

Building a Holistic Innovation Ecosystem

The Role of Kerala Development and Innovation Strategic Council

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Through the review of the Kerala Development and Innovation Strategic Council's non-linear innovation programmes—One Local Government One Idea, One District, One Idea, Young Innovators Programme, Kerala Knowledge Economy Mission, and emerging technologies in governments—the article explores the building of a holistic innovation ecosystem in Kerala by the K-DISC.

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There is a growing recognition of the importance of innovation and efficiency in economic growth and development (Schumpeter 1934). Innovation is widely acknowledged as a critical driver of economic development (Grossman and Helpman 1994), and learning capabilities play a crucial role in the competitiveness of regions (Cohen and Levinthal 1989; Bell and Pavitt 1993; Shekar and Joseph 2022). Governments have been actively involved in promoting science, technology, and innovation to improve the well-being of their constituents, often referred to as the science, technology, and innovation policy (Borrás and Edler 2014).

While innovation policies are of great interest, they have received limited attention in academic literature. This lacks the holistic models of non-linear innovation policies for regional or national systems (Edquist 2019). Differentiating between research and innovation policy is essential to foster an innovation-centric approach not controlled solely by research-focused councils (Pelkonen 2006). The academic literature of innovation studies agree about the absence of ideal types of non-linear innovation policies to aid the development of a region (Edquist 2019; Lundvall et al 2009). However, scarce but growing, scholarly and policy-oriented literature of national and international reports have studied the characteristics of subsets of existing innovation policies and a few country-specific research cases (Edquist 2019; Pelkonen 2006).

The Kerala Development and Innovation Strategic Council (K-DISC) was established by the Government of Kerala with a unique focus on innovation policy. Unlike similar councils in other parts

of the world that tend to prioritise science and research policy, K-DISC concentrates on non-linear innovation policies with the aim of building a holistic innovation ecosystem in the state.

However, there is limited publicly available information about K-DISC's operations, which creates a shortage of knowledge and information. This article aims to fill this gap by reviewing K-DISC's innovation programmes that contribute towards building the holistic innovation ecosystem, thereby improving the quality of such policies in Kerala and beyond.

Innovation Ecosystem

During the early stages of innovation research and policy, the linear model was prominent, focusing on the supply-push perspective and the role of research in driving innovation (Freeman 1987). However, the systems of innovation approach, popularised by Lundvall et al (2009) and Nelson and Rosenberg (1993), has gained traction in recent years, emphasising innovation processes and their determinants. This approach recognises that research alone is not sufficient for innovation. Previous research within the innovation systems approach has primarily focused on system components like organisations and institutions, rather than dynamic processes and their evolution (Lundvall et al 2009).

Innovation systems highlight the complex interactions between actors with complementary competencies operating under specific institutional settings (Lundvall et al 2009). The metaphor of a system emphasises the distributed yet coordinated agency underlying the innovation process, with interactions between firms, universities, policymakers, and intermediaries creating positive externalities crucial to innovation (Nelson 1993). Different variants of innovation systems have been formulated, including national, regional, sectoral, and technological approaches, each with distinct boundaries (Lundvall et al 2009). Empirical evidence suggests that innovation systems research lags behind in being systemic, broad-based, and demand-oriented (Edquist 2019; Lundvall et al 2009; Shekar and Paily 2019).

Moving towards a holistic innovation ecosystem, innovation policies have

expanded from narrow and linear perspectives to encompass a broad range of actors and activities. The innovation ecosystem is defined as the evolving set of actors, activities, artefacts, institutions, and relations that contribute to the innovative performance of individuals or groups (Edquist 2019). A holistic innovation ecosystem considers all public actions impacting innovation processes and encompasses all determinants of innovation, moving beyond a supply-driven perspective. It recognises that partial innovation ecosystems often focus on specific determinants, such as research and development, while linear innovation policies are common but limited. The government's involvement in building a holistic innovation ecosystem is essential. It guides scientific progress through innovation policy, funds infrastructure development, and provides resources for the wider society.

Kerala's Innovation Ecosystem

The evolution of science and technology policy can be traced back to government support for research and development post-World War II, driven by the Cold War and the desire to enhance technological and military capabilities. In the post-1980's globalising world, competitiveness and national systems of innovation have gained importance in knowledge creation and commercialisation. Kerala's innovation ecosystem is relevant in today's post-boom stage of the Fourth Industrial Revolution, offering a framework for building inclusive, sustainable, and innovation-driven economies. It incorporates the innovation systems perspective, emphasising systemic interactions between actors and institutions in shaping the innovation process. Additionally, it draws insights from local innovation and grassroots innovation literatures, highlighting the potential of grassroots and community-driven innovation to address social and environmental challenges.

Innovation can emerge from both technological and non-technological knowledge. Non-technological innovation relates to the know-how, skills, and working conditions embedded in organisations. Sustained gains in productivity

depend on innovation which, then, drives market power and competition among entrepreneurs. Ideation and market success require strong higher education initiatives, university–industry linkages, and contributions from the creative arts and humanities alongside science and technology. Such a broad-based platform is essential for knowledge creation and innovation. The entire innovation ecosystem of Kerala, with its interconnected factors, is crucial for enabling such an innovation. It brings academia, industry, government, private sector, development actors, and civil society together for interaction, dialogue, and social learning. Stakeholders combine their indigenous knowledge, business interests, and organisational skills to generate innovation. Interactions within the ecosystem can occur physically or virtually, addressing challenges and opportunities at different levels—from a village or community to a district or statewide, or throughout a value chain or economic sector. This aims to tackle challenges in various economic sectors while promoting socio-economic development.

Formation of K-DISC¹ and its initiatives: India declared 2010 as the “Decade of Innovation” to drive growth and competitiveness. The National Innovation Council (NIC) was established to implement inclusive innovation strategies and prepare a road map. Building on NIC's work, Kerala established the State Innovation Council and later formed the K-DISC in 2018. K-DISC's innovation agenda prioritises total sustainability by addressing global issues such as health, nutrition, business, climate change, engineering, social innovations, artificial intelligence (AI), and security. Linear innovation policies emphasised engineering and biology, overlooking social innovations. This led to unsustainable social behaviour and numerous social problems, globally. Therefore, the K-DISC's focus has shifted to non-linear innovation policies, including social innovations, recognising their significance in tackling social problems, and unsustainable behaviour.

K-DISC emphasises skill development to tackle youth unemployment through

incubation centres and mentorship programmes led by experienced academicians and entrepreneurs. This, combined with increased government and private sector funding and years of business experience, promotes sustainable industrialisation and innovation.

A holistic innovation ecosystem requires technology infrastructure, research institutions, funding sources, policy frameworks, skilled workforce, and incubators/accelerators. K-DISC recognises the importance of building such an ecosystem to drive economic growth and job creation while addressing social challenges. It provides mentorship, incubation facilities, networking events, and funding opportunities. K-DISC collaborates with stakeholders, and conducts coordinated projects on blockchain, electric vehicles, alternative energy, and climate resilience.

The major innovation programmes of K-DISC which closely integrated to Kerala's innovation ecosystem are: (i) One Local Government One Idea (OLOI) programme; (ii) One District One Idea (ODOI) programme to promote innovation ecosystem in districts; (iii) Young Innovators Programme (YIP); (iv) Kerala Knowledge Economy Mission (KKEEM); and (v) the programme for emerging technologies in governments.

K-DISC's Methods

K-DISC's methods that aim to foster innovation, knowledge sharing, and collaboration in the above-mentioned programmes include: (i) problem identification and repository: K-DISC systematically identifies and categorises problems faced by stakeholders, storing them in a digital repository. (ii) Community of practices (COP): COP fosters knowledge diffusion and innovation by facilitating communication and collaboration among academicians, researchers, engineers, and other practitioners from different disciplines. (iii) Mentorship and guidance: K-DISC provides experienced mentors who offer support and guidance to the innovators throughout their journey. (iv) Resource network and connectivity: K-DISC facilitates networking and connections with academia, private enterprises, research institutions, and government agencies to provide innovators with the necessary

resources. (v) Capacity building and training: K-DISC organises programmes and training sessions to enhance participants' skills and knowledge in innovation processes and entrepreneurship.

These methods create an environment conducive to collaboration, knowledge sharing, and continuous improvement. They enable professionals to work together, address challenges, learn from experiences, and generate new ideas for innovation. By integrating them, K-DISC initiated the below-mentioned innovation programmes and is thus driving socio-economic development by addressing societal challenges in Kerala. These programmes can leverage the collective knowledge and expertise of their participants to drive innovation and achieve their objectives.

One Local Government One Idea programme: The OLOI programme in Kerala initiated by the K-DISC exemplifies how local innovation can drive economic development and solve complex challenges. It enables local bodies to generate knowledge and apply it to local economic development (LED) through innovative solutions in various sectors. The programme aligns with the vision of local government bodies to facilitate LED and is supported by agencies like the Kerala Institute of Local Administration (KILA) and the local self-government department (LSGD). The OLOI empowers the local communities to come up with innovative solutions for sustainable economic growth. For instance, in agriculture, communities have developed techniques like integrated farming and organic practices. In healthcare, innovative approaches have been developed for palliative care and mental health.

The programme leverages the innovation systems framework, emphasising systemic interactions between actors and institutions. Diverse stakeholders collaborate to transform local interventions and address community needs, using local knowledge and resources. This highlights the importance of local innovation for economic development and problem-solving. The OLOI creates a platform for local communities to drive their own development. The COP approach

engages diverse stakeholders, including academia, industry, cooperatives, and civil society organisations. The triple helix model links universities with other sectors. A database of resources and problem statements is created for replication in similar contexts. Through COPs, this will identify problems in the selected areas, which will be then taken through brainstorming sessions and revisions, leading up to creating a shelf of problem statements. The shelf of problem statements will then be open to academia, start-ups and the public for innovation through hackathons. An innovation portal facilitates problem statement creation and solution discovery. The COPs guide the innovation process, mentor innovators, and connect them with relevant resources.

One District One Idea programme: Micro, small, and medium enterprises (MSMEs) are vital for employment generation, poverty reduction, and equitable wealth distribution in developing economies. However, their limited size hinders their potential. In India, MSME growth strategies have been incremental, focusing on common facilities and market connections for minor improvements (Shekar and Joseph 2022).

The MSMEs struggle to achieve economies of scale, hindering their ability to leverage market opportunities. Their small size limits functions like training, market intelligence, logistics, and technology innovation. This restricts their ability to introduce innovative improvements and seize new market opportunities. To address these challenges, K-DISC launched the "ODOI" programme. This initiative aims to identify and support one unique business idea in each of Kerala's 14 districts. It provides financial and technical assistance to promote innovation, productivity, and market competitiveness among MSMEs. By supporting MSME growth through this programme, K-DISC promotes inclusive and sustainable economic development in Kerala. The ODOI programme fosters entrepreneurship and innovation while creating a supportive ecosystem for small businesses. Its success contributes to the United Nation's Sustainable Development

Goals of reducing poverty, promoting economic growth, and decent work.

The ODOI programme aligns within the innovation ecosystem by promoting innovation and strategic linkages between MSMEs and academic institutions. It focuses on creating clusters and networks of MSMEs, facilitating information exchange and building trust among actors. It also provides seed money and technology support for fostering innovation, including piloting new technologies developed by start-ups and research institutions.

Young Innovators Programme²: The YIP is the K-DISC's flagship initiative to embed knowledge-driven problem-solving and collective action on global and local challenges within the public education system. It focuses on demand-led problem-solving in 22 themes and encourages students aged 13 to 37 years to participate. It promotes business model innovations, social enterprises, and applied research. YIP provides cash prizes, and mentoring in five areas, and develops design and critical thinking capabilities among mentees. Since its inception in 2018, YIP has seen four cohorts with around 12,000 participating teams and 100 ideas in the pipeline. The ecosystem includes educational institutions, domain partner institutions, facilitators, mentors, and evaluators. Collaborations with various organisations strengthen the YIP programme. An ICT-based support system facilitates identifying and processing promising ideas, connecting stakeholders from academia, industry, investors, and civil society to promote innovative solutions with sound business models and social relevance. YIP integrates stakeholders, fosters innovation culture, and supports innovators through mentoring, critical thinking development, and recognition.

Kerala Knowledge Economy Mission³: The KKEM aims to develop Kerala into a knowledge society, driving economic growth, and improving lifestyles. It focuses on knowledge-intensive activities and relies on intellectual capital rather than physical inputs. The mission seeks to address current and future societal

problems, promote sustainable development, and foster intellectual growth using digital technologies. The goal of KKEEM is to provide employment to 20 lakh educated unemployed individuals within five years. The mission has a four-pronged strategy:

(i) Mobilising unemployed educated individuals and career-break professionals through registration, training, and engagement on the digital portal for prospective employment.

(ii) Establishing a system for career counselling and providing support through skilling and assessment programmes.

(iii) Connecting trained jobseekers with job providers and facilitating potential engagements.

(iv) Establishing a social security system and infrastructure support for knowledge workers, who are engaged with job providers, enables them to work near their homes.

To achieve these objectives, the Digital Workforce Management System (DWMS) has been developed as a transparent digital platform that compiles job openings locally and internationally. This focus on creating a knowledge-based economy and providing employment opportunities through systemic collaboration builds a holistic innovation ecosystem in the state.

The emerging technologies in governments⁴: The emerging technologies in government's programme by K-DISC bring together technology experts and government officials to implement cutting-edge technologies in government operations. The programme promotes innovation and collaboration, bringing transformative changes to public service delivery. It covers areas like healthcare, water resources, transport, law enforcement, agriculture, and registration, exploring technologies such as AI, blockchain, internet of things (IoT), augmented reality (AR)/virtual reality (VR), etc. By leveraging emerging technologies, the programme improves the efficiency and effectiveness of public services, aligning with the innovation system framework. It also trains government officials to understand and integrate these technologies into operations, fostering capacity-building. The programme's focus on

collaboration and leveraging technology demonstrates its alignment with the innovation system framework, enabling innovation and improving service delivery.

K-DISC: A Role Model?

K-DISC has become a potential role model for other states in India due to its unique and non-linear innovative programmes. The council's openness and political will to absorb new perspectives have set it apart. It provides a platform for industry, academia, and politics to discuss innovation policy. The prominence of K-DISC within the political system, chaired by the chief minister, allows for the smooth transfer of advice to the government. This elevates the status of innovation policy within the government and its agencies.

K-DISC's unorthodox innovation programmes have built a holistic innovation ecosystem in the state as an alternative to traditional linear models. It can serve as a role model for other states in initiating and governing holistic innovation policies. These programmes support a diverse range of individuals and encourage innovative ideas for the state's growth. K-DISC fosters partnerships between academia, industry, and the government to address societal problems through innovation.

Policymakers can replicate K-DISC's approach to drive innovation and policy implementation in their regions, promoting economic development and improving well-being. K-DISC has enabled entrepreneurs, fostered collaboration, and built a skilled workforce. It is a valuable case study for governments seeking to promote innovation-driven economic development. However, further research is needed to assess the long-term impact of K-DISC's initiatives and identify areas for improvement to promote more effective innovation policies.

NOTES

- 1 <https://kdisc.kerala.gov.in/>.
- 2 <https://yip.kerala.gov.in/>.
- 3 <https://knowledgmission.kerala.gov.in/>.
- 4 <https://kdisc.kerala.gov.in/index.php/i4g2021>.

REFERENCES

- Bell, M and K Pavitt (1993): "Technological Accumulation and Industrial Growth: Contrasts between Developed and Developing Countries," *Industrial and Corporate Change*, Vol 2, No 2, pp 157–210.
- Borrás, S and J Edler (2014): "Introduction: On Governance, Systems and Change," *The Governance of Socio-technical Systems*, Cheltenham, UK: Edward Elgar Publishing, pp 1–22.
- Cohen, W M and D A Levinthal (1989): "Innovation and Learning: The Two Faces of R and D," *Economic Journal*, Vol 99, No 397, pp 569–96.
- Edquist, C (2019): "Towards a Holistic Innovation Policy: Can the Swedish National Innovation Council (NIC) Be a Role Model?" *Research Policy*, Vol 48, No 4, pp 869–79.
- Freeman, C (1987): *Technology Policy and Economic Performance: Lessons from Japan*, London: Pinter Publishers.
- Grossman, G M and E Helpman (1994): "Endogenous Innovation in the Theory of Growth," *Journal of Economic Perspectives*, Vol 8, No 1, pp 23–44.
- Lundvall, B-A, K J Joseph, C Chaminade and J Vang (2009): "Epilogue: Which Way Now?" *Handbook of Innovation Systems and Developing Countries*, B-A Lundvall, K J Joseph (eds), Cheltenham, UK: Edward Elgar Publishing.
- Malerba, F (2002): "Sectoral Systems of Innovation and Production," *Research Policy*, Vol 31, No 2, pp 247–64.
- Nelson, R (1993): *National Innovation Systems: A Comparative Analysis*, New York: Oxford University Press.
- Nelson, R R and N Rosenberg (1993): "Technical Innovation and National Systems," *National Systems of Innovation: A Comparative Study*, R R Nelson (ed), New York: Oxford University Press.
- Pelkonen, A (2006): "The Problem of Integrated Innovation Policy: Analyzing the Governing Role of the Science and Technology Policy Council of Finland," *Science and Public Policy*, Vol 33, No 9, pp 659–80.
- Schumpeter, J A (1934): *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*, New Brunswick, US and London, UK: Transaction Publishers.
- Shekar, K C and K J Joseph (2022): "Determinants of Innovation and Interactive Learning in Informal Manufacturing Enterprises in India," *Science and Public Policy*, Vol 49, No 3, pp 427–40.
- Shekar, K C and G Paily (2019): "The Need for an Innovation Survey in India," *Economic & Political Weekly*, Vol 54, No 38, pp 19–22.

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