0.7%	38.3%
720838	Flat-rolled products of iron or non-alloy steel, of a width of >= 600 mm, in coils, simply hot-rolled, not clad, plated or coated, of a thickness of >= 3 mm but < 4,75 mm, not pickled, without patterns in relief	155.2	Vietnam (28%), UAE (22%), Italy (17%), Malaysia (10%), Nepal (5%)	6.6	1.1%	Italy (13%), China (9%), Vietnam (9%), South Korea (7%), Turkey (7%)	7.7%	34.4%
720837	Flat-rolled products of iron or non-alloy steel, of a width of >= 600 mm, in coils, simply hot-rolled, not clad, plated or coated, of a thickness of >= 4,75 mm but < 10 mm, not pickled, without patterns in relief	128	Vietnam (31%), Italy (23%), Spain (12%), Malaysia (11%), Belgium (8%)	4.5	1.9%	Italy (14%), USA (7%), Egypt (6%), India (5%), Belgium (5%)	7.6%	43.5%
721049	Flat-rolled products of iron or non-alloy steel, of a width of >= 600 mm, hot-rolled or cold-rolled "cold-reduced", not corrugated, plated or coated with zinc (excluding electrolytically plated or coated with zinc)	127.6	Belgium (36%), Spain (31%), UK (22%), Italy (8%), France (1%)	22.7	2.1%	Germany (8%), USA (6%), Spain (6%), Belgium (5%), Thailand (5%)	1.6%	36.3%

HS Code	Description	Karnataka's Exports (US$ Million)	Karnataka's Major Export Destinations	World Imports (US$ Billion)	AAGR in World Imports (2010-19)	Major Importers	India's Share in World Exports	Karnataka's Share in India's Exports
902230	X-ray tubes	126	Singapore (36%), USA (24%), China (21%), France (10%), Japan (6%)	2	4.0%	China (25%), USA (14%), Japan (11%), Singapore (6%), Germany (5%)	7.2%	99.1%
290243	P-Xylene	120.6	China (76%), Malaysia (15%), UAE (9%)	19.8	10.8%	China (70%), Taipei (8%), India (4%), Indonesia (4%), USA (2%)	13.2%	4.7%
130219	Vegetable saps and extracts (excluding liquorice, hops and opium)	113.5	USA (60%), South Korea (11%), Japan (9%), Italy (4%), Germany (4%)	3.1	8.4%	USA (29%), Germany (8%), South Korea (7%), Japan (5%), France (5%)	11.2%	35.4%
610910	T-shirts, singlets and other vests of cotton, knitted or crocheted	110.9	USA (40%), Netherlands (8%), UK (6%), Italy (4%), Japan (3%)	28.8	2.3%	USA (16%), Germany (10%), UK (7%), France (6%), Spain (5%)	6.3%	5.6%
080132	Fresh or dried cashew nuts, shelled	110.8	UAE (39%), Saudi Arabia (22%), Germany (5%), Japan (4%), Kuwait (3%)	4.4	9.4%	USA (27%), Germany (11%), Netherlands (7%), UK (4%), China (4%)	12.0%	19.8%
630532	Flexible intermediate bulk containers, for the packing of goods, of synthetic or man-made textile materials	109.6	USA (30%), France (10%), Netherlands (9%), Australia (8%), Germany (7%)	2.5	6.7%	USA (17%), Japan (15%), South Korea (8%), Germany (8%), France (6%)	29.2%	15.6%
871120	Motorcycles, incl. mopeds, with reciprocating internal combustion piston engine of a cylinder capacity > 50 cm^3 but <= 250 cm^3	92.9	Bangladesh (%), Sri Lanka (%), Nepal (%), Colombia (%), Ethiopia (%)	9.1	6.5%	Nigeria (15%), Phillippines (11%), Vietnam (4%), USA (4%), Cambodia (3%)	17.9%	5.1%
200110	Cucumbers and gherkins, prepared or preserved by vinegar or acetic acid	75.5	USA (21%), Germany (14%), Australia (9%), France (8%), Netherlands (7%)	0.7	2.4%	Canada (11%), Germany (10%), USA (10%), Netherlands (9%), France (9%)	20.2%	68.6%
890510	Dredgers	74.4	Singapore (100%)	1.5	20.0%	Bangladesh (25%), Saudi Arabia (22%), India (17%), Kenya (10%), Senegal (3%)	32.6%	11.4%

HS Code	Description	Karnataka's Exports (US$ Million)	Karnataka's Major Export Destinations	World Imports (US$ Billion)	AAGR in World Imports (2010-19)	Major Importers	India's Share in World Exports	Karnataka's Share in India's Exports
330290	Mixtures of odoriferous substances and mixtures, incl. alcoholic solutions, based on one or more of these substances, of a kind used as raw materials in industry (excluding food or drink industries)	66.5	Indonesia (27%), South Africa (24%), Pakistan (10%), Iran (8%), Sri Lanka (6%)	8.9	5.0%	France (15%), Germany (6%), Spain (4%), Indonesia (4%), Thailand (3%)	3.2%	23.3%
300420	Medicaments containing antibiotics, put up in measured doses "incl. those in the form of transdermal administration" or in forms or packings for retail sale (excluding medicaments containing penicillins or derivatives thereof with a penicillanic structure, or streptomycines or derivatives thereof)	63.6	USA (37%), Iraq (9%), Brazil (6%), UK (6%), Slovenia (4%)	17.3	1.7%	USA (17%), Switzerland (11%), China (10%), Belgium (5%), Russia (4%)	7.1%	5.8%
901890	Instruments and appliances used in medical, surgical or veterinary sciences, n.e.s.	58.8	USA (55%), Germany (8%), Puerto Rico (6%), China (4%), Costa Rica (4%)	60.4	5.4%	USA (22%), Germany (7%), Netherlands (7%), China (6%), Belgium (5%)	0.5%	20.5%
030499	Frozen fish meat n.e.s. (excluding fillets)	57.3	Taiwan (27%), Thailand (18%), South Korea (15%), Singapore (10%), USA (9%)	1.8	-0.9%	Japan (30%), South Korea (10%), Thailand (7%), China (6%), Taipei (4%)	8.8%	24.4%
870850	Drive-axles with differential, whether or not provided with other transmission components, and non-driving axles, and parts thereof, for tractors, motor vehicles for the transport of ten or more persons, motor cars and other motor vehicles principally designed for the transport of persons, motor vehicles for the transport of goods and special purpose motor vehicles, n.e.s.	56.5	USA (48%), Thailand (17%), Italy (14%), UK (5%), Spain (3%)	25	5.1%	USA (19%), Mexico (11%), Germany (10%), Canada (5%), Austria (4%)	1.5%	14.6%

HS Code	Description	Karnataka's Exports (US$ Million)	Karnataka's Major Export Destinations	World Imports (US$ Billion)	AAGR in World Imports (2010-19)	Major Importers	India's Share in World Exports	Karnataka's Share in India's Exports
900150	Spectacle lenses of materials other than glass	55.9	France (49%), Germany (37%), Poland (4%), Malaysia (2%), UK (2%)	6.2	5.0%	USA (14%), France (9%), Germany (8%), China (5%), Netherlands (4%)	2.4%	39.6%
841112	Turbojets of a thrust > 25 kN	55.5	USA (38%), China (32%), Singapore (16%), Luxembourg (14%)	65.5	14.2%	USA (17%), UK (14%), France (9%), Germany (8%), Hong Kong (8%)	6.0%	1.8%
930510	Parts and accessories for revolvers or pistols, n.e.s.	52	USA (64%), Israel (13%), Turkey (9%), Czech Republic (6%), Philippines (3%)	0.3	11.2%	USA (67%), Slovakia (5%), Turkey (4%), Germany (4%), Czech Republic (4%)	25.2%	90.7%
871410	Parts and accessories of motorcycles, incl. mopeds, n.e.s.	49.8	Bangladesh (96%), Malaysia (2%), Indonesia (1%), Sri Lanka (1%)	8.4	64.4%	USA (8%), Germany (7%), Indonesia (6%), Thailand (6%), Italy (6%)	4.2%	12.7%
620442	Women's or girls' dresses of cotton (excluding knitted or crocheted and petticoats)	48.7	USA (49%), UK (10%), Germany (7%), Spain (6%), Canada (3%)	3.7	-0.7%	USA (15%), Japan (7%), Germany (7%), UK (7%), Saudi Arabia (6%)	15.8%	8.0%
732690	Women's or girls' dresses of cotton (excluding knitted or crocheted and petticoats)	47.5	USA (26%), Thailand (23%), Japan (17%), France (10%), Russia (3%)	48.6	4.7%	USA (10%), Germany (8%), Thailand (6%), Mexico (5%), China (4%)	1.8%	6.1%
843139	Parts of machinery of heading 8428, n.e.s.	47	USA (58%), Bangladesh (34%), Germany (3%), Nepal (2%), Bhutan (1%)	9.2	6.6%	USA (19%), Germany (7%), France (5%), Canada (5%), China (4%)	1.2%	47.2%
890110	Cruise ships, excursion boats and similar vessels principally designed for the transport of persons; ferry-boats of all kinds	46.9	Singapore (63%), UAE (37%)	5.9	4.4%	Italy (19%), Germany (18%), UK (8%), Poland (5%), India (4%)	5.4%	7.4%

Source: Data accessed from ITC Trade Map, India Exim Bank Research

In order to arrive at more item-specific strategies for export growth, the Study further classifies the product champions category into four sub-categories on the basis of change in Karnataka's export share in India's exports vis-à-vis India's export share in world exports, between 2015 and 2019. The detailed list of the same is given in Annexure 1.

Table 7 gives a summary of the number of product champion items at the HS 6-digit level belonging to each of the four categories, along with their export values and the corresponding recommendation on the kind of investments required.

As per the analysis, amongst the four categories, Category C accounted for the highest export value in 2019 at US$ 4.9 billion, highlighting the need for contemplating the reasons for the decline in State's export share across these 68 items and take corrective actions, which might span from incentivizing the sub-sectors to boosting investment.

Table 7: Export share Scenario for Karnataka and India: 2019 vis-à-vis 2015

Scenario of Exports in 2019 vis-à-vis 2015	Number of Items	Karnataka's Total Exports in 2019 (US$ Million)	India's Total Exports in 2019 (US$ Million)	Recommendation
Karnataka's share in India's exports has increased and India's share in the world exports has increased **(Category A)**	116	1764.3	14824.0	Sustain the momentum with the required investment and thrust
Karnataka's share in India's exports has increased but India's share in the world exports has decreased **(Category B)**	66	884.2	7011.0	Maintain and build over the comparative advantage over the other States, with an eventual increased share in India's exports
Karnataka's share in India's exports has decreased but India's share in the world exports has increased **(Category C)**	68	4974.8	46914.9	Identify the reasons and incentivize the sub sectors, in addition to the required investment
Karnataka's share in India's exports has decreased and India's share in the world exports has decreased **(Category D)**	40	383.4	5393.3	Identify the reasons and build the required sector-specific export friendly policies.

Source: DGCI & S; ITC Trade Map; India Exim Bank Research

Setting Merchandise Export Targets

The Economic Survey 2018-19 and the Union Budget 2019-20 indicated the Government's goal of making India a US$ 5 trillion economy by 2024-25. One of the key enablers for this would be the country's exports sector, with the Government targeting exports of goods and services to be at least 20% of the GDP, that is, US$ 1 trillion by 2024-25. Going by the current trend, almost two-thirds of the exports are expected to be generated by merchandise goods and the remaining one-third by services. Accordingly, to reach the US$ 1 trillion mark, while the economy will have to grow at a CAGR of about 9.5% during 2020-21 to 2024-25, the merchandise exports will have to grow at an even higher rate of 16.3%.

Accordingly, under an optimistic scenario, assuming that Karnataka's share in India's total merchandise exports remains the same at 5.2% as the latter touches US$ 666.6 billion mark in 2024-25, the total merchandise exports from the State will have to grow at the same CAGR to reach US$ 35.32 billion in 2024-25.

Further, under a Base Case scenario, which assumes that merchandise exports from Karnataka will grow at the same AAGR registered for its total merchandise exports during 2010-11 to 2019-20, the State may end up achieving approximately US$ 21.04 billion of goods exports by 2024-25, growing at a CAGR of 4.8%.

Lastly, under a pessimistic scenario, which assumes that India's total merchandise exports fail to achieve the US$ 666.6 billion target but touch the US$ 500 billion mark by 2024-25, the required CAGR for merchandise exports would be 9.8% during 2020-21 to 2024-25. Accordingly, in this case, growing at a CAGR of 9.8%, merchandise exports from Karnataka are likely to reach US$ 26.5 billion by 2024-25.

Overall, Karnataka's export target can range from US$ 21.04 to US$ 35.32 billion in the next five years, depending upon different scenarios.

Table 8: Merchandise Export from Karnataka: Target 2024-25

Possible Scenarios	Merchandise	
	(US$ Billion)	Required CAGR (2019-20 to 2024-25)
Actual	**16.6**	**–**
If the State's merchandise exports continue to grow at its AAGR of last 10-years (2011-20)	21.0	4.8%
Should India's merchandise exports reach US$ 666 billion, and Karnataka retains its 5.3% share in India's merchandise exports	35.3	16.3%
India achieves US$ 500 billion of merchandise exports and Karnataka retains its share in India's merchandise exports	26.5	9.8%

Source: Data accessed from DGCIS; India Exim Bank Research

It is noted that while the merchandise exports have not been concentrated around select industries, they have performed significantly below the envisaged potential in the recent years. In order to attain the said targets – in both short and medium terms, a holistic strategy focused on the State's core competencies is required which has been detailed in the next chapter.

CHAPTER 3:

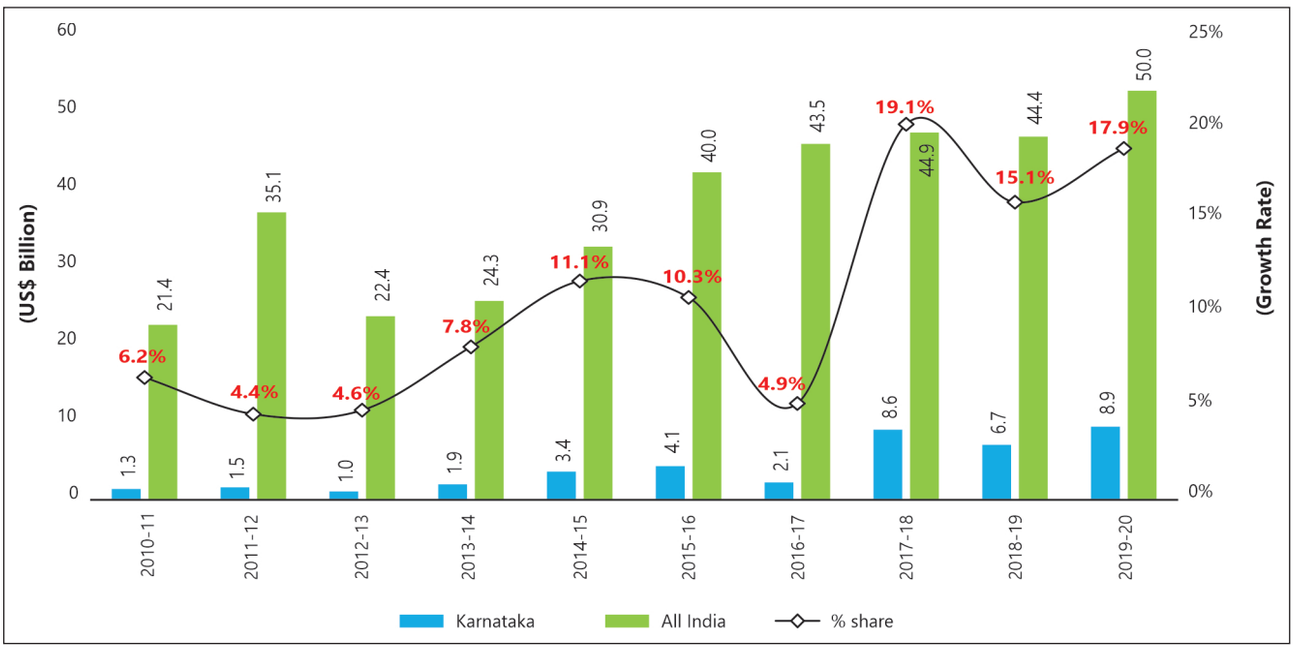
INVESTMENT SCENARIO

Karnataka has not only attracted domestic investments but also the foreign direct investment (FDI). The State's vast and diversified resource base has enabled it to become a reputed destination for investors worldwide. A few State-specific factors that have made Karnataka a preferred choice for both domestic and foreign investors include abundant availability of highly skilled manpower, knowledge output and diffusion, connectivity within the State and outside, and an entrepreneurial and innovative spirit.

According to the Centre for Monitoring Indian Economy (CMIE) States of India database, new investment projects worth ₹ 964.8 billion were announced in Karnataka in 2019-20. This was about twice the cost of new investment projects announced in 2018-19. With regard to completion of the investment projects in the State, 2019-20 saw a significant improvement with projects worth ₹ 442.7 billion being completed compared to the ₹ 227.7 billion in the previous year.

FDI, an important source of capital, supplements domestic private investment, boosts economic growth, leads employment generation, and may also facilitate technology transfer in the recipient regions. Recognizing the

Figure 10: Foreign Direct Investment Inflows in Karnataka



Source: Data assessed from Department for Promotion of Industry & Internal Trade (DPIIT); India Exim Bank Research

importance of FDI for economic development, the Government of India started the 'Make in India' programme which aims at promoting the country as an important investment destination and a global hub for manufacturing, design and innovation.

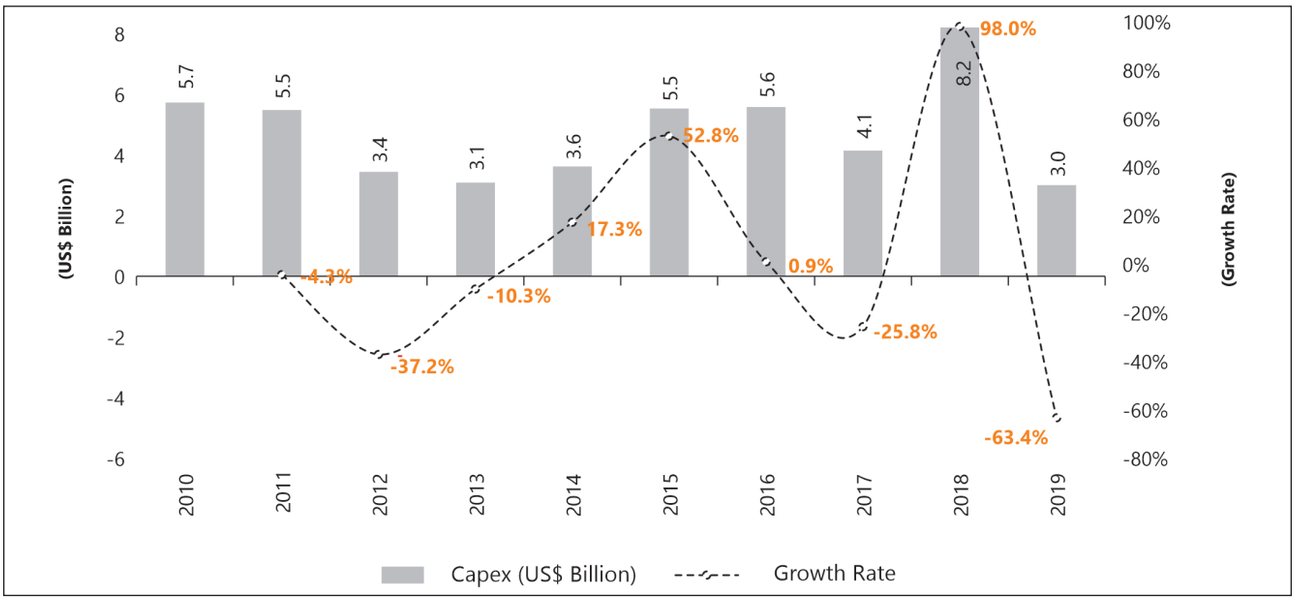
FDI in Karnataka: An Analysis

Karnataka attracted FDI inflows worth US$ 8.9 billion in 2019-20, which was 17.9% of the total FDI inflows in India during the year. The State was the second highest recipient of FDI inflows in India in 2019-20, at US$ 8.9 billion, next to Maharashtra which received FDI to the tune of 10.8 billion. During the years 2010-11 and 2019-20, Karnataka attracted cumulative FDI of US$ 39.7 billion, constituting 11.1 % of total FDI inflows in to India during the same period.

For an in-depth analysis of foreign investment inflows in to Karnataka, the DPIIT data is supplemented by using the data from fDi Markets database of the Financial Times, which provides disaggregated data not only at the State level but also cross classified at a sectoral level. The fDi Market database tracks cross-border investment in a new physical project or expansion of an existing investment creating new jobs and capital investment.

According to the fDi Markets database, during the period from January 2010 to December 2019, Karnataka had a total envisaged capex of US$ 47.7 billion, registering an AAGR of 3%. Roughly, this was about 11% of the the total envisaged capex in India, during this period.

Figure 11: Total Envisaged Foreign Capex received by Karnataka (2010-19)



Source: Data assessed from fDi Markets, February 2020; India Exim Bank Research

After Maharashtra (14%), the second highest foreign capex was envisaged in Karnataka, which was then closely followed by Andhra Pradesh with a share of 10%, Gujarat at 9% and Tamil Nadu at 8%. The top eight states, namely Maharashtra, Karnataka, Gujarat, Tamil Nadu, Haryana, Uttar Pradesh, and Delhi collectively accounted for 64% of the total envisaged foreign capex (EFC) in the country, during the same period.

In order to bring out the impact and significance of FDI to optimize exports in the right direction, Lionel Fontagné, in his Working Paper "Foreign Direct Investment and International Trade: Complements or substitutes?"[15] prepared

[15] Fontagné, L. (1999), "Foreign Direct Investment and International Trade: Complements or Substitutes?", OECD Science, Technology and Industry Working Papers, No. 1999/03, OECD Publishing, Paris

for the OECD, establishes that the foreign investment abroad stimulates the growth of exports from originating countries (investing countries) and, consequently, that this investment is complementary to trade. An analysis of 14 countries demonstrated that each dollar of outward FDI produces about 2 dollars' worth of additional exports to the home country.

Conversely, in host countries, short-term foreign investment most often tends to increase imports, whereas an increase in exports appears only in the longer term. However, in the short term, host countries enjoy many benefits from foreign investments like technology transfers, job creation, local subcontracting and more. While such a study has not been done for specific provinces or states, the empirical results are a reasonably strong proxy enabling us to deduce that FDI in India, as well as Karnataka, would form a key strategy for the State in its efforts of boosting both, merchandise and services exports.

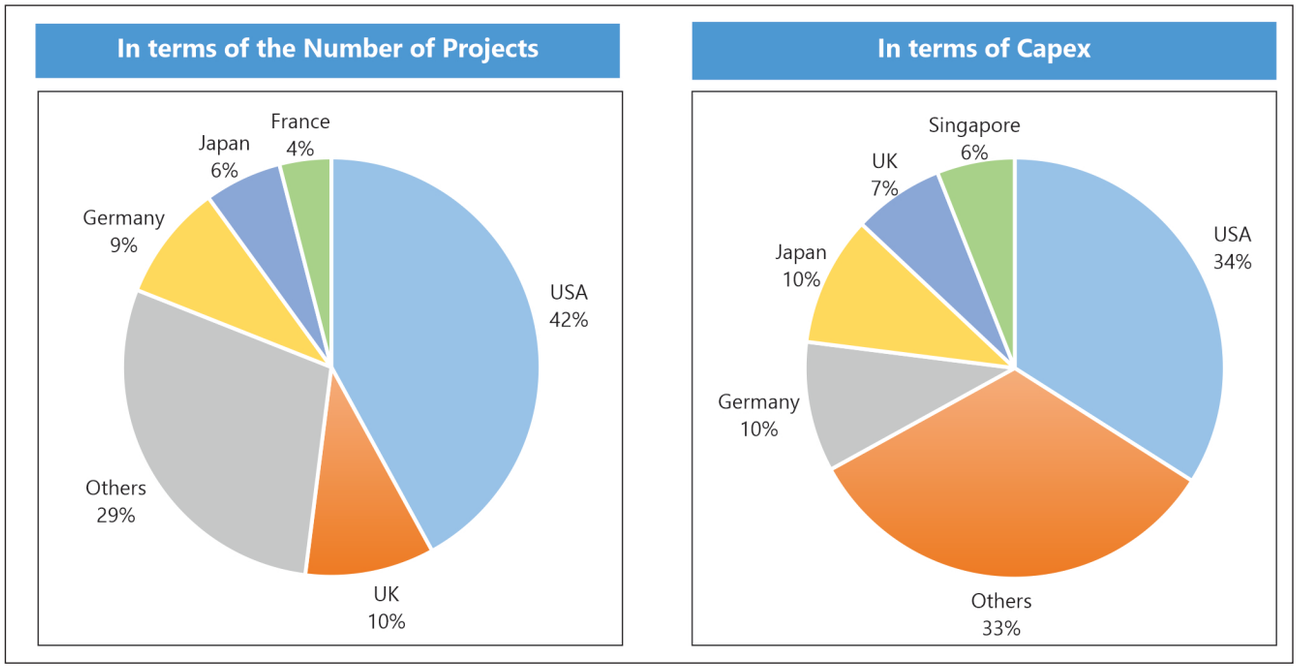
With respect to the foreign sources of investment for Karnataka, the USA accounted for the largest number of FDI projects announced in Karnataka during the period 2010 to 2019, with 42% of the total announced projects in the State, during this ten-year period. This was followed by the UK at 10%; Germany at 9%; Japan at 6%; and France at 4%.

With regards to total foreign envisaged capex in terms of value during these years, the USA was the leading source by this parameter too, accounting for 34% of the total foreign capital expenditure announced in Karnataka, followed by Germany and Japan at 10% each; the UK at 7%; and Singapore at 6%.

FDI Attractiveness and Potential Sectors for Attracting Investments

Given the increasing importance of foreign capex investments in augmenting exports from a country or a region, it is necessary to identify the specific sectors that have the potential to not only cater to the domestic demand, but also the foreign demands for both intermediates and finished goods. During the period 2010 to 2019, Software and IT services had the maximum EFC in Karnataka, followed by the Renewable Energy Sector, Real Estate and Communications. The four sectors, collectively, accounted for around 40% of the State's total EFC during the said period.

Figure 12: Top Sources of Envisaged Foreign Capex (EFC) received by Karnataka (2010-19)



Source: Data assessed from fDi Markets; India Exim Bank Research

Table 9: Envisaged Foreign Capex in Karnataka (EFC) – Industry wise: 2010 to 2019 (US$ Million)

Sector	EFC in Karnataka	EFC in India	Karnataka's Share in India's Total EFC
Software & IT services	8061.9	24614.9	33%
Renewable energy	3667.3	34467.3	10%
Real estate	3457.2	31439.4	11%
Communications	3277.4	19535.4	17%
Financial services	2778.2	23495.9	12%
Aerospace	2597.8	4722.8	55%
Automotive OEM	2583.2	24033.1	10%
Electronic components	2533	21674.3	12%
Metals	2441.2	36556.3	6%
Industrial equipment	2046.1	15715.5	13%
Coal, oil & gas	1472.8	26335.4	5%
Business services	1411.5	13095.2	11%
Consumer products	1374.3	16342.9	8%
Automotive components	1258.9	11997	10%
Semiconductors	1186.1	3369.7	35%
Transportation & Warehousing	978.1	24237.6	4%
Food & Beverages	932.1	10364.6	9%
Non-automotive transport OEM	885	5266.5	17%
Building materials	514.3	6578.2	8%
Leisure & entertainment	505	2727.1	18%
Engines & turbines	474.6	4729.2	10%
Chemicals	444.9	12904.7	3%
Hotels & tourism	429.3	5594.1	7%
Pharmaceuticals	360.5	3204.4	11%
Business machines & equipment	334.8	1415.6	24%
Medical devices	308.9	5533.2	5%
Healthcare	282.7	2228.4	13%
Plastics	252.7	2524.5	10%
Rubber	212.4	3545.5	6%
Paper, printing & packaging	184.5	4913.6	4%
Textiles	173.7	2513.6	7%
Space & defense	166.4	1188.4	14%
Consumer electronics	96.7	5562.6	2%
Biotechnology	81.1	304.1	26%
Minerals	17.4	478.4	3%
Wood products	14.4	103.7	14%

Source: Data assessed from fDi Markets; India Exim Bank Research

It is to be noted that Karnataka's share in India's total EFC during 2010 and 2019 was the highest at 55% for the aerospace sector, followed by semiconductors (35%), software & IT services (33%), and biotechnology (26%).

The Study herein has attempted to analyze the trends in investment flows across select sectors in the State of Karnataka with the following observations.

Aerospace Sector

The Economic Survey of Karnataka 2019-20 acknowledges that the State is the undisputed leader of the country in the Aerospace and Defence sector producing quarter of India's aircraft and spacecraft. It has a strong base of lower tier suppliers with more than 2000 SMEs which execute niche subcontracting work for the defense PSUs creating a strong ecosystem in the state, also making up for more than 65% of the aerospace related exports from the country.

The most recent measures taken by the State to give a push to the sector, apart from rolling out a dedicated Aerospace Policy, include earmarking 950 acres for an Aerospace SEZ near the Bengaluru International Airport and setting up of India's first operational Aerospace SEZ at Belgavi.

During the period 2010 to 2019, the sector had a total EFC of US$ 2.5 billion through 34 projects in the State. Boeing and Rolls-Royce Holdings PLC, each made up for 30% of the total EFC, followed by Hamilton Sundstrand (8%) and Airbus (7%). With regard to source markets, the USA accounted for more than 45% of the total EFC in the sector, followed by 33% share by the UK, and 16% share by the Netherlands. On the receiving end, Bengaluru alone accounted for 95% of the total EFC in Aerospace.

Biotechnology Sector

Also known as the biotech capital of India, Karnataka is home to one of the earliest and most thriving biotech ecosystems in India, holding about 2% market share of the global biotech industry, 9% market share in Asia and an impressive 35% share in India. The major hubs for biotechnology include Bengaluru, Mysuru, Hubballi - Dharwad, Tumakuru and Mangaluru, with new potential hubs under development, across the State. The support for industry and start-ups comes from the strong and evolving biotech research base in Karnataka, comprising of many nationally and internationally renowned research institutions, companies and startups. Currently, Karnataka's biotech industry comprises of 400 small, medium and large sized companies and 270 startups, together constituting 60% of the biotech companies in India[16]. Amongst the biotech market segments in Karnataka, Biopharma is the largest segment, contributing 65%, followed by Bioservices (16%), Bioagri (13%), Bioindustrial (3%) and Bioinformatics (3%).

During the period 2010 to 2019, the sector had a total EFC of US$ 81.1 million through 7 projects in the State. Notably, more than 55% of the total EFC was from Agilent Technologies alone and 19% from Merck KgaA, making the USA the biggest source markets for the investments.

Software and IT Services Sector

Karnataka's stellar progress in the high performing Software and IT Sector dates back to 1991, when the outsourcing industry came into being in the State. Gradually, realizing the potential the sector has been holding, Karnataka went on to becoming the first state to announce its IT Policy in 1997, becoming a role model for rest of the country. It initially started as a "Professional Support Services" industry but then created a big opportunity with the Y2K problem – requiring software engineers to look into practically every single computer, globally[17],

[16] Economic Survey of Karnataka 2019-20

[17] The Karnataka ICT Group 2020

and with plethora of such talent available in Karnataka, the State became the centre of choice to engage cost competitive manpower.

Bengaluru was the first city in India to set up a Satellite Earth Station in 1992, for high speed communication services to facilitate software exports. The State made a giant leap in the Information Technology sector by establishing the country's first extended facility of the international gateway and network operations centre at the Software Technology Park of India (STPI) in the Electronic City area.

Currently, Karnataka is home to over 5500 IT&ITES companies, 750 MNCs contributing to over US$ 58 billion (₹ 4 thousand crores) of exports, giving direct employment to over 12 lakh professionals and creating over 31 lakhs indirect jobs. Notably, the industry contributed to over 25% of the State's GDP and made up for nearly 40% of the country's US$ 155 billion exports in 2019-20.

It is acknowledged that investments, both domestic and foreign, have laid the foundation for the remarkable growth in the State's Software and IT Services Sector, and would play an even more important role in sustaining the same.

The sector had the highest EFC worth US$ 8.07 billion in the state, during the period 2010 to 2019. The top investing companies in the sector during the said period were Facebook (5%), NDS Group (4%), Robert Bosch (4%) and Sunpa (3%), while the maximum involvement was by IBM, Accenture, LinkedIn and Oracle.

Renewable Energy Sector

Karnataka State has been experiencing conditions of power shortage because of the ever-growing demand for power influenced by the rapid economic progress. In view of the shortage of electrical power, it is imperative to promote the use of renewable energy such as solar and wind power, and adoption of energy efficiency measures. The addition to the installed capacity during 2018-19 was 2705.54 MW, of which 1253.06 MW was under renewable energy. During 2019-20 (up to November 2019), the capacity addition under renewable energy stood at 1183.83 MW.

It is worth noting that in the private sector power generation capacity, the share of renewable energy sources of power generation (excluding the share of IPP Thermal & Mini Hydel) was 46.2% in 2018-19.

The State has been on the forefront of capacity addition in the Renewable Energy sector and the same has been evident through the cumulative EFC of US$ 3.6 billion during the period 2010 to 2019. Across the sub-sectors, maximum EFC of US$ 2.1 billion or 60% of the total EFC in the renewable energy sector was in the Solar Electric Power domain in the said period, followed by wind electric power (25%) and marine electric power (9%).

Comparative Advantage Analysis of FDI in Karnataka

Given the increasing importance of foreign capex investments in augmenting exports from a country or a region, it is necessary to identify sectors where FDI can be attracted not only to serve the domestic market but also to cater to the foreign markets. In order to do so, the Revealed Comparative Advantage (RCA) methodology for identifying key target sectors for inward investment has been used. Although, historically the limited availability of FDI data has hindered the application of RCA theory to FDI, the availability of new greenfield FDI datasets can make the application possible. These datasets can be disaggregated to the sub-national level, enabling inter-industry comparative advantage analysis for states, regions, countries and cities[18].

[18] fDi Markets

At the regional level, the RCA-FDI can be computed in the following way:

$$\text{RCA-FDI} = (FDI_{kj}/FDI_{k}) / (FDI_{ij}/FDI_{i})$$

Where,

FDI_{kj}: FDI into region 'k' (in this case, Karnataka) in sector 'j'

FDI_{k}: Total FDI into region 'k' (in this case, Karnataka)

FDI_{ij}: FDI into the country 'i' (in this case, India) in sector 'j'

FDI_{j}: Total FDI into the country 'i' (in this case, India)

This model presumes that the sub-national regions, i.e. the different states of India, are primarily competing for FDI with each other and not with any country/region overseas. A score of more than 1 will indicate that Karnataka has an RCA in the sector for inward FDI. A score of less than 1 will indicate that Karnataka has a revealed comparative disadvantage in the sector for inward FDI. It may be noted that in the model, the Envisaged Foreign Capital (EFC) has been used as a proxy to the FDI.

The analysis based on the RCA methodology has been undertaken at the sectoral level for the cumulative time period from 2005 to 2019 and has been further analyzed in three phases to mitigate any possible aberrations. The RCA methodology for inward investment was applied on 35 sectors across three time periods of 2005-09; 2010-14; and 2015-19.

The following matrix is colour coded in accordance with the trends in NRCA index for each of the major sectors – assigning the colour Green to the time period in which the index was at its highest and Red to the time period in which the lowest value for the same was observed.

Table 10: NRCA Index as per the Total Envisaged Foreign Capex in Karnataka (2005 to 2019)

Sector	2005-09	2010-14	2015-19
Aerospace	0.51	0.55	0.70
Automotive components	-0.39	-0.08	-0.02
Automotive OEM	-0.05	-0.15	0.06
Biotechnology	0.06	0.45	0.16
Building materials	0.37	-0.06	-0.36
Business machines & equipment	0.36	0.25	0.42
Business services	-1.00	0.19	-0.25
Chemicals	-0.19	-0.48	-0.64
Coal, oil & gas	-0.82	0.36	-0.67
Communications	-1.00	0.30	0.10
Consumer electronics	-0.98	-0.91	-0.56
Consumer products	-0.20	-0.14	-0.17
Electronic components	-1.00	0.45	-0.39

Sector	2005-09	2010-14	2015-19
Engines & turbines	-0.74	-0.50	0.17
Financial services	-0.28	-0.06	0.08
Food & Beverages	-0.44	-0.23	-0.03
Healthcare	0.02	-0.16	0.28
Hotels & tourism	0.19	-0.25	-0.16
Industrial equipment	-1.00	-0.23	0.29
Leisure & entertainment	-	-	0.21
Medical devices	0.75	0.05	-0.65
Metals	0.04	-0.19	-0.41
Non-automotive transport OEM	-	-	-0.03
Paper, printing & packaging	0.15	-0.04	-0.72
Pharmaceuticals	-0.12	0.01	-0.17
Plastics	0.10	0.12	-0.47
Real estate	0.20	0.03	-0.02
Renewable energy	0.25	-0.22	0.02
Rubber	-	-	-0.38
Semiconductors	-1.00	0.50	0.52
Software & IT services	-1.00	0.36	0.55
Space & defense	-	-	0.25
Textiles	-0.52	-0.06	-0.56
Transportation & Warehousing	-0.09	-0.46	-0.55
Wood products	0.27	0.60	-0.15

Source: Data assessed from fDi Markets; India Exim Bank Research

In the 35 major sectors considered, through the three specified time periods, a distinct change in Karnataka's competitiveness is noticed across nine major sectors. This included Automotive OEM; Communications; Engines & Turbines; Financial Services; Industrial Equipment; Leisure & Entertainment; Semiconductors, Software & IT Services and Space & Defense.

Notable improvement in the FDI attractiveness is reflected in sectors like Aerospace, Engines & Turbines, Financial Services, Healthcare, Industrial Equipment, Semiconductors and Software & IT Services during the period 2015 to 2019, compared to the period 2005 to 2009, with the last two sectors moving from being at an absolute comparative disadvantage in the period 2005 to 2009 to a relative comparative advantage during the period 2015 to 2019. The surge in investments across the aforementioned sectors has translated reasonably well into increased exports from the State, as well – making it a leader in the exports of Aerospace, Semiconductors and IT Services.

On the other hand, the State lost its FDI competitiveness across eight sectors – Building Materials, Hotels and Tourism, Medical Devices, Metals, Paper, Printing & Packaging, Plastics, Real Estate and Wood Products.

Table 11: Classification of the Sectors based on FDI Competitiveness (2005-09 vs 2015-19)

Gaining the Competitive Edge	Consistent Underachievers	Losing the Competitive Edge	Consistent Achievers
Automotive OEM, Communications, Engines & turbines, Financial Services, Industrial equipment, Leisure & entertainment, Semiconductors, Software & IT services, Space & Defense	Automotive Components, Business Services, Chemicals, Coal, Oil & Gas, Consumer Electronics, Consumer Products, Electronic Components, Food & Beverages, Pharmaceuticals, Textiles and Transportation & Warehousing	Building Materials, Hotels and Tourism, Medical Devices, Metals, Paper, Printing & Packaging, Plastics, Real Estate, Wood Products	Aerospace, Biotechnology, Business Machines & Equipment, Healthcare and Renewable Energy

Source: India Exim Bank Research

It is to be noted that in eleven sectors, out of 35, the State continued to be at comparative disadvantage throughout the period 2005 to 2019. These were Automotive Components, Business Services, Chemicals, Coal, Oil & Gas, Consumer Electronics, Consumer Products, Electronic Components, Food & Beverages, Pharmaceuticals, Textiles and Transportation & Warehousing.

Out of the lot, only seven sectors retained or gained the competence during 2005 to 2019. These were Aerospace, Biotechnology, Business Machines & Equipment, Healthcare and Renewable Energy. While the NRCA index for the first four showed a steady improvement, the same for the Renewable Energy sector registered a decline.

On comparing the sector-wise competitiveness of FDI for Karnataka with other competing states, namely, Maharashtra, Tamil Nadu, Gujarat and Haryana, following data have been obtained.

Table 12: Sector-wise NRCA Index as per the Total Envisaged Foreign Capex in Karnataka and Competing States (2005-19)

Sector	Karnataka	Maharashtra	Tamil Nadu	Haryana	Gujarat
Aerospace	0.7	-0.1	-0.9	0	-0.7
Automotive components	0	0.4	0.4	0.2	0.2
Automotive OEM	0.1	-0.1	0.3	-0.6	0.2
Biotechnology	0.2	0.6	-1	-1	0.5
Building materials	-0.4	-0.2	-0.2	-0.2	-0.3
Business machines & equipment	0.4	0.2	-0.4	0.1	-0.2
Business services	-0.2	0.1	-0.2	-0.2	-0.7
Chemicals	-0.6	0.4	-0.5	-0.8	0.2
Coal, oil & gas	-0.7	-1	-1	-0.7	0.5
Communications	0.1	0.1	0.1	-0.2	-0.9
Consumer electronics	-0.6	-0.2	0.2	-0.3	-0.6
Consumer products	-0.2	0.3	-0.1	0.3	-0.6

Sector	Karnataka	Maharashtra	Tamil Nadu	Haryana	Gujarat
Electronic components	-0.4	-0.7	0	-1	0.4
Engines & turbines	0.2	0.2	0.8	-1	-0.7
Financial services	0.1	0.2	0.1	-0.5	-0.3
Food & Beverages	0	0.1	-0.5	-0.6	-0.3
Healthcare	0.3	-0.9	-0.6	-0.9	-1
Hotels & tourism	-0.2	-0.4	-1	-0.2	-0.5
Industrial equipment	0.3	0.3	0.4	-0.4	0
Leisure & entertainment	0.2	0.2	0.4	-1	-1
Medical devices	-0.6	0.2	0.1	0.5	-0.2
Metals	-0.4	-0.1	0.1	-0.5	0.1
Non-automotive transport OEM	0	0.2	0.1	0	0
Paper, printing & packaging	-0.7	0.3	-1	-1	-1
Pharmaceuticals	-0.2	0.6	-1	-0.7	-1
Plastics	-0.5	0.4	-0.3	-0.7	0.5
Real estate	0	0.1	0.1	0.7	-0.2
Renewable energy	0	-0.9	-0.3	-0.7	-0.6
Rubber	-0.4	0.2	-0.6	0	0.5
Semiconductors	0.5	-0.3	-0.7	-0.9	-1
Software & IT services	0.5	0.2	-0.1	-0.3	-0.8
Space & defence	0.3	-0.4	-0.8	-0.4	-1
Textiles	-0.6	0.2	0.2	0	-0.6
Transportation & Warehousing	-0.6	0.4	0	0.2	-0.3
Wood products	-0.1	0.8	-1	-1	-1

Source: Data assessed from fDi Markets; India Exim Bank Research

The State of Karnataka has evidently outperformed the other four States across the sectors like Aerospace, Space & Defense, Software & IT Services and Semiconductors, in terms of FDI attractiveness as measured by the NRCA index. However, it is worth noting that even though, for sectors like Renewable Energy and Food & Beverages, Karnataka's performance when compared to the other States was better, it still did not indicate any signs of comparative advantage.

Further, it may be noted that the highly export oriented sectors, like Pharmaceutical, Automotive Components, Textile, Chemicals and Business Services, should be approached on a priority basis in a phased manner to identify and rectify the challenges faced by these sectors, so that FDI is received at the optimum level and the sectoral potential is fully realized.

CHAPTER 4:

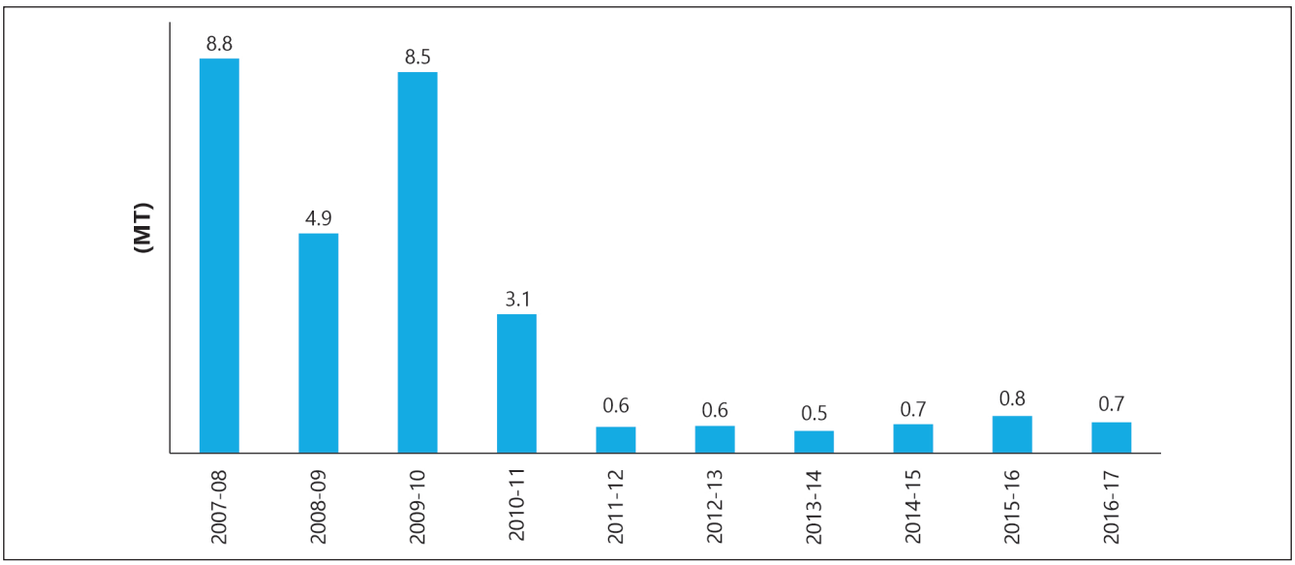
EXPORT INFRASTRUCTURE

To supplement the State's effort in realizing its envisaged merchandise export potential, the export infrastructure will have a critical role to play. A well-developed and resilient export infrastructure in the State, by improving regional connectivity helps in significant reduction in logistics costs to facilitate exports. Apart from making the State's own exports more competitive in the international markets, development of export infrastructure can play a crucial role in re-routing the foreign trade flows of neighbouring states via Karnataka. Going forward, following are the key areas that could be worked on for creation of new facilities and upgradation of existing export infrastructure in Karnataka.

Port Development

As has been noted, Karnataka has a maritime coastline of 155 nautical miles (300 kilometers), studded with ten minor ports and one major port. However, due to inadequate infrastructure across all ports in the State, the amount of traffic handled at the non-major ports remained as low as 0.7 MT during 2016-17, compared to 345.7 MT in Gujarat, 34.8 MT in Maharashtra and 69.6 MT in Andhra Pradesh[19] (the states that have higher exports

Figure 13: Traffic Handled at Non-Major Ports in Karnataka



Source: Data accessed from Ports Association from India; India Exim Bank Research

[19] Indian Ports Association

than Karnataka). In fact, Emma Maersk (largest cargo ship) can not come closer to these ports due to limited port capacity and associated infrastructure.

A ten-year data from the Indian Ports Association, shows that there has been a sudden plunge in the total traffic handled at the non-major ports in Karnataka from 8.8 MT in 2007-08 to just 0.7 MT in 2016-17. With regards cargo traffic, the State's only major port, New Mangalore Port Trust (NMPT), saw a 5% increase from 39.9 MT in 2017 to 42 MT in 2018, but continued to remain substantially below the other major ports like Kandla (110 MT), Paradip (102 MT), JNPT (66 MT), Vishakhapatnam (65 MT), and Chennai (51 MT).

The state of the non-major ports, with the exception of Karwar, is not very encouraging, given the fact that they not only lack the required infrastructure and warehousing facilities, but also pose a huge connectivity challenge, which in turn is passed on to the exporters with a significantly higher logistics cost. Therefore, majority of the Karnataka's cargo is being exported/imported by the ports of neighboring states.

In order to reduce Karnataka's dependence on its neighboring States for the merchandise foreign trade, apart from deepening the draft at various ports, it is important to boost investments via PPP mode, preferably on a BOT basis (For example: Construction of Container Terminal at Ennore Port in Tamil Nadu; Mechanization of EQ 1,2,3 Berths at Paradip Port) models for both, greenfield and brownfield projects. Focus should also be laid on undertaking Capital Dredging to deepen the channel draft and enable the entry of larger vessels into the State's major ports, especially the New Mangalore Port. It is to be noted that by allowing the entry of larger ships, carrying more cargo, the cost per container gets reduced significantly, thereby making the port viable and internationally competitive.

It is to be noted that the only port from Karnataka, NMPT, comes within the purview of Project Unnati – aimed at improving the efficiency and productivity Key Performance Indicators (KPIs) for twelve major ports in India as per the global benchmarks. As per the data sourced from the Ministry of Shipping, out of the five initiatives designated towards improving operational efficiency at the NMPT, only two have been completed and the remaining three have been dropped. In this context, a thorough relook of the State's port infrastructure is required with definite timelines to plug the gaps and help the State achieve its export potential.

Development of Inland Container Depots

Inland Container Depots, otherwise known as ICDs, are dry ports equipped for handling and temporary storage of containerized cargo as well as empties. This means that hinterland customers can receive port services more conveniently closer to their premises. It may be noted that Karnataka lags behind other States in terms of the number of ICDs. Out of the total 46 ICDs in India, only one is located in Karnataka (Whitefield, Bangalore), compared to seven in Maharashtra, six in Andhra Pradesh and three in West Bengal. It may be noted that the construction of an ICD Container Corporation of India Limited (Concor) at Kadakola near Mysuru has recently started.

Put overall, the merchandise exports from Karnataka could see a massive revival with the redevelopment of ICDs. Despite the train connectivity at the Bangalore ICD, all the cargo is transported either to the Chennai Port or Paradip and none to New Mangalore, thereby contributing more to the businesses of ports in other states.

Warehousing and Storage Capacities

The logistics sector, comprising the transportation, storage and distribution components is a key driver of a State's competitiveness in the national and international markets. Transportation accounts for nearly 60% of the logistics market in India, while warehousing accounts for 25%. The remaining 15% is accounted by the freight forwarding and the value-added logistics. In Karnataka's context adequate transportation, storage and distribution services

is a major constraint as sensitive products such as pharmaceuticals and marine products account for a significant share of the State's exports.

Similarly, the State also needs substantial expansion of cold storage infrastructure as also multipurpose cold storage facilities, which are critical for ensuring quality and maintaining shelf life of perishable products such as potatoes and dairy products. Currently, the State has over 150 cold storage units, 20 of them with a capacity of over 5000 MT. In addition to this, it is noted that the total horticulture production in the State stood at 22,156.5 thousand MT[20] in 2018-19 with insufficient cold storage facilities to slightly stretch the shelf-life of the produce. Even though Karnataka has been the second highest recipient of the disbursements under NABARD's Warehouse Infrastructure Fund at ₹ 2.24 billion during 2013-14 to 2019-20, given the vast export potential of the State, funds are required not only to setup new warehouses, but also to upgrade the existing ones. Going forward, the State authorities must consider setting up emerging models like automated warehouses and other warehouse management systems to optimize the inventory levels and build more efficient supply chains.

The State could consider developing a multi-modal cold-chain network which can involve two or more modes of transport for facilitating transportation and storage of perishable products. Investment in development of last mile connectivity can also serve as an objective for this proposed multi-modal network. Given the fact that most of these cold storages are located in Bengaluru and Bellary, the State needs to initiate steps in order to not only upscale the current capacity to meet future needs but also address the locational biasedness, so as to reduce the overall cost for the exporters, who are spread across the State.

Leveraging the Trade Infrastructure for Export Scheme

The Trade Infrastructure for Export Scheme (TIES) was launched in 2017-18 with a view to assist Central and State Government Agencies for creation of appropriate infrastructure for growth of exports from the States. The Scheme provides financial assistance in the form of grant-in-aid to Central/State Government owned agencies for setting up or for up-gradation of export infrastructure. The scheme can be availed by the States through their Implementing Agencies, for infrastructure projects with overwhelming export linkages like the Border Haats, Land customs stations, quality testing and certification labs, cold chains, trade promotion centers, dry ports, export warehousing and packaging, SEZs and ports/airports cargo terminuses.

However, the funds received by Karnataka under TIES during 2017-18 to 2018-19 have remained significantly lower than the other states.

Table 13: State-wise Disbursements under the Trade Infrastructure for Export Scheme

State	TIES fund released (₹ crore)
Tamil Nadu	36.99
Andhra Pradesh	36.15
Madhya Pradesh	25.71
Manipur	11.83
Kerala	13.00
Karnataka	8.70
Tripura	6.15

Source: PIB

[20] National Horticulture Board

Even though the TIES is designed to provide assistance for setting up and up-gradation of infrastructure projects with significant export linkages, sectors like textile, electronics, and IT do not fall within its purview. The funds designated for the scheme could therefore be used to develop and expand the existing cold chains and trade facilitation centers. Focus should be laid on encouraging departments like Department of Horticulture, State Drugs Logistics and Warehousing Society and other PPP projects to gain access to the TIES funds. It is to be noted that the eligibility of PPP projects under the Scheme presents a unique opportunity to combine the public and private investments towards building of resilient export infrastructure.

GI Recognition

The reference to geographical origin along with the use of traditional practices and processing methods, provides substantial marketing potential. As per the WTO Agreement, (under Article 22(1), on TRIPS (Trade-Related Aspects of Intellectual Property Rights) GI has been defined as "Indications which identify a good as originating in the territory of a member, or a region or a locality in that territory, where a given quality, reputation or characteristic of the good is essentially attributable to its geographic origin."

GIs are considered important tools for marketing strategies, and function as product differentiators. However, one of the major issues with GIs is that consumers are usually not aware of how the GI tag is supposed to convey information regarding the special characteristics, quality or reputation of the concerned product. Therefore, it requires government or private effort to advertise, improving communication between the producer and the consumer and filling in the other gaps created by information asymmetry. Currently, following are the GI tagged products from Karnataka.

Table 14: Karnataka's GI Tagged Products

Geographical Indications	Goods (As per Sec 2 (f) of GI Act 1999)
Mysore Silk	Handicraft
Mysore Agarbathi	Manufactured
Birdiware	Handicraft
Channapatna Toys & Dolls	Handicraft
Mysore Rosewood Inlay	Handicraft
Mysore Sandalwood Oil	Manufactured
Mysore Sandal soap	Manufactured
Kasuti Embroidery	Handicraft
Mysore Traditional Paintings	Handicraft
Coorg Orange	Agricultural
Mysore Betel Leaf	Agricultural
Nanjanagud Banana	Agricultural
Mysore Malligae	Agricultural
Udupi Malligae	Agricultural
Hadagali Malligae	Agricultural
Ilkal Sarees	Handicraft
Ganjifa Cards of Mysore	Handicraft

Geographical Indications	Goods (As per Sec 2 (f) of GI Act 1999)
Navalgund Durries	Handicraft
Karnataka Bronzeware	Handicraft
Molakalmuru Sarees	Handicraft
Monsooned Malabar Arabica Coffee	Agricultural
Monsooned Malabar Robusta Coffee	Agricultural
Coorg Green Cardamom	Agricultural
Malabar Pepper	Agricultural
Dharwad Pedha	Food Stuff
Devanahalli Pomello	Agricultural
Appemidi Mango	Agricultural
Kamalapur Red Banana	Agricultural
Sandur Lambani Embroidery	Handicraft
Byadagi Chilli	Agricultural
Udupi Mattu Gulla Brinjal	Agricultural
Kinhal Toys	Handicraft
Bangalore Blue Grapes	Agricultural
Bangalore Rose Onion	Agricultural
Navalgund Durries (Logo)	Handicraft
Guledgudd Khana	Handicraft
Udupi Sarees	Handicraft
Mysore Silk (Logo)	Handicraft
Kolhapuri Chappal	Handicraft
Coorg Arabica Coffee	Agricultural
Wayanaad Robusta Coffee	Agricultural
Chikmagalur Arabica Coffee	Agricultural
Bababudangiris Arabica Coffee	Agricultural
Sirsi Supari	Agricultural

Source: GI Application Register

To reap the benefits of GI status, it is important for the GI brand to be recognized as a reliable and preferred brand in the market with a distinguished positioning. In order to leverage the GI certification, Karnataka could consider adopting a two-pronged approach – first, identifying newer products from different categories which can be conferred GI status, like the two varieties of paddy Kaggabhatta from Kumta, and Rajamudi from Hassan, and 'Kare Eeshadu', a variety of mango from Ankola. Second, branding the existing GI products like the Dharwad Peda, Mysore Silk, Appemidi Mangoes and Coorg Green Cardamom. The marketing and branding strategy for

GI products, apart from effectively exploiting the commercial potential of the designated products should be aimed at improving the awareness of GI brands amongst customers, protecting their market share and increase the access to new markets[21]. This could be done by creation of a Market Development Fund, wherein the funds for the activities of the GI enablers initially come from the State government and later can be supplemented by contributions from producers. For example, in order to build the brand awareness for select GI products, the State government could fund the advertising campaigns in the preliminary stages. Subsequently, once the brand is established, the respective producers could contribute to the fund as well. Throughout the stages of branding, e-commerce platforms must be leveraged to the maximum possible extent to tie-up with various retailers and consumers spread across the world. Currently, there are nineteen Karnataka GI tags for handicraft products, sixteen for agriculture-related products, three for manufactured products and one food item.

The State could effectively use platforms like Incredible India for a wider reach and recognition of these products. Previously, the campaign has been successful in doing so with the ad films on the State tourism and specialties being played on the screens of passengers on New Delhi bound international flights. A similar campaign could be designed to promote the exports of Karnataka's GI tagged products as well.

Lastly, the State Government could complement its efforts of GI branding by setting up a Brand Equity Fund, along the similar lines as India Brand Equity Foundation (IBEF), which can function under the aegis of the Department of Commerce, Industry and Employment of the Karnataka Government, focused on building globally competitive brands for products originating from the State.

De-crowding Bengaluru and Focus on Urban City Planning

Bengaluru's initial growth was spearheded primarily by heavy investment from the Central Government in the public sector, which resulted in a concentration of technical and scientific skills. Currently, the city contributes to over 85% of the State's economy and accounts for about 98% of the State's software exports.

The Government of Karnataka, in multiple instances, has acknowledged that the city of Bengaluru levels, and requires restrictions to be imposed on further activities, besides incentivizing industries to shift to tier-II cities. While Bengaluru has had its own comparative advantages, making it a preferred choice for starting and operating businesses in the country, it is in a dire need for an appropriate de-crowding strategy.

While shifting industries away from Bengaluru, especially manufacturing, to the State's tier-II cities the first step to achieve the aforementioned goal, doing so will require extensive and streamlined marketing activity to be undertaken by the State Government and its institutions — like the Karnataka Industrial Area Development Board (KIADB), the Karnataka Small Scale Industries Development Corporation (KSSIDC), the Small Industries Development Corporation (SIDCO), to address industry challenges for Karnataka's tier-II cities to develop some attributes comparable to Bengaluru. De-crowding of Bengaluru on a macro level could be planned on the basis of the State's 'Beyond Bengaluru' initiative, as envisioned in the IT Policy 2020-25. The initiative has identified the upcoming cities of Karnataka[22] like Mysuru, Hubballi-Dharwad, Kalaburagi, Belagavi and Mangaluru to be having the potential competitive advantages in terms of relatively low-cost structures and rapid urbanization in comparison to the saturated metros across comparative states. While 'Beyond Bengaluru' has been focused on building the IT and ITeS ecosystem beyond the capital city, the State could engage in undertaking such initiatives for other industries as well.

In this regard, it is also suggested that the Government of Karnataka, with the Central Government's assistance, starts working on improving connectivity between the identified satellite cities and Bengaluru by expanding

[21] Centre for WTO Studies "Marketing of GI Products: Unlocking their Commercial Potential"
[22] Outside Zone 3 as per the prevailing Karnataka Industrial Policy

the network o expressways and mass-rapid urban transport systems. Simultaneously, ten-year tax holidays or concessions could be given to businesses setting up bases in the identified locations.

Further, it is suggested that cities in geographical proximity of Bengaluru (e.g. Tumakuru and Mysuru) could be developed along the similar lines as the twin cities concept, like that of Hyderabad and Secunderabad, Mumbai and Pune, Bhubaneswar and Cuttack, Ahmedabad and Gandhinagar, Delhi and NCR, Bhopal and Indore, amongst many others.

Institutional linkages quintessential for Technology Clusters

The Government of Karnataka can facilitate an enabling environment for strong industry-academia linkages, wherein institutions are motivated and encouraged to share common platforms with clusters for knowledge sharing and research. Karnataka, in that regard, has an inherent advantage over its competing states with the endowment of country's top-notch institutions in the fields of science, technology and management.

It may be noted that in 2019, Karnataka stood amongst the highest-ranking states as per the university-industry linkage index. The survey, conducted by PHD Chamber of Commerce and Industry in association with the Ministry of Science and Technology, takes into account six key parameters[23] to establish a relationship between university-industry linkages and the employment scenario in the country. Further, the survey identified ten sectors for improving industry linkage through capacity building, research and development activity, including agro and food processing, textiles, information technology (IT) and IT-enabled services, energy, cement, pharmaceuticals and automotive sectors.

While the industry linkages were found to be moderate in India with an overall score of 4.7 on a scale of 10, the State of Karnataka scored 7.8 out of 10, higher than Kerala (7.3) and Gujarat (6.7). While the Study suggests that the State should focus on building industrial clusters related to pharmaceuticals sector and research centers, centers of excellence related to machine tools, agriculture implements and food processing, among others, to further improve its university-industry linkages, it is important to take note of the strategic collaboration between the National Institute of Technology Karnataka and Bosch, a valid case-in-point in aforementioned context.

Box 1: Strategic collaboration of the National Institute of Technology Karnataka and Bosch

Bosch Power Tools Training facility was established at the National Institute of Technology, Karnataka in order to tap the high market potential for power tools in the State of Karnataka. The same was funded by Technical Education Quality Improvement Program (TEQIP) and which was supported by the Power Tools Division of Bosch.

Key Objectives of the Collaboration

The collaboration between the NIT, Karnataka and BOSCH was aimed at addressing the following areas:

- Providing the students access to the state of art and power tools facility so as to have the best of facilities, thereby encouraging R&D activities.
- To identify skill gaps in the market and potential for the industry collaboration to ensure mutual benefits, and benefits to the society at large.
- To enable the students to gain hands-on experience with the support of industry experts from Mico-Bosch.

[23] Industry consultation in setting up of pedagogy; Gaining patents; Regular interaction with industry; Student's internships; Providing specific solutions to the industry; Links with industry

- To maintain successful collaborations and ensure that it holds periodic review through meetings of the joint working group dedicated to the industry.
- Improving the curriculum to make the students more market-ready and to enhance their innovative thinking.

Key Learnings

The key takeaways from the aforementioned collaboration were:

- An important outcome from this training center was that the University also utilized the laboratory as a part of its social responsibility initiative. The lab facilities were being used for training purposes in respect to the Community Development Programs for skilling local people.
- The workshops were being conducted on a regular basis and were helping the rural artisans in upgrading their skills.
- This collaboration included a combination of product demonstration and training in order to empower the self-employed artisans so that they could further negotiate trade on their own.
- This collaboration also focused on giving hands on experience of using a power tool for carpentry, metalworking and construction which facilitated the students to undertake research and activities with the state-of-the-art technology.
- This collaboration believed in providing an opportunity not only to interact with current students but also to influence the curriculum being taught in Universities so as to ensure that they have both practical and theoretical elements which would guarantee that the students are not only academically qualified but also trained in practical skills that are relevant to the market.

Source: Adapted from "Framework of Industry-University Linkage in Research", Department of Scientific and Industrial Research, Ministry of Science and Technology, Government of India

CHAPTER 5:

BOOSTING SERVICES EXPORTS FROM KARNATAKA

Services Exports: India

Over the last few years, India's services exports have visibly outperformed the merchandise exports, resulting in India's increased share in world's commercial services exports to 3.5% in 2019, up from 3.1% in 2010. According to RBI, India's total services exports reached US$ 213.2 billion in 2019-20, registering an AAGR of 5.5% during 2010-11 to 2019-20.

Apart from the significant growth noted in the IT sector exports, medical and wellness tourism has also exhibited good performance, with patients from other countries seeking high-quality medical treatment at competitive prices in Indian hospitals.

According to NASSCOM, India's IT-BPM total industry revenue (including hardware) was valued at US$ 191 billion in 2019-20, up from 146.4 billion in 2014-15, thereby recording an AAGR of 5.5%, during this period.

The IT-BPM exports were recorded at US$ 136 billion in 2018-19, a share of almost 77% in the total IT-BPM revenue in 2018-19. The highest contributor to India's IT BPM exports revenue in 2018-19 was IT services with exports amounting to US$ 74 billion, followed by BPM exports revenue and exports of software products, engineering and R&D services. It may be noted that 'exports of software products, engineering and R&D services' and hardware production recorded double digit AAGRs during 2014-15 to 2019-20.

Table 15: Major Indicators of IT-BPM Industry

Parameter	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	AAGR (2014-15 to 2018-19)
IT-BPM Total Industry Revenue (incl. Hardware), US$ Billion	146.4	143.0	154.0	167.0	177.0	191.0	5.5%[24]
IT-BPM Domestic Revenue, US$ Billion	48.0	35.0	38.0	41.0	41.0	44.0	-0.7%[25]
IT-BPM Exports Revenue, US$ Billion	98.5	108.0	117.0	126.0	136.0	147.0	8.3%[26]

[24] From 2014-15 to 2019-20
[25] From 2014-15 to 2019-20
[26] From 2014-15 to 2019-20

Parameter	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	AAGR (2014-15 to 2018-19)
IT Services Revenue, US$ Billion	68.6	75.0	80.0	86.0	91.0	-	7.3%
IT Services Domestic Revenue, US$ Billion	13.3	14.0	15.0	17.0	17.0	-	6.4%
IT Services Exports Revenue, US$ Billion	55.4	61.0	65.0	69.0	74.0	-	7.5%
BPM Revenue, US$ Billion	26.0	28.0	30.0	32.0	35.0	-	7.7%
BPM Domestic Revenue, US$ Billion	3.5	4.0	4.0	4.0	4.1	-	4.2%
BPM Exports Revenue, US$ Billion	23.0	24.0	26.0	28.0	31.0	-	7.8%
Exports of Software Products, Engineering and R&D Services	20.0	22.4	25.0	26.0	30.0	-	10.7%
Hardware Production, US$ Billion	31.1	37.2	47.3	60.2	65.5	-	20.7%

Source: NASSCOM; India Exim Bank Research

Services Exports: Karnataka

With respect to Karnataka's overall services scenario, its Net State Value Added (NSVA) by services at Constant Prices stood at ₹ 5.73 trillion during 2019-20, accounting for 8.9% share in the country's Net Value Added in the services sector and 63.6% share in Karnataka's total NSVA in 2019-20. During 2011-12 to 2019-20, Karnataka's NSVA by the services sector grew at an impressive AAGR of 9.0%, compared to 7.9% and 6.5% AAGR observed for Maharashtra and Tamil Nadu, respectively.

Table 16: Karnataka's Net State Value Added by Services

Year	NSVA (₹ trillion)	Growth
2011-12	2.89	–
2012-13	3.20	10.7%
2013-14	3.54	10.7%
2014-15	3.78	6.8%
2015-16	4.26	12.7%
2016-17	4.71	10.6%
2017-18	4.95	5.0%
2018-19	5.38	8.7%
2019-20	5.73	6.4%

Source: CMIE States of India; India Exim Bank Research

At a sub-sectoral level, highest AAGR of 9.8% community, social and personal services was recorded for which was followed by (9.4%), and trade, hotels, transport, storage and communication (7.9%) during 2011-12 to 2019-20.

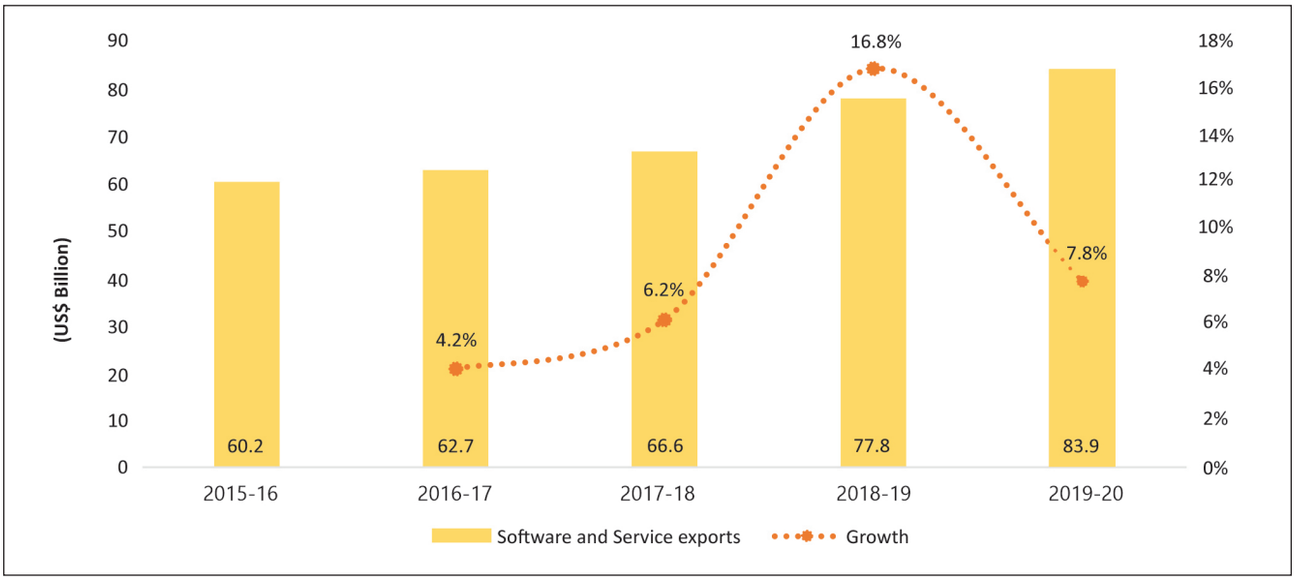
Tourism, IT and ITeS, and healthcare services sector were among the major services exports from the State. In addition, Karnataka has traditionally been a hub for engineering services in the country, with presence of leading PSUs like Bharat Electronics Limited (BEL), Hindustan Machine Tools (HMT) and Bharat Heavy Electricals Limited (BHEL), as well as large MNCs like SKF, Ingersoll Rand, Waltex and Durco. Going forward, the State could also focus on increasing the share of engineering services exports in the total services exports.

Further, it may be noted that India's services trade prospects remain bright, primarily on account of abundant skilled manpower across the various sectors that are both essential and critical to the overall economic growth of the country. In this regard, being the largest exporter of software and services, Karnataka's services export performance could likely be considered to be the driver for the services exports from the country.

As per the Visvesvaraya Trade Promotion Centre (VTPC), the software and services exports from the State were valued at US$ 83.9 billion in 2019-20. Between 2015-16 and 2019-20, the AAGR in software and services exports from Karnataka was recorded at 8.7%, higher than the AAGR of 8.0% recorded for exports of the same from India.

It may also be noted that the Government of Karnataka recently announced the Karnataka Digital Economy Mission in 2020 which targets a revenue of US$ 150 billion in IT exports in the next five years.

Figure 14: Exports of Software and Services – Karnataka

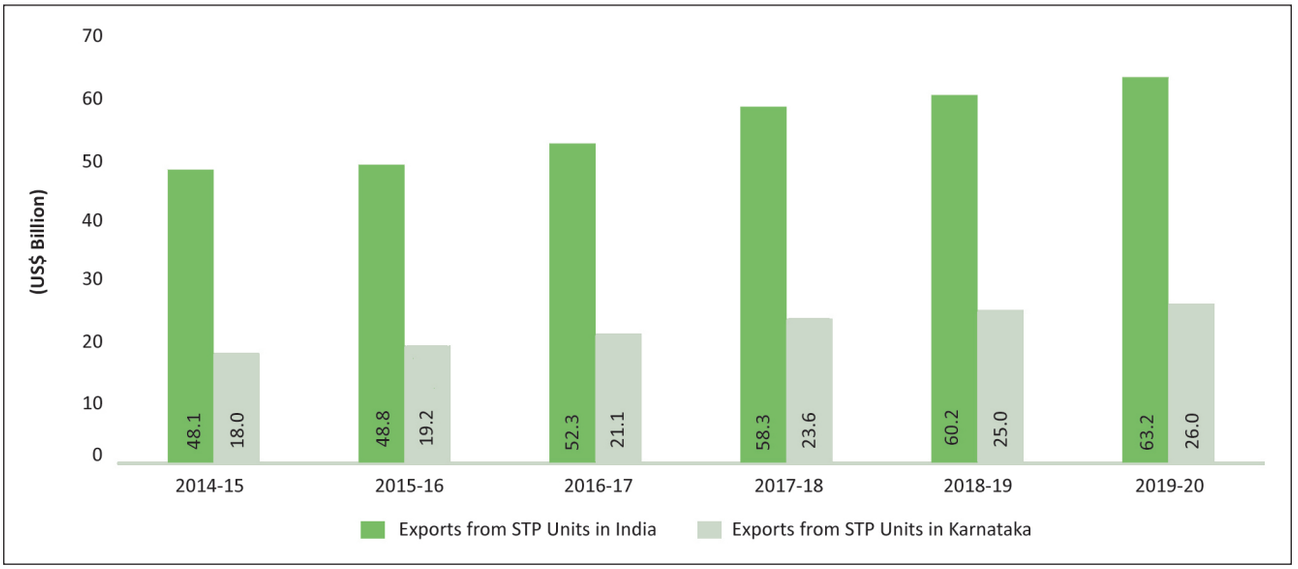


Source: Data accessed from Visvesvaraya Trade Promotion Centre (VTPC), Government of Karnataka; India Exim Bank Research

As with regard to the Software Technology Parks of India (STPI) in Karnataka, the Computer Software and ITeS exports from Karnataka's STPI units were registered at US$ 26 billion in 2019-20, growing at an AAGR of 7.8% between 2014-15 and 2019-20, as against the AAGR of 5.7% recorded for India's overall exports of Computer Software and ITeS exports from the STPI units.

As can be seen in Figure 15, during 2019-20, Karnataka accounted for over 41% of the Computer Software and ITeS exports from all the STPI units in India. Currently, there are sixty STPs in India, out of which, five are in Karnataka (Bengaluru, Hubli, Mangaluru, Manipal, and Mysore). Another STP in Davangere in Karnataka is in the pipeline.

Figure 15: Computer Software and ITeS Exports from STPI Units: Karnataka vis-à-vis India (2014-15 to 2019-20)[27]



Source: Data accessed from STPI; India Exim Bank Research

Targeting the Exports of Engineering, Research and Development (ER&D) Services

India has demonstrated a steady progress in the Engineering Research & Development (ER&D) sector since the digital revolution came into picture, with Karnataka spearheading the sector's growth. Over the last two decades, India's focus areas in the ER&D sectors have shifted from relatively low to mid engineering domains such as the computer-aided design (CAD)/computer-aided engineering (CAE), embedded software testing and validation services to software development and system engineering. However, the decade 2016-25 is likely to be an inflection point for the sector with the emergence of Industry 4.0, which is expected to redefine value chains across industries. Given this scenario, the role of ER&D services[28] has become even more crucial than before.

The ER&D sector saw a global spending of US$ 1.4 trillion in 2018 and is resiliently reflecting a consistent growth pattern and evolution, expecting to reach US$ 2 trillion by 2025[29]. With the software and internet vertical segment growing in double digits and impressive investments by companies such as Amazon, Microsoft, Facebook, Alphabet and Oracle, the ER&D sector has grown much faster than the traditional IT sector. According to NASSCOM, during 2019 to 2025, while the global spending on ER&D is expected to grow at a CAGR of 36%, the global spending on sourced ER&D spending is expected to grow at a higher CAGR of 45%.

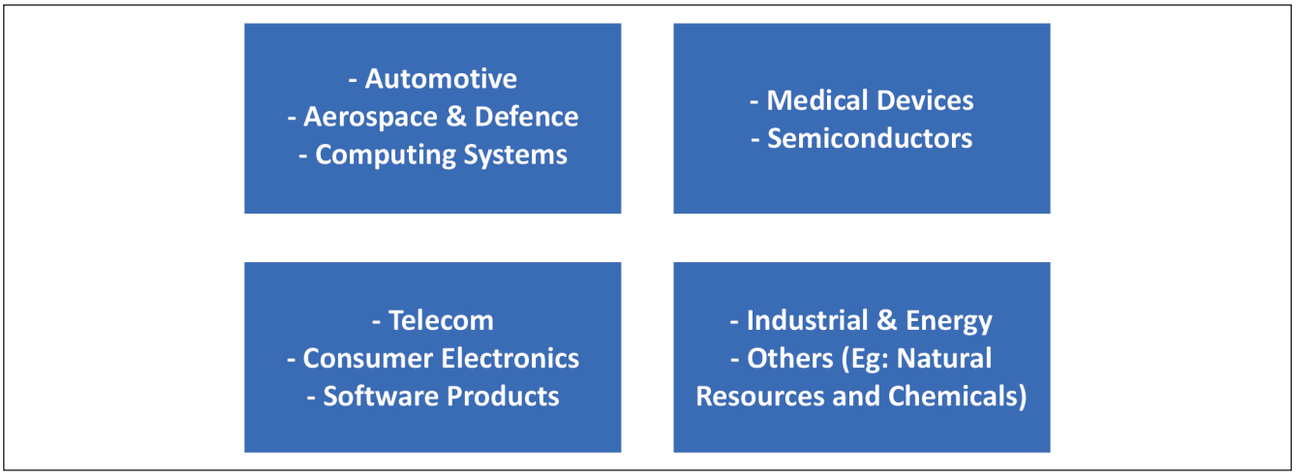
It may be noted that with a current share of 34% in the global ER&D sourcing, India is well positioned to tap into this digital engineering-led ER&D growth. This is also supported by the country's enabling landscapes on the regulatory front, for instance, 100% tax exemption on profits for three years to start-ups; and 100% FDI allowed for infrastructure, aviation, and automotive sectors. Interestingly, India's aspirational pursuit of generating US$ 100 billion revenue from the ER&D sourcing market by 2025 will depend hugely on digital engineering. As per NASSCOM, India's ER&D services currently bring in revenue of approximately US$ 31 billion, out of which nearly US$ 2.5 billion is from the domestic market and majority comes through the exports.

[27] Annual average of INR/US$ rate used for conversion

[28] Engineering R&D Services include services involved in creation of new products (hardware or software) across the entire product life cycle (product conceptualization, design, development, testing, manufacturing, and maintenance), in addition to services associated with maximizing the life span and optimizing the yield associated with a product or asset.

[29] NASSCOM-Everest Group Report on Digital Engineering, An Opportunity Unparalleled, January 2020

Figure 16: Key ER&D Verticals



Given that Karnataka already houses a large share of companies specializing in the aforementioned verticals, it could be the flag bearer of the next IT revolution in the country, which is likely be led by the ER&D services. In this regard, it may be noted that the State has recently launched its ER&D Policy 2021-26, in line with the recommendations made in the Economic Survey of India 2020-21, on ramping up investments in the R&D space. The policy sets a target for Karnataka to contribute to about 45% of India's ER&D revenue by 2026, up from the current share of 40%.

It may also be noted that NASSCOM has set a target of US$ 100 billion for India's ER&D sector by 2025. While exports from the sector (global sourcing of ER&D services) are going to play the major role in achieving the said targets, the domestic market also cannot be undermined. In either case, Karnataka is at an advantageous position to cater to the rising global and domestic demand in this space due to its already established structure. With a 40% share in India's overall IT revenue, Karnataka, in the ER&D sector as well, could fetch extra US$ 40 billion revenue by 2025. In fact, the Government of Karnataka in its IT Policy 2020 aims to encourage R&D in multi-disciplinary fields such as Medical Electronics, Robotics etc. This will be initiated at the higher education level through inter-disciplinary R&D centers and Centers of Excellence for various areas. The Government is also giving R&D grants in the form of reimbursement to registered KESDM companies for the expenses incurred on R&D for products, as per its IT Policy.

Services Focused Exports

It has been noted that infrastructural bottlenecks have resulted in limited development of other industries in Karnataka, thereby causing the socioeconomic development to be dependent on services sector (largely IT), thereby deterring the holistic growth across all sectors in the State.

While Karnataka has been a leader in services exports from India through its IT and ITeS sector, it is noted that other emerging knowledge processing sectors like legal services, content development, R&D services, accounting services, and financial services have export potential. Besides, the export potential of health and hospitality services should also be examined. With a well-established IT base in the State, the focus could also shift towards the development of the fintech industries.

Further, the rapidly growing software sector in the State provides a conducive business environment for associated industries like animation, video and gaming services (AVGS) to thrive. Accordingly, establishment of dedicated 'Media Zones' that provide production and post-production services for movies, and AVGS could lead the State towards a more diversified and inclusive economy.

Broadcasting hubs, on the similar lines of Dubai Media City, could be setup on the outskirts of Bengaluru and Mysuru to provide an environment for media-related businesses to operate globally out of Karnataka. Creation of Special Economic Zones for the Audio-Visuals industry is also needed to boost foreign investments and help in upscaling overall services exports from Karnataka.

Tourism Infrastructure

Karnataka is home to three[30] UNESCO's World Heritage Sites[31] that have the potential to boost the State's revenue from tourism with an improvement in tourism infrastructure. Additionally, four other sites – Aihole-Badami Pattadakal, Kalaburagi-Bidar-Vijayapura (Deccan Sultanate), Srirangapatna, and Belur-Halebidu are on the tentative list of World Heritage Sites. It is to be noted that in 2019, earnings from tourism contributed to 14.8% of the State's GSDP and supported over 3 million jobs[32]. Further, Karnataka has been ranked as the fourth preferred destination among domestic tourists and third preferred destination for investments in the tourism sector[33]. While the State has continuously featured amongst the top ten states with the highest domestic tourist arrivals, accounting for 9.8% of the total domestic tourist arrivals in 2019, it has lagged behind in attracting foreign tourists. The total foreign tourists' arrival in Karnataka was recorded at 0.6 million[34] in 2019, as compared to 6.8 million in Tamil Nadu, 5.5 million in Maharashtra, and 4.7 million in Uttar Pradesh.

It is to be noted that the State recently released its new Tourism Policy 2020-25. The policy aims to position Karnataka as a visible global brand in tourism for visitors as well as investors by encouraging development of relevant infrastructure through partnerships between private sector, government, and the community. This can be achieved through a well-planned marketing campaigns with platforms like Incredible India and creation of Heritage Zones around the sites of Hampi, Bidar, Badami and Aihole, among others. The development should be supported in accordance with the master plans tailored for each location.

Further, given the diverse and wide-ranging themes attracting domestic and international tourists to Karnataka, development of integrated theme-based tourism circuits, like coastal tourism, eco-tourism, and heritage tourism are required to be created and developed.

Karnataka may also explore undertaking the centrally sponsored schemes like the Swadesh Darshan[35] and Pilgrimage Rejuvenation and Spirituality Augmentation Drive[36] (PRASHAD), launched by the Ministry of Tourism. The State may also look into securing the funds to develop its coastal tourism circuit covering Dakshina Kannada, Udupi, and Uttara Kannada.

It is also suggested that cruises of international standards could be started through BOT frameworks along the Mangaluru-Karwar coast to boost Coastal Tourism. To supplement this, coracles, catamarans, traditional sail boats and houseboats could be emphasized at identified destinations.

Medical Tourism

Over the last two decades, in response to the increasing insurance premiums and strained healthcare systems across the world, the need for relatively cheaper and cost-effective medical care has made India a preferred

[30] Hampi, Pattadakal and the Western Ghats of Karnataka

[31] Karnataka Tourism Policy 2020-25

[32] Karnataka Tourism Policy 2020-25

[33] Karnataka Tourism Policy 2015-20

[34] The total foreign tourists' arrival in a State are reported directly from the international check points (international airports in the given State) by the Ministry of Tourism. The instances of foreign visitors landing in other airports like Chennai and the traveling to any part of Karnataka are not accounted for, while arriving at such statistics. Accordingly, in this case, 0.6 million foreign tourist arrivals might not fully reflect the exact footfall of foreign tourists in Karnataka during 2019.

[35] Swadesh Darshan Scheme aims to positioning the tourism sector as a major engine for job creation, the driving force for economic growth, and building synergy with various sectors to enable tourism to realize its potential

[36] PRASHAD was launched in 2014-15 with the objective of integrated development of identified pilgrimage and heritage destinations

destination for affordable medical care for the foreigners. The demand for such medical tourism in India has been robust over the last few years and well identified by medical service providers ranging from practitioners to para-medical staff. Medical tourism is defined as 'activities related to travel and hosting a foreign tourist who stays at least one night at the destination region for the purpose of maintaining, improving or restoring health through medical intervention'[37].

Currently, India holds around 18% of the global medical tourism market and one of Asia's fastest growing medical tourism destinations. It is important to note that the growth of medical tourism industry in India has had spillover effects on other industries like hospitality and insurance, thereby encouraging foreign investors to invest in Indian medical infrastructure and multi-specialty hospitals. During 2019, an estimated 6,97,453 foreign nationals visited India to seek medical care, accounting for 6.4% of the total foreign tourist arrivals. Over 50% of these foreign tourists were from Bangladesh, followed by Iraq (9.2%), Afghanistan (7.2%), Oman (4.2%), and the USA (2.5%)[38]. With the increasing demand for access to affordable and quality medical care by the foreign nationals, the state of Karnataka could serve as a destination for wellness tourists as it is well endowed with super-specialty hospitals and medical colleges that are equipped with state-of-the-art facilities to deliver treatment at a relatively lower cost. It is to be noted that the State carries the distinction of running the highest number of government-run medical colleges and hospitals in the country.

Further, with regard medical tourism, the State has already identified Bengaluru and Mangaluru as the potential healthcare tourism clusters. It is noted that AYUSH has also been playing an important role in encouraging medical tourism in the entire country, and Karnataka with its inherent advantages of skilled practitioners and relatively better infrastructure has the potential to emerge as one of the leading States in this domain. Going forward, the growth in India's medical tourism industry is likely to be propelled by the growing demand for procedures relating to cosmetic, orthopedic, cardiac, neurology, and organ transplant surgery. Karnataka, in this regard, is ideally placed to leverage the growth potential of medical tourism in India with the large presence of skilled medical professionals across domains ranging from yoga and naturopathy to dentistry and advanced critical care units.

It is, therefore, suggested that the State government, in collaboration with the Centre, should ramp up its investments in the healthcare sector with a long-term perspective of boosting medical tourism in the State. Drawing inspiration from the Thai model of medical tourism, such investment by the Government should be focused on upgrading both, the technology and infrastructure across the State's hospital and medical colleges. Tax exemptions for investments in new health facilities could also be provided to build a healthcare ecosystem that is relatively more competitive, thereby boosting inbound medical tourism in Karnataka.

A two-pronged approach to tap the potential growth opportunities in the sector, targeting both the treatment as well as regions to be catered, needs to be developed. First, with respect to treatments offered, Karnataka could focus on creating affordable capacities in domains like cardiology, orthopedics and oncology in the short term; and higher-end domains like bariatric surgery and cosmetology in the long run. Second, with regards regions, the State should focus on catering to tourists coming from Africa and Middle East in the short run; and Latin America and Eastern Europe in the long run.

Improving Regional and International Air Connectivity

As has been noted previously, Tamil Nadu accounted for the highest footfall of international travelers in 2019, mostly on account of pilgrimage tourism. In this regard, it is important to note that Tamil Nadu has four international airports at Chennai, Madurai, Tiruchirappalli, and Coimbatore. Even though the estimates on tourist footfall need to be measured by the sale of tickets at the State's tourist spots and not by airport arrivals, Karnataka has just

[37] Medical Value Travel in India: FICCI Knowledge Paper

[38] India Tourism Statistics at a Glance 2020

two international airports at Bengaluru and Mangaluru, making the State relatively less accessible for foreign travelers.

In this regard, it is suggested that as a part of upgradation of the State's tourism infrastructure, focus should be laid on the development of both, the international airports as well as regional airports, to improve the accessibility to the State. Regarding regional connectivity, it is to be noted that the coverage of UDAN Scheme in Karnataka has been lower with just three airports when compared to six airports in Gujarat and five airports in Uttar Pradesh. Karnataka's experience with the UDAN Scheme, especially with its extension to the Hubballi airport, has been visibly overwhelming with the monthly footfall at the airport increasing from an average of 3600 in 2018 to over 45,000 in 2020. The Hubballi airport, apart from catering to the business travels for people working in the city's industrial estate, has also eased the connectivity to Hampi.

It is suggested that more airports from Karnataka's tier-II cities, especially in North Karnataka, like Gokarna and Raichur be covered under the UDAN Scheme. Improved connectivity to smaller cities via affordable air travel, is also likely to promote dispersed growth in the State, besides providing boost to travel and tourism. In this context, it may be noted that almost 60% of Karnataka's GDP is generated from Bengaluru alone, thus the need for decentralization.

Targets for Software and Services Exports from Karnataka

Under a scenario, wherein software and services exports from Karnataka grow at the same AAGR registered for its software and services exports during 2015-16 to 2019-20, the State may end up achieving approximately US$ 127.3 billion of exports by 2024-25, up from US$ 83.9 billion in 2019-20 (as per VTPC), growing at a CAGR of 8.7%, during 2019-20 to 2024-25.

Table 17: Software and Services Exports from Karnataka: Target 2024-25

Software and Services (ii) Possible Case Scenarios	Software and Services (ii)	
	(US$ Billion)	Required CAGR (2019-20 to 2024-25)
Actual	**83.9**	**-**
If State's software and services exports continue to grow at the same 5-year AAGR 2019-20	127.3	8.7%
Should Karnataka's software and services exports reach US$ 150 billion by 2024-25, as targeted in the State's Digital Economy Mission	150.0	12.3%
Karnataka to achieve US$ 100 billion of software and services exports by 2024-25	100.0	3.6%

Source: India Exim Bank Research

Further, under a scenario where Karnataka's software and services exports reach US$ 150 billion by 2024-25, as envisioned in the State's Digital Economy Mission, a CAGR of 12.3% would be required.

Lastly, under a scenario where Karnataka's software and services exports fail to achieve the US$ 150 billion target but touch the US$ 100 billion mark by 2024-25, the growth would have been a meagre CAGR of 3.6%, during 2019-20 to 2024-25.

CHAPTER 6:

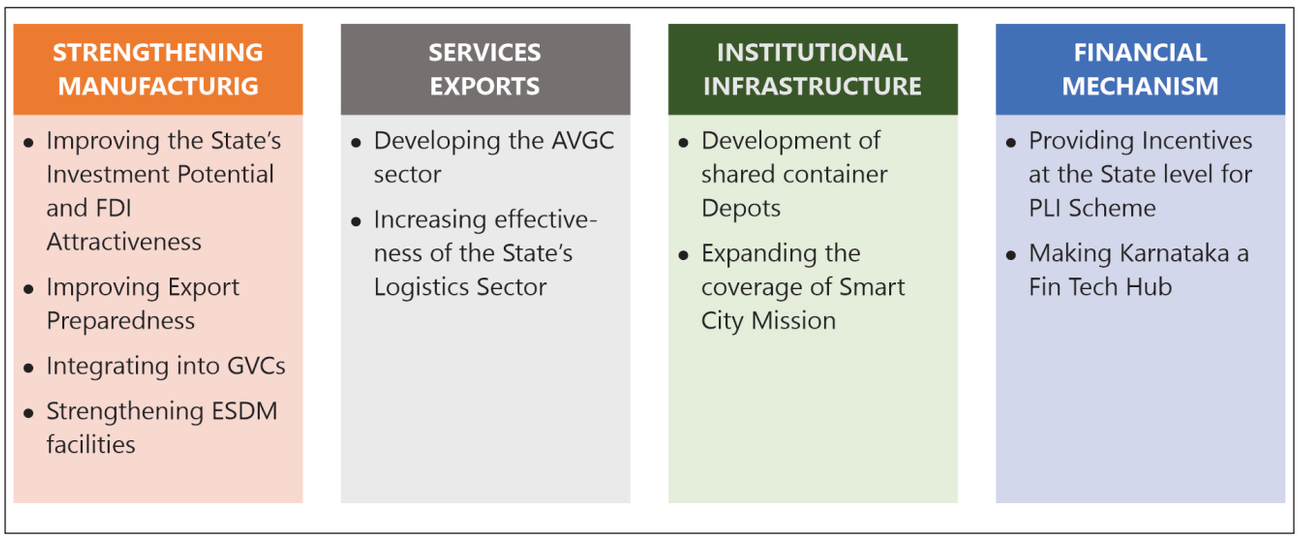
STRENGTHENING KARNATAKA'S INTERNATIONAL TRADE - CHALLENGES AND STRATEGIES

As per the targets set by the Study, the merchandise exports from Karnataka can range from US$ 21.04 billion to US$ 35.32 billion, under different scenarios. On the other hand, the software and services exports from the State can reach up to US$ 150 billion, as per the target set by the Karnataka Government.

While the merchandise exports from the State have been reasonably well-diversified across industries, the State's exports have underperformed compared to its potential in the recent years. At the same time services exports from Karnataka which is pivotal to the growth of export of services in the country has the potential to strengthen further in the State and perhaps could serve as a significant hub in Asia.

For Karnataka to effectively overcome issues to strengthen the trade in goods and services, some effective strategies would be required. This chapter presents select aspects towards the same.

Figure 17: Strengthening Karnataka's Trade - Challenges and Strategies



Source: India Exim Bank Research

MERCHANDISE EXPORTS

Improving the State's Investment Potential and FDI Attractiveness

It is suggested that the share of development expenditure in the State's total expenditure must increase to attract investments. In 2018, while the share of development expenditure[39] in Karnataka's total expenditure was reported at 69.7%, the same was much higher in States like Rajasthan (98%), Telangana (78.2%), and Haryana (81.4%). As has been noted previously, an investment friendly ecosystem is likely to invite more FDI and motivate firms to manufacture and export globally from India.

This Study, in an earlier section[40], observed that as per the data from DPIIT, at US$ 8.9 billion FDI inflows in 2019-20, Karnataka is ranked second among Indian states; however, the FDI inflows are half of that received by Maharashtra, during the same year. Further, as per the fDi markets data at sectoral level, despite Karnataka having significant envisaged foreign capex across industries, it stands at a relative comparative disadvantage with respect to other Indian states, in many sectors.

On the other hand, while Karnataka retained its overall ninth rank[41] in the NCAER's State Investment Potential Index 2018 (N-SIPI)[42], Karnataka lagged in the land and infrastructure pillar. In fact, under the land pillar, Karnataka's score was lower than India's average in 2018. The primary reason for the relatively lower score in the land pillar was the difficulty in getting land approvals in the State. According to the N-SIPI industrial survey the percentage of respondent firms facing moderate to severe difficulties in land approvals[43] were the highest in Karnataka.

Table 18: Problem in Getting Permissions/Approvals for Land from Government Departments before Starting Business (%)

State	No Problem	Moderate	Severe
Andhra Pradesh	44.4	44.4	11.1
Assam	54.8	32.3	12.9
Bihar	44.4	22.2	33.3
Chhattisgarh	54.5	24.2	21.2
Delhi	82.9	9.8	4.9
Gujarat	97.2	2.8	0
Haryana	79.5	15.4	5.1
Himachal Pradesh	70	16.7	13.3

[39] NCAER's State Investment Potential Index 2018: Development expenditure comprises of expenditure on education, sports, arts and culture, food, storage and warehousing, relief on account of natural calamities, and rural development. The parameter is used to indicate state economic activities and efforts of the state government in promoting sustainable economic development across all strata of the society.

[40] Chapter 3

[41] The NCAER State Investment Potential Index 2018 – Karnataka's overall score was 46.7, marginally higher from 46.0 recorded in 2017. The State also fared reasonably well with respect to the labour and governance & political stability pillar of the index. Notably, Karnataka is one of the top performing states for e-governance, seating capacities of ITIs, congestion index, low insurgency rates and perception on business climate. During the year, highest increase was noted with respect to the economic pillar which increased from 41.2 in 2017 to 49.1 in 2018

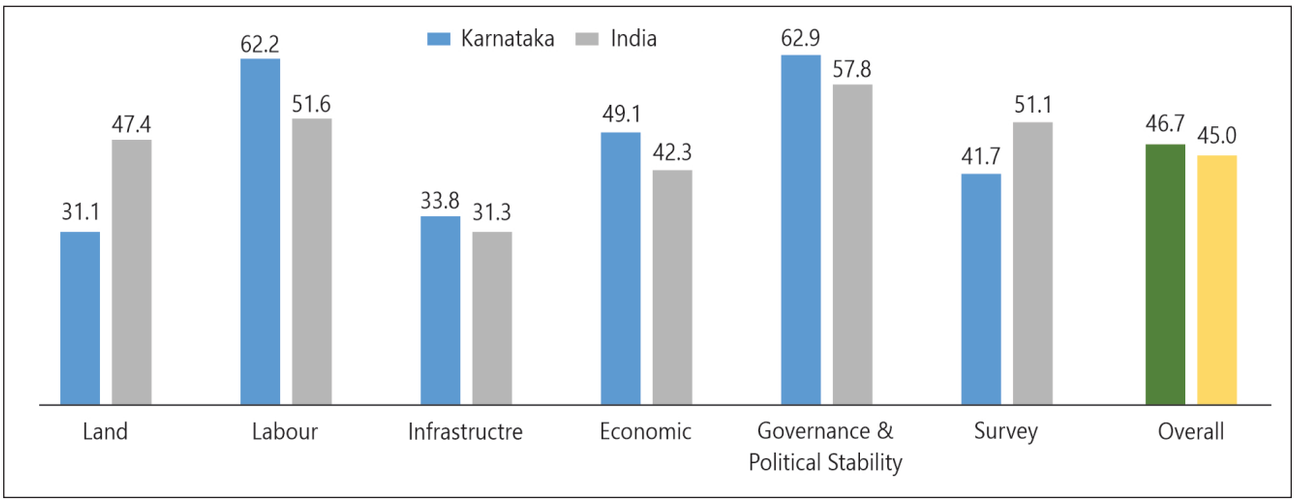
[42] The idea behind N-SIPI is to provide a single composite investment rating of how the Indian states and the Union Territory of Delhi are positioned to encourage and attract investment. It is to be noted that the index value is arrived at by taking into account six determinants -driven (economic climate, and political stability and governance), and perceptions driven (responses to the surveys).

[43] The land pillar of the N-SIPI captures the availability, efficiency and policy space in land across the states. It comprises of two sub-sections: One, problem in acquiring land for the factory or service unit; Two, problem in getting permissions/approvals for land from government departments before starting business. It is noted that about 92.4% of the respondent firms of the N-SIPI 2018 industrial survey faced moderate to severe difficulties in the latter part.

State	No Problem	Moderate	Severe
Jharkhand	36.7	43.3	20
Karnataka	7.6	72.7	19.7
Kerala	68.4	26.3	5.3
Madhya Pradesh	81.4	7	7
Maharashtra	23.8	40.5	34.9
Odisha	61.3	29	9.7
Punjab	58.1	25.8	16.1
Rajasthan	42.3	55.8	0
Tamil Nadu	58.3	29.8	11.9
Telangana	18.4	47.4	34.2
Uttar Pradesh	47	50.6	1.2
Uttarakhand	83.9	12.9	3.2
West Bengal	75.7	20	4.3
Total	**56.7**	**29.9**	**12.8**

Source: Data accessed from N-SIPI 2018

Figure 18: Pillar-wise scores of N-SIPI: Karnataka vis-à-vis India's Average in 2018



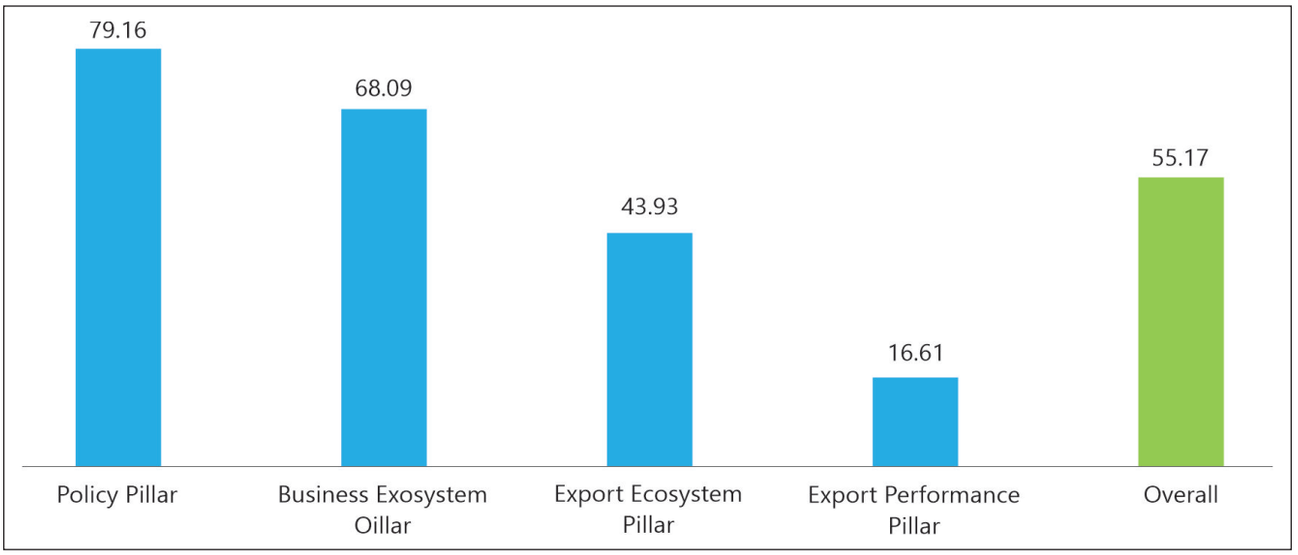
Source: Data accessed from N-SIPI 2018; India Exim Bank Research

Improving the level of Export Preparedness

With a score of 55.17 in the Export Preparedness Index (EPI)[44] of NITI Aayog, Karnataka ranked ninth in terms of export preparedness. Even though it ranked third in the category of coastal states, Karnataka's overall score was significantly lower than some of the competing states like Gujarat (75.19), Maharashtra (75.14), Tamil Nadu (64.93), and Odisha (58.23), among coastal states, and Telangana (57.43), Haryana (56.03) among non-coastal states.

[44] NITI Aayog's EPI is aimed at identifying challenges and opportunities; enhance the effectiveness of government policies**;** and encourage a facilitative regulatory framework. The framework of the EPI was based on essential feedback from states, UTs and organizations like India Exim Bank, IIFT and DGCIS. The EPI considers four broad parameters (Policy Pillar, Business Ecosystem Pillar, Export Ecosystem Pillar, Export Performance Pillar) to arrive at a cumulative score for each state.

Figure 19: Karnataka's Pillar-wise Scores of the EPI 2020



Source: Data assessed from Export Preparedness Index 2020; India Exim Bank Research

As can be seen, Karnataka scored the least amongst the four parameters in the Export Performance Pillar of the EPI in 2020, indicating relatively lower growth of exports and lower export diversification. Going forward, apart from focusing on the overall export growth from Karnataka, it is also crucial to monitor other parameters like the number of exporters in the State and the export to GDP ratio, that have underperformed in comparison to other ten Indian states with similar per capita GSDP.

Further, it may also be noted that Karnataka lagged in terms of R&D infrastructure, as per the EPI 2020. At a sub-segment level, the index indicating underperformance across crucial indicators like ratio of inspection agencies, ratio of NABL labs, and ratio of research institutes. In addition, Karnataka was reported to have been faced with challenges in terms of power availability and trade support by the Government.

According to NITI Aayog, improving the level of export preparedness would require implementation of the following strategies, which would namely be

- Development of export infrastructure
- Strengthening industry-academia linkages; and
- Creating state-level engagements for economic diplomacy

These strategies could be supported by revamped designs and standards for local products and by harnessing the innovating tendencies to provide new use cases for such products, with adequate support from the Centre.

Competing States and the Need for Integration into the GVCs

As has been noted earlier[45], Karnataka's export performance in the recent years, has remained subdued in the recent years, both with respect to the national average as well as that of its competing states like Maharashtra, Gujarat, and Tamil Nadu. By developing an effective strategy for coordinating and promoting exports, Karnataka has an opportunity to reinvigorate an important section of the State's economy and improve the competitiveness of State businesses. It will also be important for Karnataka to evaluate on what can possibly be adopted from the industry-specific, tried, and tested export promotion strategies of other states.

[45] Chapter 2

This Study proposes that with the inherent advantage Karnataka has across the sectors, e.g., semiconductors, electronics, and textiles, integrating into the global value chains would be as important as addressing the exports of final goods from the State. Not only will that enable manufacturers to specialize across select stages of production, but also would position the State in crucial coordinates on the global trade map. It is to be noted that as the value chains improve, it enhances efficiencies, intra competition and promotes development creating a stronger economy, and subsequently better for those businesses function within the chain.

The Economic Survey of India 2019-20 noted that China's remarkable export performance vis-à-vis India is driven primarily by deliberate specialization at large scale in labor-intensive activities, especially "network products", where production occurs across GVCs operated by multi-national corporations. The Survey hints at laser-like focus to enable assembling operations at mammoth scale in "network products", uptake of which could be given a kick-start at the state level in Karnataka.

A relevant case in point here is the Sichuan province in China. The natural advantage in Sichuan is the abundance in minerals which have been extracted and optimized continuously through manufacturing and construction activities. This has, further, led to the formation of a cluster of high-performance firms in the fiber and composite materials sector led by companies like Yulong Chemical. Subsequently, increased connectivity, labour cross over, R&D spillover have enabled the formation of a new battery energy sub cluster. In sum, this has resulted in the creation of an 18% increase in industry output in 2018, year-on-year. This is an example of the multiplier effect in value chains; so, by capitalizing on comparative advantages, it is more effective in creating industry insulation[46].

The way Sichuan province has moved up in the GVC, brings out a multi-dimensional approach that could be adopted across the industries in which Karnataka has a comparative advantage like – coffee processing, semiconductors, machine tools, automobile and auto parts, electronics, and aviation manufacturing.

Strengthening the ESDM facilities

The rapidly growing Electronics System Design and Manufacturing (ESDM) sector in Karnataka offers immense opportunity for domestic value-addition and integration into critical GVCs.

Going forward, Karnataka's ambitious i4 policy[47], along with the current Karnataka ESDM Policy 2017-22, could also be leveraged to boost investments along the various stages of value-chains of the ESDM sector in the State, thereby increasing the domestic value-addition in manufactured exports. It is suggested that focus should be laid on engaging more extensively in stages that involve relatively higher value addition like design and manufacturing, as against assembly lines. In addition, organization of mega electronics events like "Electronics Telangana", as envisioned in Telangana's ESDM Policy 2016, could be done in partnership with the industry. As a part of the aforementioned initiative, the Government of Karnataka could encourage investments through viability gap funding and marketing activities, apart from providing assistance to industry associations by identifying liaison officers as point of contacts to simplify investment procedures.

Karnataka may also consider introducing a focused dimension in its ESDM Policy, taking inspiration from Madhya Pradesh's Analogue Semiconductor Fabrication Investment Policy (FAB Policy), which was targeted on the development of FAB units in the State. As per the MP's FAB Policy, an investment benchmark of ₹ 30 billion was set for enterprises to qualify as a FAB unit, which were then entitled to a host of benefits and incentives like free government land, reimbursement for the cost of building the shell (building) of the manufacturing unit, round the clock power supply from two separate power grids and quality water supply at the doorsteps of the FAB units at an internationally competitive price fixed for ten years.

[46] Value Chains in Chengdu: An Economic Protection Strategy (https://www.1421.consulting/2019/09/value-chains-in-chengdu/)

[47] Karnataka's i4Policy (IT, ITeS, Innovation Incentives Policy) offers incentives to new IT / ITeS and other knowledge-based sectors to set up their facility in tier 2/3 cities across the State

SERVICES EXPORTS

Developing the Animation, Visual Effects, Gaming and Comic (AVGC) sector

Over the last few years, the Indian Media & Entertainment (M&E) industry has grown rapidly at an average of 9% and is expected to further expand at a CAGR of 13.5% during 2019-24 to reach US$ 43.9 billion[48]. The investments in the sector are supported by an open FDI policy, wherein 100% FDI under the automatic route is allowed in advertising, TV broadcasting and cable network. Within the M&E industry, the Animation, Visual Effects, Gaming and Comic sector (AVGC) has been recognized as a sunrise sector, growing at an average rate of 29%[49]. Interestingly, more than 65% of the AVGC sector's revenue comes from the services to the global markets[50]. This is indicative of the potential gains that might arise on further integration of India's AVGC sector with the global supply chain for AVGC production.

It is to be noted that Karnataka is home to over 22% of India's game developers and service providers[51]. Out of the country's 425 studios (300 animation, 40 VFX and 85 game development), 11% are located in Bengaluru[52]. In this regard, Karnataka being the hub for animation services, VFX services and game developers has a competitive edge over other states to cater to the growing demand for outsourcing of animation technology to India and support the "Make in India, Show the World" initiative.

Currently, the growth of Karnataka's AVGC sector has been envisioned in the State's AVGC Policy 2017-22, which focusses on making Karnataka a leading global AVGC hub in terms of export revenues, projects acquired, and employment created by strengthening the ecosystem to support the same. Interestingly, along the lines of the State's 'Beyond Bengaluru' initiative, the policy also aims to develop at least one tier-2 city in Karnataka as a hub and a preferred destination after Bengaluru for the AVGC industry. The key strategies prescribed in the AVGC Policy 2017-22, for the State to realize the aforementioned goals are: Skill Development; Enabling Infrastructure; Encouraging Start-ups and MSMEs; Market & Ecosystem Development; and Incentives & Concessions.

To achieve the State's goal of maintaining the share of exports from the AVGC sector to more than 75% of the total export revenue from the sector, it is suggested that in addition to the recommendations made in the Karnataka AVGC Policy 2017-22, the Government could undertake measures like exemption of entertainment tax in the State for animation films. In this regard, the State could suitably adopt the provisions made under Maharashtra's IT and ITeS policy for the AVGC sector. In particular, along the lines of Maharashtra's IT and ITeS policy, Karnataka Government could consider providing a capital subsidy which will include an anchor unit subsidy equal to 25% of the fixed capital investment for an AVGC unit with a minimum investment of ₹ 50 crores & creating a minimum employment for 100 people. The fixed capital investment shall include investment in land, building, machinery, equipment, electrification, pre-operative expenses capitalized.

As the Government of India is collaborating with IIT Bombay to setup a Centre for Excellence to provide courses associated with the sector, the State of Karnataka is also strategically positioned to drive the growth of the AVGC segment by leveraging its abundant resources across the IT and ITeS industry and the pool of skilled workforce. Accordingly, the State should also focus on identifying the sub-sectors with in the AVGC sector with the highest growth potential, like augmented reality, e-sports and cloud gaming, that can substantially contribute to the AVCG sector's exports from Karnataka.

Increasing the Efficiency of the State's Logistics Sector

Over the last few decades, with increasing integration of the world economy, efficiency of the logistics sector has become a critical factor in determining the competitiveness of exports. An efficient logistics sector, apart from giving a competitive edge to the exporting State, also gives greater ease of access to newer markets.

[48] IBEF

[49] Ministry of Information and Broadcasting

[50] Centre of Excellence- Association of Bangalore Animation Industry (ABAI)

[51] NASSCOM 2015

[52] Karnataka AVGC Policy 2017-22

The Ministry of Commerce and Industry, in this regard, introduced the "Logistics Ease Across Different States" (LEADS) Index to establish the performance benchmark for the logistics sector, based on the perceptions of users and stakeholders, at the State level. The LEADS index provides the basis for stakeholder engagement, discussions, and evolving action plan by various agencies. While it is not an index of the performance of the State Government, it may be used to assess the status of logistics efficiency in each State.

Table 19: LEADS 2019 Score for the Top-ten States

Rank Order	State	Availability of logistics infrastructure	Quality of logistics infrastructure	Quality of logistics services provided by service providers	Ease of arranging logistics at competitive rates	Timeliness of cargo delivery	Ease of track and trace
1	Gujarat	3.92	3.80	3.80	3.45	3.70	3.53
2	Punjab	3.64	3.65	3.58	3.29	3.35	3.50
3	Andhra Pradesh	3.59	3.50	3.51	3.37	3.54	3.37
4	Maharashtra	3.64	3.51	3.66	3.21	3.50	3.48
5	Tamil Nadu	3.63	3.52	3.53	3.30	3.48	3.45
6	Haryana	3.62	3.53	3.44	3.16	3.45	3.46
7	Karnataka	3.51	3.44	3.49	3.29	3.42	3.51
8	Telangana	3.34	3.29	3.27	3.00	3.43	3.13
9	Madhya Pradesh	3.30	3.13	3.45	3.23	3.23	3.30
10	Odisha	3.36	3.20	3.23	3.04	3.30	3.33

Source: Data assessed from LEADS 2019 Report, Ministry of Commerce and Industry; India Exim Bank Research

In 2019, Karnataka ranked seventh as per the LEADS index, down from the fourth rank in 2018, whereas Gujarat ranked first, and Punjab ranked second[53]. As can be seen from the Table, amongst the key determinants that held back Karnataka from performing better on the index were availability of logistics infrastructure and quality of logistics infrastructure, wherein the State's score was 3.51 and 3.44 respectively, as compared to Gujarat's score of 3.92 and 3.80. In particular, the LEADS index survey reports inefficiencies at Whitefield terminals and rail connectivity. In this regard, a dedicated logistics policy with a significant focus on city freight logistics is needed. Further, the State Government in collaboration with the Centre could engage in increasing the length of State highways in Karnataka, which were reported to be of 19,578 kms as against 38,999 kms in Maharashtra. Focus should also be laid on widening and maintenance of the existing road network in the State, especially the ones connecting various industrial estates to the New Mangalore Port.

Going forward, it is suggested that the Government of Karnataka could develop a dedicated logistics park policy, as has been done in Maharashtra and Chhattisgarh. In doing so, the State would be better positioned to achieve its objective of becoming a leading logistics hub of the country, as envisaged in the Karnataka Industrial Policy 2020-25. As a part of the State's logistics policy, the Karnataka Government could encourage setting up multi-modal logistics park (MMLP)[54] in the State via PPP mode, aside from upgradation of existing logistics parks in the State. Additionally, similar to Chhattisgarh's Logistics Park Policy 2018, investments into the new logistics parks in Karnataka should also be granted the industry status, in order to attract investments.

[53] LEADS Index Report 2019

[54] MMLP is the refined form of logistics park where various value-added services are rendered in addition to rail or road transportation

INTITUTIONAL INFRASTRUCTURE

Development of Shared Container Depots

The Direct Port Delivery (DPD) Scheme was introduced in India, in 2016, aimed at addressing the inefficiency losses to businesses arising on account of procedural delays in the supply chains. Broadly, the Scheme sought to improve the ease of doing business by enabling select Accredited Client Program (ACP) importers to take direct delivery of the containers, thereby eliminating the longer process of routing the clearance through the Container Freight Stations (CFSs). The DPD initiative was first launched at JNPT and thereafter extended to other ports in the country.

However, the DPD model has not proved to be as effective in practice, compared to what was proposed in theory. It is to be noted that, as in 2017, almost 70% of India's containerised imports were routed via CFSs, and the Government of India aimed to convert 70% of these imports into DPD. Amongst the key factors that have prevented smooth implementation of the DPD model, in India, is the lack of sufficient infrastructure with the importing firms, resulting in suboptimal inventory control.

For instance, a leading Indian luggage manufacturer recently raised the request to be removed from the DPD list, citing that its operational costs related to the ports have more than doubled under the model. Specifically, the scheme requires the importing firms to have a particular container lifted within 72 hours of landing in the port, beyond which it is moved to a CFS. In addition, the importing firms are required to take custody of all the containers carried by a particular vessel, regardless of their available storage facility, hence making it difficult for a significantly large number of firms to switch to the DPD model.

Given the large presence of SMEs in Karnataka (especially across sectors like automobile, electronics and consumer durables), importing firms could collectively harness the benefits of the DPD model by using shared container depots. This will enable start-ups and small importing firms to significantly reduce the turnaround time without investing substantially in establishing their own storage facilities. Depending on the location and size, such shared container depots could be set up under the aegis of Trade Infrastructure for Export Scheme (TIES). Further, for relatively large-scale projects, PPP models could be used to develop competitive export infrastructure in the State.

Expanding the Coverage of Smart-City Mission

National Smart Cities Mission is an urban renewal and retrofitting program by the Government of India with the mission to develop smart cities across the country, making them citizen friendly and sustainable. The selection of smart cities is done in two stages. In the first stage, the States shortlist potential smart cities on the basis of conditions precedent and scoring criteria and in accordance with the total number allocated to it, followed by the second Stage, which involves each of the potential smart cities to submit a Smart City Proposal (SCP).

The State in coordination with the Central Government could expand the coverage of the Smart City Mission and increase the number of statutory towns[55] in smart cities[56] as a percentage of total in the State. By increasing the access to potential markets for businesses, this is likely to attract investments across Karnataka. In 2018, the percentage of statutory towns in Karnataka's smart cities was 4.9%, as against 11.3% in Telangana, 8.6% in Maharashtra and 7.7% in Andhra Pradesh.

It must be noted that the development of smart cities can be instrumental in boosting investments and thereby, exports from the State, through a hub and spoke model. Each smart city could act as an urbanized hub and

[55] Statutory towns are notified under law by the concerned State/Union Territory (UT) Government and have local bodies like municipal corporations, municipalities, etc., irrespective of their demographic characteristics

[56] A 'smart city' is defined as an urban region that is highly advanced in terms of overall infrastructure, sustainable real estate, communications, and market viability.

encourage the growth in neighbouring satellite towns, the way Delhi being the hub has exemplified the urban growth through its spokes - the NCR towns. Similarly, development of urban hubs in the State under the Smart City Mission is likely to bolster the investment flows which in turn can be channelized to boost the exports from the adjoining regions of the smart cities, as well.

FINANCIAL MECHANISMS

Providing Incentives under Production Linked Incentive Scheme at the State level

To address the WTO non-compliant areas of the PMP (like backward integration via tariff protection), the Production Linked Incentive (PLI) Scheme was launched in March 2020 as a part of the National Policy on Electronics.

The Scheme is an outcome-and-output-oriented scheme where incentives will be paid only if the manufacturers make the goods. This scheme will give cash incentives for five to seven years and all the sunrise and important sectors[57] are proposed to be covered in this. The scheme shall extend an incentive of 4% to 6% on incremental sales (over base year) of goods manufactured in India and covered under target segments, to eligible companies, for a period of 5 years with FY 2019-20 considered as the base year for calculation of incentives.

However, the sectors identified in PLI are sunrise and promising sectors, but they may need support in the initial stage which is lacking. There is a growing demand in the world for diversification in supply chains and Karnataka, for that matter, has a reasonably good potential. The Government of Karnataka may take a leap forward to provide additional incentives to the exporters who, through increased investments, are able to create additional capacity to export. It is noted that select niche sectors wherein Karnataka enjoys a relative competitive advantage over other States, like biotechnology and medical devices should be given a priority in terms of the additional incentives offered at the State level.

Making Karnataka a FinTech Hub

Making Karnataka a FinTech hub could significantly alter the lending scenario and thereby the ease of doing business for the MSMEs in the State.

It may be noted that fintech companies operating in trade finance typically focus on cost-reduction initiatives such as digitization and automation, including blockchain and alternative lending options (for example, peer-to-peer lending). Against the backdrop of SMEs struggling to obtain conventional sources of financing, emerging financial technological innovations need to step up to bridge the funding gap. In this regard, digital lending by fintech players can significantly benefit MSMEs in Karnataka to gain access to quick capital.

Apart from P2P lending, amongst the key offerings by the FinTech firms that can bolster the growth of Karnataka's MSMEs include point-of-sale transaction-based lending, bank and fintech partnership models, invoice discounting exchanges, marketplaces and captive models.

[57] Currently, the sectors within the purview of the PLI scheme are: Mobile manufacturing and specified electronic components; critical key starting materials/drug intermediaries and active pharmaceutical ingredients; manufacturing of medical devices; advance chemistry cell (ACC) battery; electronic/technology products; automobiles & auto components; pharmaceuticals drugs; telecom & networking products; textile products: man-made fiber segment and technical textiles; food products; high efficiency solar PV modules; white goods (ACs & LED); and specialty steel.

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