

K-DISC WORKING PAPER SERIES

2025

W.P. 01/2025

**A People's Innovation System for the transition of
Kerala to a Knowledge Economy**

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A People's Innovation System for Kerala's Transition to a Knowledge Economy: The Role of K-DISC

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A People’s Innovation System for Kerala’s Transition to a Knowledge Economy: The Role of K-DISC¹

1. Introduction²

The unique facets of Kerala’s development trajectory amongst the states of India, its unparalleled achievements in distributive justice with low economic base along with its aspiration to transform into a developed state has fascinated and attracted attention of scholars worldwide. In this paper, we capture the important stages in Kerala’s developmental trajectory in a brief manner since the formation of state in 1956 culminating with the initiatives undertaken by the present Government to transform the state to a knowledge economy. In the next section, we elaborate on the various policy initiatives undertaken by the State to enable the transition to a knowledge economy in terms of building and strengthening the knowledge infrastructure and aiding knowledge production activities and creating employment opportunities in the knowledge related sectors. We conclude the paper with some reflections on future alternative – holistic development of quadruple helix ecosystem for inclusive and sustainable innovation in public space as well as knowledge co-creation and employment

¹ A previous version of the article was presented at the 18th All India People’s Science Congress (AIPSC-18), West Bengal University of Animal and Fishery Sciences, Kolkata, 27th–30th December 2024. The author list has been updated to reflect contributions to the present version.

² Note on terminology:

In this paper, the term ‘transition to a knowledge economy’ follows the formulation used by the Government of Kerala in its budget announcements 2020-21 and related policy documents on the Knowledge Economy Mission.

generation being implemented to enable Kerala to progress to a knowledge economy.

2. Steps towards Social Welfare and Redistribution

The Travancore-Cochin region of erstwhile Kerala during the colonial period prior to independence witnessed social reform movements leading to upward mobility and social progress of certain backward communities. The northern part of Kerala had disparities in education and health, was backward relative to southern part. The Communist movement had its genesis in the freedom struggle and was involved in mobilising a number of historic struggles and uprising by the tenants and industrial workers. Following independence, it had emerged as a force of Malayalis unifying Malabar, Cochin and Travancore regions of Kerala during state re-organisation in 1956.

- The Communist government voted to power in the first assembly elections after the formation of the State in 1956 recognised the farmers struggle against feudal landlords and ushered in Land Reforms in Kerala in 1957 leading to redistribution of farm lands for the poor.
- At that time Kerala was battling with poverty as the agroclimatic conditions of the State were more suited for cash crop production resulting in insufficient land available for cultivation of food crops. At the time of state reorganisation as the rice growing Nagercoil- Kanyakumari area was merged with Tamil Nadu, the

newly emerged state of Kerala felt the deficiency in food grain production since its formation.

- To alleviate mass poverty, the Government undertook various measures such as strengthening the public distribution system and supplying free food. The struggles undertaken by the trade unions and organisations for improving working conditions culminated in the Government focussing on improving human development.
- The state introduced a comprehensive education bill to achieve universal and compulsory education within ten years and the state made educational as well as health services free for the public.
- The state witnessed low mortality rates, however the children were born underweight.
- With a weak industrial base as compared to other parts of India, and non-availability of mineral resources, the state leveraged its access to cheap hydroelectric power and invested in energy intensive industries such as fertilizer, chemicals, aluminium etc to stimulate industrialization.
- The state was plagued with educated unemployment problem owing to lack of employment opportunities and slow industrialisation.

Together, these measures are documented in detail in Kerala's development literature (Kannan 2022; Kerala State Planning Board 2022; Drèze and Sen 1989).

3. Kerala Mode of development or Kerala Model

Relatively better performance of the state in the human health and education sector, compared to other states in India, without a simultaneous rise in per capita income, large-scale industrial development and urbanisation during the 1970s drew wide attention. (Centre for Development Studies 1975; Kannan 2022; Dreze and Sen 1989) In 1975, the United Nations Economic and Social Council, commissioned a research work to Centre for Development Studies to understand the various implications of policies for promoting distributive justice along with development with reference to the experience of the state of Kerala under the Chairmanship of Prof. (Dr.) K. N. Raj. “This study (1975) brought to the fore that Kerala, a provincial state in India, has been able to achieve within a little less than two decades of its formation in 1956 a ‘critical minimum of human development and welfare to its people despite a very low per capita income by international standards’ (Kannan, 2022, summarising CDS 1975)”.

Since Raj’s report, Kerala model or Kerala mode of development entered in development discourse and over the years gained national and international acclaim (Planning Commission 2008a). Kerala occupies unique position among all the States in India, so far as literacy, life expectancy, IMR, population growth and overall human well-being including poverty reduction are concerned (Table 1). The State continues to rank first among all the States in India on the matter of Human Development Index (HDI). By 2021, Kerala’s HDI was 0.79

whereas the Indian average stood at 0.647. (Kerala State Planning Board 2022; UNDP 2021; NITI Aayog SDG Index, various years)

Table 1: Selected social indicators and position of Kerala and India

Sl. No	Indicators	India	Kerala	Kerala's Rank in India
1	Population growth rate (decadal) (2021)	9	5.2	1
2	Life expectancy at birth (2021)	70.9	76.4	1
3	Life expectancy-Female (2015-2016)	70	78.2	1
4	Infant Mortality Rate (IMR) per 1000 live births (2018)	32	7	1
5	Maternal Mortality Ratio (MMR) per lakh live births (2018)	113	43	1
6	Literacy (2021)	77.7	96.2	1
7	Female literacy (2016)	65.46	92.07	1
9	Sex ratio (2021)	945	1082	1
10	Multi-dimensionally poor people as % of total population (head count ratio) (2019-21)	14.96	0.55	1
11	Human Development Index (HDI) (2021)	0.647	0.79	1
12	Sustainable Development Goal Index	71	79	1
13	Per capita income (Current prices) 2021 (In Rs.)	1,45,680	2,52,662	

Compiled from different sources.

Sources: Economic Review 2022, Kerala State Planning Board; NITI Aayog SDG Index; UNDP HDR country tables.

Kerala's experience signifies that social sector development and resilience-building are possible through effective public action (Drèze and Sen 1989, Pillai 2008). Kerala case has been widely studied, debated, and examined by national and international scholars (Tornquist and Tharakan 1995, Franke and Chasin 2000, Isaac Thomas and Franke 2000, 2021, Veron 2001, Chattopadhyay and Franke 2006, Ravi Raman (ed) 2010, Chattopadhyay 2019 among others). What emerges from all these studies is that apart from geographical positioning and natural resource base (Chattopadhyay 2021), the historical legacy in education and health care particularly under the princely states of Travancore-Cochin, public policy and affirmative government actions since the formation of the State and induction of first elected left government, vibrant civil society, and awareness and social consciousness of people including their willingness to take part in the governance have contributed to this development (Table 2). All these have been further accentuated through initiatives by the polity to promote decentralisation, draw more and more people, particularly women into development activities, institutionalisation of the process of participation, and decentralisation, and creation of socio-political-technical space for debate. Kerala's development history demonstrates 'that critically examining one's context and making, by mass protest, if necessary, the appropriate adjustments lead to a radically more healthy, egalitarian, and meaningfully informed society' (Brown, 2013).

Decentralisation and bridging the gap in development form an integral part of Kerala mode of development. There are several lessons to note from Kerala's experience (Oommen 2004, Heller 2005, Tharakan 2008, Jafar 2014). These will be unfolded during the course of our discussion.

The increase in energy prices, dwindling hydro resources, non-availability of cheap power, made energy intensive manufacturing uncompetitive and slowed the growth of secondary sector fostering development of tertiary sector. Thus, Kerala made a unique economic transition from primary sector to tertiary sector bypassing the development of secondary sector. Further, the focus of the state on improving human development, led to increase in the supply of educated manpower. Unable to get employment within the state, a huge exodus of people with minimum level of education and skill to metropolitan cities in search of jobs began to emerge. After the oil crisis, Keralites started to emigrate to Gulf countries in search of job opportunities. Outward migration of Keralites led to inflow of remittances back into Kerala. Over time the increase in volume of remittances lead to boost in private consumption, increase in per-capita income and savings. However, contribution of secondary sector to Kerala's growth was minimal. The state began to experience demographic transition with decline in birth rate. When economic growth of the State began to decline, the success of Kerala in achieving high human development despite low economic growth started facing serious questions regarding its sustainability. This periodisation follows

Törnquist’s reconstruction of Kerala’s political–development trajectory (Törnquist 2021).

Table 2: Time line of Kerala’s Development Trajectory

Year	Events
Late 19 th Century	Socio-religious reform movements for citizenship and educational rights, princely tenancy reforms against large landowners in Travancore –Cochin
Early 20 th Century	Broader unity among the reform movements for equal rights
1930-1950	Travancore-Cochin and Malabar combined struggle against British, Feudalism, united Kerala, and equal rights. Socialist/ communist movement began. Indian Independence
1950-1960	Formation of Kerala (1956), First Communist led elected state assembly (1957), Bill for Land reform, Administrative reform, Equal education, Dislodgement of elected government, President’s rule
1960-1970	Split of Communist movement, Formation of Left coalition government, CPI led government with Congress
1970-1980	Kerala tenancy rights land reform implemented, Adoption of science policy resolution, establishment of a series of Research and Development Institutes, Environmental movement, National emergency
1980-1990	Total Literacy Campaign, Expansion of Civil Society Organisation (CSO), Developing reformist agenda, rural development, group farming, intruding decentralisation
1990-2000	CSO and political campaign for group farming, Resource mapping, Participatory planning, constitutional amendment for LSGI, International seminar on Kerala’s development, People’s Plan Campaign, Panchayat level Development reports, First state IT Policy (1998), formation of KIIFB, Information Kerala Mission, Akshaya

Year	Events
	e-literacy programme, Friends Jana Seva Kendra, Kumarakom pilot panchayat computerisation project
2000-2010	Panchayat plan continues, Kudumbashree movement strengthened, Block level and district level plan initiated, decentralised energy models
2010-2020	2 nd phase of PPC began, District and Block plans strengthened, Disasters in consecutive years , Mission mode programmes initiated, 25 years of PPC reviewed the situation, Nava Kerala initiatives, KIIF Act 2016, IKM governance models, Formation of K-DISC, carbon neutral initiatives
2020-present	Launching of Knowledge economy programme, IT Policy (2023), Industrial Policy (2023), initiatives in strengthening industrialisation, focus on knowledge industries, K-DISC activities

Source: Adapted from Tornquist 2021.

4. People's Plan Campaign: A new beginning of Social empowerment and grass root intervention

After a series of abortive attempts, the State implemented decentralised planning in 1996 by launching the People's Plan Campaign (PPC) (Charvak 2000), which is considered a paradigm shift in democratic decentralisation and earned global attention (Isaac Thomas and Franke 2000; 2021, Franke 2008, Heller 2005, 2008, Tornquist 2001, Gopinath, 2009, Chattopadhyay and Franke 2006). This PPC experiment has initiated a new process of planning that can be viewed from several perspectives. We mention here some of them:

- (a) The decentralisation promoted in this experiment tried to bring government to the people in contrast to the withdrawal of

government that many of the proponents of decentralisation advocate. The PPC devolved administrative, financial, and project execution power by activating the local self-government organisations like Panchayats and Grama Sabhas and building local capacity as envisaged in Panchayati Raj Act (73 and 74 constitutional amendments).

- (b) The PPC has set the process of localism with emphasis on local culture, local history, local resources, local plan, and local people. It instilled confidence among people that they can participate in plan preparation and support by providing technical inputs based on their local knowledge.
- (c) The PPC succeeded in involving technical experts and drawing on social capital for social transformation at the ground level.
- (d) Perhaps the most important gain that has a long-term implication is that the PPC has succeeded in creating and enlarging the democratic space for socio-technical interactions and deliberations on development at the ground level.

These features together illustrate why many scholars see PPC as a paradigmatic experiment in deep democratic decentralisation (Isaac and Franke 2000; Heller 2005; Oommen 2004).

5. Information Kerala Mission (IKM)

Recognizing the role of information, knowledge, education, and science in spurring economic progress, the government of Kerala adopted an IT policy designed to encourage the growth and development of this sector (Miller, Palackal & Shrum, 2012). The

Information Kerala Mission (IKM) is a product of this policy decision and was established as an autonomous body under local self-government department to address the issues concerning local body governance, decentralized planning, and local economic development by applying ICT. A liberal package from the Planning Commission for creating a model IT support system for decentralised planning triggered the programme. The IKM envisages a phased transformation of the existing systems to electronic systems. The human-centered e-governance approach adopted in Kerala differs from the IT initiatives in other states and Government of India. It is characterised by the ‘holistic, proactive, objective oriented decision-making and citizen-friendly interfaces with better accountability’. (Miller, Palackal & Shrum, 2012). The emphasis is on demystification of technologies and on establishing adequate technical support systems for common people to benefit from the fruits of science and technology. Imparting training is given high priority. For social change, the ICT must provide the people improved opportunities to access a greater variety of information regarding health care, education, market prices, farming technology, and similar other matters that have strong bearing in day to day life of people. IKM has taken out extensive pilot deployment of its application suites developed using an iterative human centric spiral model of application development built around the spirit of People’s Plan with the people and democratically elected people at the centre. With twelve software application suites, IKM is implementing a state level ERP suite in open source to further strengthen the public

administration. The largest and most comprehensive ICT system built up in the state stands out against national and international models for e-governance established with the support of consultancy organisations and external funding.

6. Kerala's Development Challenges

Appropriate public action, nurtured and facilitated by affirmative Government policy is perhaps the key element of Kerala's development. While there had been substantial achievements in social and human development sectors, the state is facing several development challenges. The Government of Kerala after assuming office in 2016 decided to deepen and extend its achievements in human development and to use these achievements as a foundation on which to create new employment opportunities for the people, particularly, youth to enhance the productive forces, and increase income from enhanced production in agriculture, industry, and income-bearing services and to build infrastructure (Ramachandran, 2021). A modern, developed Kerala should be marked by scientific and technological progress capable of meeting aspirations of the young women and men, who are entering the labour force, resilient to withstand natural and human crisis like that witnessed during floods, landslides and Pandemic and vibrant to meet emerging challenges of sustainability. (Ramachandran, 2021) We discuss here some of the challenges that merit immediate attention. As Ramachandran notes, the state now faces 'high levels of educated unemployment with low female work participation despite such high levels of human development'

alongside stagnating productivity in primary sectors and a constrained fiscal space (Ramachandran 2021).

- The decreasing scope for land redistribution to further contribute to economic growth
- the minimal diffusion of technology in small scale sector
- high levels of educated unemployment with low female work participation rate despite such high levels of human development
- decline in remittances owing to migration to gulf countries in search of employment from rest of the world for both unskilled and skilled jobs further exacerbated the development challenges
- The local economic development is variously affected. Productivity of primary sector is stagnating and for many crops it is declining. The land water and input management require high level of Science and Technology interventions and innovative approach. Value addition remains a big challenge.
- Micro, medium and small enterprises (MSMEs) have high potentials. Improved performance of this sector mainly, in the chemicals and electrical machinery sectors is significant. It is important to strength this sector and advance forward. (Ramachandran, 2021)
- Under service sectors, the challenges are to develop IT and BT sectors, promotion of innovations and start-ups, and promote tourism.
- The decline in the share of education and health sector expenditure to total government expenditure over the decade of 1974-75 to

1984-85 was flagged as a matter of concern (George, 1993) raising serious questions regarding the sustainability of Kerala's high human development achievement despite low economic growth. (Kerala State Planning Board,2022) The decline in financial resources began to affect the quality of services and in per-capita terms, the Kerala's social sector expenditure declined vis-à-vis many other states. To meet the committed expenditure incurred the state has been allocating funds for social sector through borrowings and the quantum of funds allocated has been insufficient.

- The stagnant tax base over time constrained the avenues for resource mobilization leading to decline in capital expenditure incurred on transportation (roadways, railways, airways and water transportation): power generation, transmission and distribution; telecommunications: port development; water supply and sewage disposal; irrigation; medical and educational services resulting in infrastructure deficit leading to lacklustre economic development. Infrastructure being an intermediate input, reduction in the supply of economic and social infrastructure amplified as constraints to industrial development creating a vacuum in employment opportunities within the state.
- Any public borrowing by states requires authorization of central government as per constitutional mandate limiting the availability of budgetary support for financing infrastructure development.

To cater to the developmental needs of the state, the Kerala government constituted the Kerala Infrastructure Investment Fund

Board (KIIFB) under the Kerala Infrastructure Investment Fund Act, 1999 as a body corporate with the objective to mobilize funds from open market for investments in the infrastructure projects in the State. (Ramachandran, 2021, Government of Kerala, 1999; Kerala State Planning Board 2022).)

7. Transition of Kerala to a knowledge economy

The left government of Kerala took on itself the bold objective of transitioning Kerala to a Knowledge Economy in 2021. The blueprint for the transition was developed through a series of regional dialogues that culminated in the state level workshops in Thiruvananthapuram in 2020. The last budget speech of the outgoing government (2016-21) and the Left Democratic Front (LDF) Election Manifesto for the 2021 election elaborated a multi-pronged approach for achieving the transition to a knowledge economy. Building on that, we summarise the transition strategy in six broad strands:

- i) Addressing Infrastructure deficit/ backwardness through KIIFB. KIIFB mobilises funds for service infrastructure (schools, hospitals), logistics and manufacturing infrastructure (roads, industry parks), as well as knowledge industries (Centres of Excellence, Translational Parks).
- ii) Promoting Innovation Ecosystem and start-up ecosystem. The Kerala Development and Innovation Strategic Council (K-DISC) is the strategic organisation under the Planning and Economic Affairs department of the Government to develop the holistic innovation ecosystem for the state and lead interventions aimed at

strengthening the quadruple helix model of innovation in Kerala. The Kerala Startup Mission has created the best innovation ecosystem in the country in Kerala. The Kerala State Industries Development Corporation (KSIDC) supports established businesses scale up through adoption of innovations. The model of K-DISC - KSUM - KSIDC is unique to the country.

iii) Transforming Higher Education. KDISC integrates the Skilling and Recruit-Train-Deploy (RTD) model within the framework of Collaborative-Real-World-Problem-Solving (CRWPS), a powerful approach for tackling complex challenges and bridging the gap between academics and the workplace. CRWPS enhances employability by shaping students into change-makers and leaders while fostering experiential and peer learning. This approach helps students build a portfolio centred on the problem-solution life cycle, preparing them for impactful careers. The K-DISC projects of YIP, Manchadi, Mazhavillu, Course integrated RTD model are initiatives towards this.

iv) Promoting Knowledge intensive industries. Innovation, Skilling and Transformation of higher education should lead to Knowledge intensive industries that lead to extensive value addition based on knowledge inputs and knowledge workers. These industries include Biotechnology industries, Medical devices, pharmaceutical industries, Engineering Industrial parks, film and video park, electronic hardware park etc.

- v) Addressing unemployment of educated-unemployed - A comprehensive Kerala Knowledge Economy Mission (KKEM) was implemented to address unemployment of educated-unemployed in Kerala with a focus on career-break women and recent graduates. The programme and its platform, Work Near Home, and Vijnana Keralam components are detailed in later sections.
- vi) Digital Transformation of all sectors of economy. The KFON project has created high speed digital connectivity for the vulnerable populations and connecting all government institutions. The KFON network is being expanded with the government's promise of affordable internet for all.

This framing draws on official policy documents and K-DISC's own articulation of the knowledge-economy strategy (Kerala State Planning Board 2022; K-DISC 2023).

8. Context of K-DISC

The Kerala State Innovation Council (KSINC) was established in 2013 to support the National Innovation Council to foster activities relating to innovation in the state as a part of the decade of innovation program of the Government of India. KSINC was recast as the Kerala Development and Innovation Strategic Council (K-DISC) in 2018. According to its activity report, K K-DISC brings out path-breaking strategic plans that reflect new directions in technology, product and process innovations, social shaping of technology and creating a healthy and conducive ecosystem for fostering innovations in the State. (Kerala Development and Innovation Strategic Council, 2023) The

state's limitations in land and natural resources are not conducive to a conventional investment led industrial growth model. Kerala's parameters indicate Kerala's need to transition to a knowledge economy as discussed in Section 7. The state has embraced innovation as a key driver of economic growth. Innovation is also necessary to address second-generation problems affecting Kerala discussed in Section 6.

The transition to a knowledge economy brings to the forefront opportunity to address a myriad of wicked problems that are unique to Kerala. Challenges such as urban sprawl, social inequalities of the outliers and immigrants, complex micro regional issues demand integrated and innovative solutions. Transitioning Kerala's low value-added low diversification enterprises to high production high productivity requires knowledge input. The growth story of MSME's emphasise this requirement (Balagopal, 2023). Transforming Kerala economic base from the present low productivity regime to a high productivity knowledge economy holds immense promise for driving sustainable economic growth, fostering innovation, and improving living standards. (Shekar and Unnikrishnan (2023)).

Central to Kerala's transition is the adoption of the quadruple helix model, emphasizing collaboration between government, academia, industry, and civil society (**Fig 1 Quadruple Helix Model**). This model fosters synergies between knowledge creation, technology transfer, and market dynamics, driving value addition across sectors. A holistic innovation ecosystem model (**Fig 2 Holistic Innovation Model**) has

been built to create a People's Innovation system for the transition of Kerala to a Knowledge Economy.



Figure 1: Quadruple Helix Model

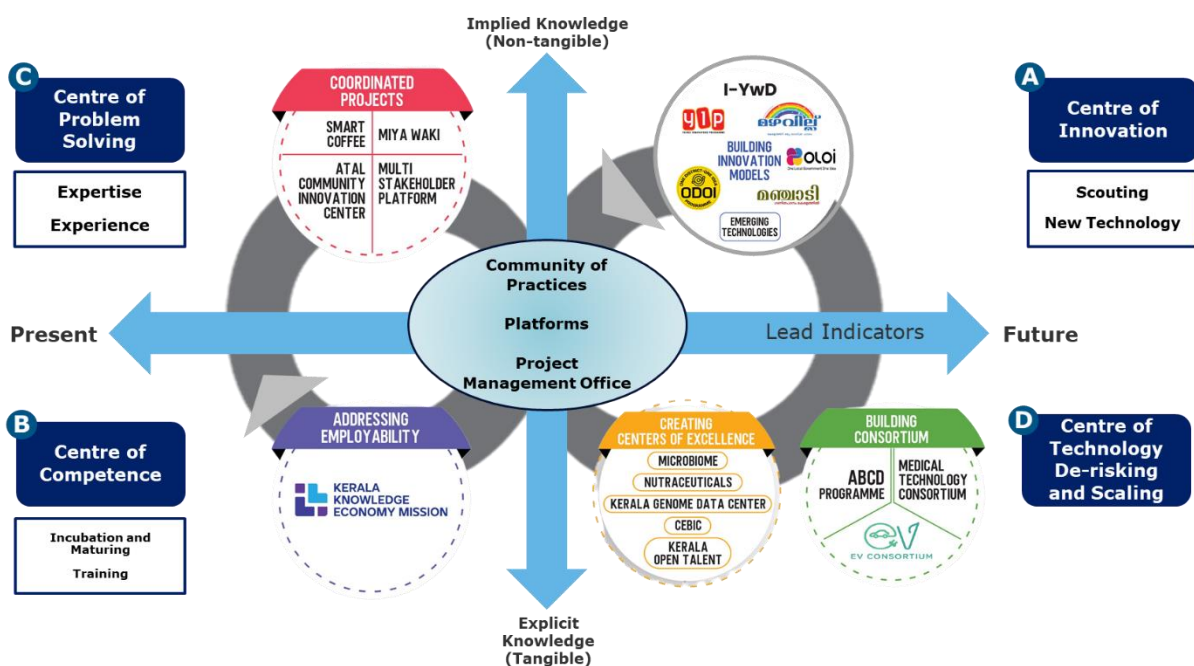


Figure 2: Holistic Innovation Model

9. Experiments and Results

K-DISC has designed and implemented, through a participative and iterative process, an Innovation Ecosystem for Knowledge Co-production based on praxis. It has created a mutually reinforcing and dynamic portfolio of projects that are grouped under:

- a. Centre of Innovation
- b. Centre of Capability Building
- c. Centre of Problem Solving
- d. Centre of Technology De-risking and Scaling

The explanation of each Centre and the projects under each are beyond the scope of this paper. The paper will discuss some key initiatives and highlight the participative and locally anchored design of the projects that make it unique in the country.

9.1. Young Innovators Programme

The Young Innovators Program integrates innovation-focused learning with school and college curricula for participants aged 13 to 37. The Young Innovators Programme (YIP) is built on the ‘vision of enabling students to identify real world problems and apply principles of design thinking to explore innovative solutions, with the support of teachers, domain experts, and entrepreneurs’. (K-DISC 2023). Unlike other national and international programmes for young innovators that functions disconnected from the education system and encourages solutions with potential for commercial gains, As described in K-DISC’s programme note, YIP functions within the educational

system and aims to develop critical thinking and creative exploration in students to solve problems they see around them. (K-DISC 2023). Nevertheless, students who wish to pursue novel ideas and moon-shot projects are also given the right mentorship and support.

YIP operates on a quadruple helix model, connecting industry, start-ups, government, academia, and civil society. YIP has established a partner ecosystem, that pillion rides on the District Innovation Council, comprising the district panchayat chairperson, the district collector, and representatives of the district's academia, research institutions, and industry. The problems sourced from various government departments and Research Institutions are compiled into a Problem Shelf consists of 1970 problem statements accessible to students along with 30 themes and sub-themes identified by K-DISC.

9.2. Manchadi and Mazhavillu

The Education Innovation Programmes – Manchadi – Teach Maths for Kerala and Mazhavillu – Teach Science for Kerala, have demonstrated that developing contextual understanding among children is possible through an activities and practices based approach that facilitates critical thinking, enquiry-based, project-based, and integrated thematic learning. This is achieved through contextual life-related activities driven by a sense of purpose and an environment of teaching-learning, avoiding direct teaching with scaffolding based on the learning needs of children. Effort is made to enable group activity, peer learning, interaction, and dialogue, leading to a superior understanding of

concepts through guided reinvention. A process of continuous assessment and developing an ICT-based tool for supporting the conceptual development of the teaching-learning process is also attempted.

9.3. One Local Government One Idea

The People's Plan Campaign of 1997 was a landmark movement in the Panchayati Raj system in India, where funds, functions, and functionaries were devolved in letter and spirit to the local governments in Kerala. 40% of the state's budget outlay has been earmarked for the Panchayats since. The trust invested in the local government system has paid dividends in the form of empowered local communities, as experienced in social health and education interventions as well the local response and resilience during the Kerala floods and the global pandemic. However a variety of complex challenges especially those involving higher science and technology inputs in the various sectors need to be addressed.

The One Local Government One Idea (OLOI) is a project that aims to extend the innovation methodology of problem solving and creating value to local governments. According to K-DISC's programme report, since its inception in 2021 and launch in 2023, it has trained 19,306 LSGI Stakeholder in collaboration with the Kerala Institute of Local Administration (KILA), including 1,757 Local Self Government Institution Heads, 495 District Level Implementing Officers, 7,760 Elected Representatives, 1,632 Block Level Implementing Officers,

and 7,662 Grama Panchayat Level Implementing Officers for the successful roll out of OLOI programme.(K-DISC,2023)

1,500 Experts are engaged on a pro-bono basis through the Community of Practice (CoP) across 27 thematic areas. 498 Academic institutions are connected with the OLOI programme to support the LSGIs in problem-solving as a part of the quadruple helix model. KDISC has partnered with APJ Abdul Kalam Technological University to involve students in real-life problem-solving by incorporating socially relevant projects into the higher education curriculum.

During the pilot phase of the OLOI program, 33 LSGIs highlighted issues related to handling low-value plastics and sanitary waste, highlighting a significant area of concern that requires innovative solutions. To address this, KDISC organized a Waste Management Hackathon. A platform for hackathon was launched in November 2023 that attracted 187 pan-India solutions across various waste management themes. After a rigorous evaluation process, five Ready-To-Implement projects were selected, focusing on recycling sanitary pads and plastics into value-added products like pulp, plastic granules, and building materials. Efforts are being made to take forward the geriatric care, palliative care, and care of the disabled to new heights linking it to innovation. Interventions in value added agriculture and allied sectors will transform the low productivity economic base of Kerala.

OLOI reverberates the Kerala ethos of empowered Local Self Governments and aims to strengthen the capabilities for contextual innovative problem solving and Local Economic Development in the public space focussing on equity and sustainability.

9.4. One District One Idea (ODOI) MSME Development Project

The guiding principle behind the innovation cluster approach is that Micro, Small, and Medium Scale Enterprises (MSMEs) play a crucial role in local economic growth and equitable development, significantly contributing to employment generation, poverty reduction, and wealth distribution in most developing economies. The One District One Idea (ODOI) program, initiated by the Kerala Development and Innovation Strategic Council (K-DISC), is an innovation challenge aimed at promoting creativity and technological advancements among MSMEs across Kerala, fostering non-linear and non-incremental growth in manufacturing and enterprise clusters through innovation and technology.

By incorporating the Blue-Ocean strategy, ODOI focuses on creating new market spaces and making the competition irrelevant, encouraging MSMEs to explore untapped markets and innovative business models. (Shekar and Unnikrishnan 2023). Support is available for piloting new technologies developed by academic, and research institutions that could potentially transform the cluster but have not been tried out so far. Intellectual property support, as well as costs for handholding the

innovations until they stabilize, are covered under the initiative. Innovation clusters differ from MSME clusters in that firms manufacturing similar products could be geographically dispersed but are part of a network linked with the innovation ecosystem. K-DISC, academia, R&D centres, and sectoral experts/community of practitioners constitute the innovation ecosystem. This intervention is critical for transforming low productivity base of traditional industries in Kerala.

The ODOI project is different from the other national MSME cluster programmes in that it explores collaborative blue ocean opportunities and does not direct its focus on competing passively in global capital driven red oceans and tries to emulate the innovation led MSME growth models of the Calicut footwear cluster, Penpol Ltd., Synthite, SciGenom Labs etc.

9.5. Electric Vehicle and Green Hydrogen Programme

To achieve the net-zero vision by 2050, the Government of Kerala, through K-DISC, is building a sustainable Electric Vehicle (EV) ecosystem by implementing the State EV Policy, establishing an EV Consortium, and proposing an EV Park that leverages locally available resources. By harnessing the state's strengths in EV research, development, and design, K-DISC aims to position Kerala as a global hub for cutting-edge EV technologies, fostering local talent, self-reliance, and significant investments in sustainable mobility solutions.

One of K-DISC's key initiatives is leveraging Kerala's mineral-rich beach sands, particularly for extracting valuable elements like Yttrium, Erbium, Zirconium, Gadolinium, Lanthanum, Cerium, and Neodymium, which can serve as catalysts for developing a robust manufacturing ecosystem. This strategic move aligns with the state's vision of fostering knowledge-driven industries and advanced technologies. (Unnikrishnan, Athira, and Ajit (2022))

K-DISC has spearheaded the formation of an EV Consortium comprising premier institutions such as Travancore Titanium Products Limited (TTPL), Vikram Sarabhai Space Centre (VSSC), Centre for Development of Advanced Computing Thiruvananthapuram (C-DAC T), Trivandrum Engineering Science & Technology (TrEST) Research Park and the Indian Institute of Science Education and Research Thiruvananthapuram (IISER TVM). This consortium focuses on developing EV subsystems, including batteries, motors, and power electronics, while supporting research and innovation in related fields.

The EV battery development is also sought to be linked to household level electrolysis to enhance the states energy transition to green hydrogen and renewable energy transition.

Unnikrishnan, Athira and Ajit (2022) emphasise that by establishing the EV Park and streamlining collaborations, K-DISC ensures Kerala's transformation into a global player in sustainable electric mobility solutions based on self-reliance, unlike creating "Assemble-in-India" EV policies.

10. Vijnana Keralam

A key challenge facing Kerala is unemployment among educated people. For a long time, unemployment in Kerala was 2-3 times the national average. However, since the 1990s, it has increased to 4-5 times in Kerala. Unemployment is most severe among women. 25-35 percent of women job seekers are unemployed. However, unemployment in Kerala, which was 4-5 times the national average, has recently come down to 2 times. This is most acute among young people between the ages of 15 and 29. Recent NSSO data show Youth unemployment in Kerala is 30 percent, compared to the national average of 10.2 percent. Kerala has the highest youth unemployment rate. (NSSO 2024).

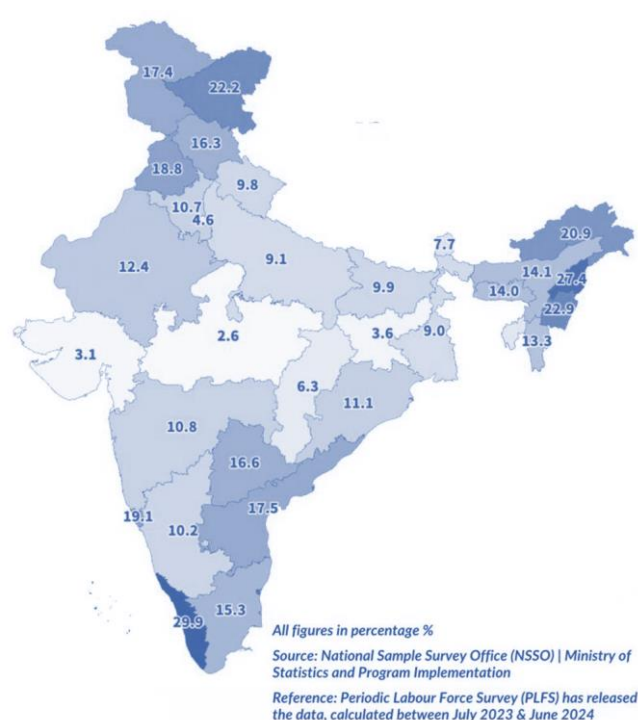


Figure 3: Unemployment levels in India (Source: NSSO, Ministry of Statistics and Program Implementation, 2024)

An important thing is to provide skill training to students and educated job seekers and make them employable. Today, the undergraduate and postgraduate courses taught in colleges do not equip anyone for any job in particular. This requires a skill development training program that links their basic subjects with employment and the production process. Even children studying in polytechnics and ITIs need training or internship in the exact skills required by the industries. To fulfil this duty, the Kerala government has created the Kerala Knowledge Economy Mission (KKEM).

KKEM has two responsibilities: 1) Identify educated job seekers and provide them with the necessary support and provide them with employment through or without job fairs 2) provide job-related skills training to students currently studying in colleges, polytechnics, and ITIs to ensure that they will be employed at the end of their studies.

- “KKEM has created a national award winning platform – Digital Workforce Management System (DWMS) – to connect job seekers, employers, and skill providers”.(Government of Kerala,2021)
- DWMS is a conglomerate of platforms. Monster, India's largest employer platform, (rebranded as Foundit); LinkedIn, the social media platform of the global company's Indian division, which handles high-tech jobs in the IT sector; i-Track, India's most comprehensive skills platform created for Transnueron N. S. D. C.
- Educated persons (Plus Two, ITI, Diploma, Degree, B.Tech etc.) between the ages of 19 and 59 can register on DWMS. Job seekers

can register by providing their qualifications, skills and experience in their DWMS profile. Since voluntary registration is not enough, more than 18.50 lakh job seekers were registered on this platform through a door-to-door campaign led by Kudumbashree.

The description here follows official KKEM documentation and the Kerala State Planning Board's Economic Review 2022 (Kerala State Planning Board 2022; Government of Kerala, 2021)

What sets KKEM apart from the other skilling and employment projects is the focus on equitable access and community-based skilling. KKEM is not a technocentric platform solution alone, but it is complemented by a local government and community driven on-ground mechanisms of job stations and district co-ordination units. This ensure the driving force remains the aspirations of the people and not only the needs of the corporate job market. The Diversity Inclusion Projects of KKEM focus on career break women, Unnati, Oppara, Samagra for members of SC, ST, fisherfolk, persons with disability (PwD) communities, PRIDE for transgenders. In addition to a platform model, the Vijnana Keralam initiatives creates physical touch points in partnership with local governments to ensure digital inclusion and local ownership of KKEM. A programme to create an alternative innovation collective linked platform of freelancers addressing the widely criticised anti-labour model of Uber and Lyft creatively linking it with a new co-operative model inspired by the Mondragon worker's co-operative and Platform Co-operative Consortium has been also launched.

11. Innovation as a process of empowerment

“Since assuming office in 1957, the left Government stressed on people’s access to resources through land reform and empowerment of people through administrative reform, decentralization, health and education. These initiatives also created the necessary environment for total literacy, land literacy, people’s science movement, and concerned citizenry. (Isaac and Franke 2000; Parayil 2000; Chattopadhyay and Franke 2006).” Nurturing human resource received high priority in government initiatives as Kerala inherently faces constraints of traditional mineral resource availability, that propelled India’s industrialisation. Rare earth deposits are the only atomic minerals for which Kerala is known. Education helped people to move around both within and outside the country. People of Kerala have the glorious ancestry to interact with the international community, adapt to new ideas and enrich themselves. The architecture of Kerala testifies this trend. Advent of Information Technology opened a new horizon for Kerala’s development. While Government has taken initiatives to use information technology for development of the State, the larger society showed their interest to absorb technology and use it for empowerment of the masses and for redefining the public space from a rights perspective.

Banking of government initiatives, social adaptability and the need for innovation-led development is proposed, which is a natural corollary of the development process that the state is following since its formation. Innovation in this context may be defined as

interdisciplinary, inclusive, collaborative, contextual real-world problem solving organised based on social needs and addressing environmental concerns within a public framework. Most of the problems faced by Kerala are highly localised wicked problems with no straightforward solution. According to Rittel and Webber (1973), wicked problems are ‘complex social or public policy issues that are difficult or impossible to solve’ due to their unique characteristics. In the absence of right or wrong solutions, the objective is to differentiate between better and worse solutions. Head & Alford (2015) emphasize creating a ‘shared understanding’ among stakeholders about the problem for contextualised and effective solutions. K-DISC creates an innovation ecosystem based on the quadruple helix model, that brings together representation from government, academia, industry, and civil society to define local problems and scout innovative solutions. The focus of the innovation ecosystem is on ensuring interaction between the stakeholders for participative problem definition and contextualised solution discovery. This is the Doing Using Interacting (DUI) model of the innovation process. DUI innovation is experiential innovation which is tacit and could be transferred through networks and informal means. In contrast, in Science Technology Innovation (STI), the innovation process is driven by scientific research. K-DISC blends DUI and STI innovation processes to ensure contextualisation as well as technical proficiency of solutions ensuring democratic participation of community. That the model is also linked to the wider context of

Kerala's development, which itself is an alternative to the neo-liberal development model brings in its alternate dimensions.

12. Summary and Conclusions

Kerala's development experience provides several lessons, affirmative public action being the high point. The state has addressed first generation social and human development problems admirably, although there are outliers both in spatial and sectoral terms. It is also noteworthy that trajectory of Kerala's development is organically evolved, where access to land resources formed the basic foundation, supplemented by education, healthcare and social security. Human capacity building and empowerment played a vital role. However, there are problems with stagnating economy, slow growth, low productivity, restricted job opportunities, and incidences of disasters including impact of climate change. The changing scenario, both biophysical system and socio-economic system requires paradigm shift in our approach to development initiatives. Given the resource constraints and limitations to further redistribution, the traditional management practices, hitherto followed are not sufficient to address the problems. There is a need for innovation-led development. Establishment of K-DISC is to fulfil this requirement. It is important to note that K-DISC's activities are centred around Government of Kerala activities and it strives to involving people in all stages of innovation ecosystem. The quadruple helix model is conceived as a platform to bring people in the same platform along with Government, academician and private sectors. This is in contrast to the triple helix model, that considers

government, academician and private sector. People and the public space have virtually no role in this scheme. Engaging Community of Practices and organising Hackathon, K-DISC ensures that the solutions to problems are just not techno-centric but socially contextualised, broad based and also set the process of generating new ideation through a process of social construction based on praxis. K-DISC recognises that people are innovative and that they should be empowered with necessary skills to take part in innovation-led development, which is essential for achieving sustainable development. The task of innovation is not the sole prerogative of a select group or private enterprises. It is a social construct and deserve a holistic ecosystem approach to benefit the marginalised and for social good.

While innovation centres in other states are mostly non-functional with little or no impact, K-DISC in Kerala has initiated several programmes as highlighted in this paper. A state-wide strategy for innovation-led growth is a pioneering one. The programmes have been implemented only for the last few years, and it is too early to assess outcomes. Nevertheless, it is important to record that by virtue of the comprehensiveness of the programme and its contextualisation, these initiatives have started yielding early results which are well evident and encouraging.

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Kerala Development and Innovation Strategic Council (K-DISC) is a strategic think-tank and advisory body established by the Government of Kerala, registered as an independent society under the Travancore-Cochin Literary, Scientific and Charitable Societies Act, 1955.

Vision

A competitive and inclusive Kerala through the creation of a healthy, conducive ecosystem for transformative and bold innovations through new directions in technology, product, and process innovations.

Mission

- Holistic and Quality Human Development in Kerala
- A Knowledge-centered Technology Based Local Economy with Global Connect
- Enhanced inclusion, participation, and self-reliance through cutting-edge knowledge and technology.
- Seeding new knowledge-based industries through coordinated projects with the participation of multiple stakeholders.



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