



## **E-GOVERNANCE IN KERALA- THE FIRST FULLY E-GOVERNED STATE IN INDIA**

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### **Abstract**

*The paper makes a closer look into the e-Governance initiatives in Kerala - the State which has recently been declared as the first fully e-governed State in India. Based on an analysis of the recent developments in Kerala in the Information Technology (IT) front especially in e-Governance, the paper makes suggestions for the faster growth of the State through effective e-Governance adoption.*

**Keywords:** *ICT, E-Governance, e-Sevanam, m-Sevanam, e-Office, K-FON, Knowledge Economy.*

### **1. Introduction**

Having declared the first fully-governed State in the whole of India, Kerala – the small southernmost State in the Indian union has already embarked on an aggressive strategy to promote ICT in a big way, especially in the e-Governance front. The favourable features of Kerala include its very high digital literacy and internet penetration, besides being one of the earliest fully literate States in India. Of late, Kerala has ventured into K-FON (Kerala Fibre Optic Network) which is a public-funded initiative by the Govt. of Kerala (GOK) to provide high speed internet connectivity throughout Kerala. The GOK seeks to ensure internet connectivity to the masses and to ultimately transform the State of Kerala into a Knowledge Economy. The utmost significance that Kerala has accorded to the ICT and allied advances in technology, including the requisite infrastructure, like, internet connectivity, telecommunication etc. need not be overemphasized. In is in the above context that this paper seeks to look into e-Governance initiatives in Kerala which has now attained the unique distinction of India's first e-Governed State.

### **2. Objectives of the Study and Methodology**

1. To study the developments in Kerala's IT sector, especially the State's e-Governance initiatives;
2. To study the scope of ICT and e-Governance to transform various sectors of Kerala economy;
3. To analyse the implications of Kerala's e-Governance initiatives on Kerala economic growth;
4. To design strategies for the sustained growth of Kerala by transforming it as a knowledge society.

This study is designed was descriptive-analytical cum exploratory one. Data from authentic secondary sources like the publications of the Govt. of Kerala (GOK), Reserve Bank of India (RBI), Govt. of India (GOI), IBEF reports, etc. were used for the purpose of this study. Being a study of exploratory nature, no specific hypothesis was framed. Findings of past studies were used to corroborate the findings of this study and to make logical conclusions; and accordingly to make pragmatic suggestions for the sustained economic growth of Kerala, an emerging knowledge society.



## 5. Studies on ICT and Automation in Various Industries and Sectors with a Kerala Focus

Mohanty and Parundekar (1990)<sup>[1]</sup> have noted that India's manufacturing units have not been serious in modern techniques that impart flexibility, like, FMSs. Rao and Deshmukh (1994)<sup>[2]</sup> too have noted the key need for workers' participation in automation citing the case of Maruti Udyog Ltd. (MUL)-Indian PSU which later became a private unit; now, it is an Indian subsidiary of Suzuki Motor Corporation. Besides the studies done in industrial (or manufacturing) sector, like the ones above, many studies in the service sector (like, banking, tourism etc.) too have noted ICT's vital role for better quality and competitiveness e.g. a study by P.K. Manoj (2003)<sup>[3]</sup>, Significance of Knowledge Management: in Gaining Strategic Competence of Banks, in *IBA Bulletin* deals with ICT in banking.

A study by P.K. Manoj (2008)<sup>[4]</sup> 'Cost Competitiveness and Indian Economy: Significance of Mandatory Cost Audit in the Globalized Regime' *The Management Accountant*, has noted the need for cost competitive goods. Cost management is to be done scientifically using practices like Target Costing (TC) according to a study, P.K. Manoj (2009)<sup>[5]</sup> 'Targeting operational excellence through cost management: Some firm level evidence' *International Bulletin of Business Administration*. The growth in microenterprises (MEs) needs to be ensured by ensuring adequate skilled manpower with entrepreneurial capabilities. Growth in MEs not only ensures industrialization, but also equitable growth as MEs are run by the poor and other marginalized groups including women. For instance skilled women can start their own MEs as per their expertise and skills, e.g. ITI qualified women start MEs that need technical skills. Manoj (2011)<sup>[23]</sup> 'Just in time (JIT) inventory management for enhanced operational efficiency: an 'Indianised JIT' strategy for an agro machinery manufacturing unit in Kerala'. *European Journal of Technology and Advanced Engineering Research*, has observed that if modern management practices like JIT are used, then operational efficiency can be gained.

Many studies have noted that MEs of women collectives like SHGs could empower them, especially with the added empowerment potential of ICT – the powerful tool. Manoj P.K (2012)<sup>[24]</sup>, 'Potential of micro enterprises in women empowerment: A critical study of micro enterprises run by women under the Kudumbashree Programme in Kerala' *International Journal of Business Policy and Economics*, has noted the vital role that MEs under Kudumbashree have been successful in the socio-economic empowerment of the respective women members. Poor people, including women if properly trained by imparting requisite skills can accelerate the pace of economic growth in an equitable manner. Manoj P K et. al. (2014)<sup>[31]</sup> 'Impact of e-crm on commercial banking: an empirical investigation with reference to private sector banks in Kerala' *International Journal of Applied Services Marketing Perspectives*, have noted that e-CRM, that is the ICT-based CRM, could improve the performance of Kerala-based private banks. In a study done in a rural setting in India on e-banking acceptance, James and Manoj (2014)<sup>[33]</sup> 'Relevance of E-Banking Services in Rural Area—An Empirical Investigation' *Journal of Management and Science*, have suggested for extending online mode banking in rural areas. Joju et. al. (2015)<sup>[38]</sup> 'E-CRM: A perspective of Urban and Rural Banks in Kerala', *International Journal of Recent Advances in Multidisciplinary Research* have recommended E-CRM or ICT-based CRM for both urban and rural banks and have also suggested separate strategies for both. Manoj (2016)<sup>[41]</sup> 'Bank marketing in India in the current ICT era: Strategies for effective promotion of bank products' *International Journal of Advance Research in Computer Science and Management Studies* has noted the key need for ICT tools for effectively marketing the bank products. GOK (2017)<sup>[6]</sup> in its *IT Policy 2017* and GOK (2017)<sup>[7]</sup> in



its *IT Policy 2017: Sub Policies and Guidelines* deals with the IT policy of the GOK; while the former is the policy document per se, the latter larger document elaborates the detailed operational guidelines and also the sub-policies under the IT major policies dealt in the former document.

Joju and Manoj (2019)<sup>[60]</sup> ‘Banking Technology and Service Quality: Evidence from Private Sector Banks in Kerala’, *International Journal of Recent Technology and Engineering*, have noted that ICT adoption in banks can boost service quality and hence ICT adoption needs to be encouraged. These studies suggest that any skill development initiative should invariably impart ICT-based skills and training, because only ICT-based products and services are preferred today, even by the rural customers. There is the crucial for flexibility in globalised markets; P.K Manoj (2019)<sup>[61]</sup> ‘Competitiveness of manufacturing industry in India: need for flexible manufacturing systems’ has noted that modern systems like FMS are key for better cost and quality competitiveness. Studies have also noted that ICT-based products and services could command a market premium as ICT enhances the industries and sectors that use it, e.g. ICT for online services (reservation etc.) by tourism sector.

Oommen (2008)<sup>[62]</sup> has warned about the environmental harm in Kerala’s development experience pointing out the ‘Ecological Overkilling’ that is going on in Kerala which in turn has almost irreversibly spoilt Kerala’s natural environment. A study by Manoj (2010)<sup>[21]</sup> ‘Impact of technology on the efficiency and risk management of old private sector banks in India: Evidence from banks based in Kerala’ has observed that ICT adoption can improve the capacity for risk management with respect to old private sector banks in Kerala. Nasar, K.K. & Manoj, P.K. (2014)<sup>[34]</sup> ‘Factors influencing the purchase of apartments: some empirical evidence’, *CLEAR International Journal of Research in Management*, have noted that vital factors that influence the buyers like the price of apartments, its quality, its location, and so on. P.K Manoj (2014)<sup>[29]</sup>, ‘Role of ICT in Women Empowerment: A Study with a Focus on ‘Kudumbashree’ Programme in Kerala State of India’, *International Journal of Information Technology & Computer Sciences Perspectives* has noted the vital role that ICT could play in empowering the women in Kerala with a focus on the world famous ‘Kudumbashree’ sponsored by the GOK. A study on ecotourism by P.K. Manoj (2017)<sup>[49]</sup> ‘Segmentation Strategy for Promotion of Ecotourism Products: Evidence from Thenmala Ecotourism’, *South Asian Journal of Socio-Political Studies (SAJOSPS)* has pointed out the need for promotion of ecotourism in an environment-friendly and hence sustainable manner and also to attract more visitors by way of scientific segmentation of the customers. K.X Varghese., and P.K. Manoj (2013)<sup>[27]</sup> ‘Educational loans and the higher education sector in India’, *SSIJBMR* has noted the key role that educational loans play in human development and the need to boost educational loans in India.

Rajesh and Manoj (2015)<sup>[37]</sup> ‘Women Employees work life and challenges to Industrial Relations: Evidence from North Kerala’ have observed that women employees face work-life balance (WLB) issues and these must be solved. ICT-based intervention is one of the best choices at present. ICT-adoption is a vital need for marketing of products in modern times, as noted by Manoj (2016)<sup>[41]</sup> ‘Bank marketing in India in the current ICT era: Strategies for effective promotion of bank products’ *International Journal of Advance Research in Computer Science and Management Studies*. Another study by P.K Manoj (2017)<sup>[51]</sup> ‘Cost management in the construction of affordable housing units in Kerala: A case study of the relevance of earned value analysis (EVA) approach’, *International Journal of Civil Engineering and Technology (IJCIET)*, has underscored the need for



using scientific tools like EVA for effective cost management. J. Joju., and P.K. Manoj (2019)<sup>[59]</sup> Digital Kerala: A study of the ICT Initiatives in Kerala state, *International Journal of Research in Engineering, IT and Social Sciences*, have noted the major ICT initiatives of the GOK and the need for further promotion of such initiatives for the faster development of the State in view of the unique features of Kerala that are conducive for the growth of ICT-based industries. Saritha, C.K. and Manoj, P.K. (2023)<sup>[67]</sup> Social inequalities in IT sector: Evidence from Kerala State in India in *Environment and Social Psychology* have noted the need for solving the social inequality among the IT sector employees in Kerala for the faster and sustained growth of this vital sector in Kerala. As studies in the IT sector in Kerala are scarce, especially those on e-Governance initiatives of the GOK, this paper critically reviews the e-Governance in Kerala and suggests strategies for its sustainability.

## 6. Significance of the Study

ICT is an enabler for sustained economic growth in this knowledge era. It is widely recognized that e-Governance can tremendously enhance the transparency and quality of public services. Kerala's unique socio economic environment, like its commendable status in education and literacy, especially its universal literacy and that too coupled with high digital literacy, makes Kerala ideal for ICT-based development. Based on this perspective, the State has been promoting ICT in a big way, particularly by way of e-Governance and other ICT-based governmental services. Initiatives like K-FON seek to augment the infrastructure further. Of late, it has been declared as the fully e-Governed State in India.

## 7. IT Sector in Kerala and Various ICT-based Services of the Govt. of Kerala (GOK)

The Approach Paper ('*Sameepana Rekha*' in Malayalam), a policy document of the GOK that is prepared by the Kerala State Planning Board (KSPB) under the GOK, as a policy approach of GOK to the 14<sup>th</sup> Plan period (2022-2027) has noted the following in respect of e-Governance in Kerala. The GOK acknowledges the vital role of ICT for the economic development in the modern world. The high educational achievements of Kerala in the School and University education and also the State's high digital literacy makes Kerala competent to expand and deepen e-Governance in India in an unparalleled manner. First, e-Governance seeks to ensure all the Governmental services through online mode. Second, e-Governance seeks to transform of all Governmental activities into electronic files and electronic administration. Besides, for the effective handling the whole information resource relating to the various departments the need for inter-operable technical architectures is vital. In fact, inter-operability means not simply the suitability of the software, rather it should support individuals and institutions that function in an integrative manner. In fact, the disaster mitigation activities of the Government show the diverse kinds of mutual efficiency underlying institution-wise integration of technical agencies and also stakeholders that are both internal and external to the Government. [Source: Para 11.2, *Sameepana Rekha* (Approach Paper), 14<sup>th</sup> Plan 2022-2027, KSPB, GOK, p.62.].

The most important initiatives of the GOK and the salient features of Kerala's IT sector as of Jan. 2023 is shown in Exhibit I. It may be noted that the State's initiative towards providing high speed internet connectivity by way of installation of a statewide optical cable network viz. K-FON (i.e. Kerala Fiber Optic Network) is one of the major landmarks in the IT history of the State. Similarly, the State has got to its credit as high as 2734 Akshaya Centres throughout the length and breadth of



Kerala which provide employment to 9017 persons across the State. The vast network of Wi-Fi hotspots, App incubation centre in association with IAMAI, a statewide network of thousands of Enrolment Centres, Tech startups and an IT Park i.e. Technopark are a few other laurels of Kerala.

Exhibit I: Highlights of Kerala’s IT Sector as of Jan. 2023.

- KFON a Statewide optical fibre network capable of providing highspeed internet connectivity to about 30,000 Government and educational institutions offer free internet to 20 lakh economically backward families and internet services at a lower rate for others
- 2,734 Akshaya Centres are functioning across the State giving employment to 9017 persons.
- Completed installation of second phase of 1,000 Wi-Fi hotspots and nearly 15 lakh unique mobile users are availing the facility. Per day data consumption is up to eight TB.
- Cyberpark in association with Internet and Mobile Association of India (IAMAI) has developed app incubation hub, first of its kind in Kerala.
- Presently there are about 900 permanent Enrolment Centres and 1,500 Child Enrolment Centres by Akshaya CSCs to facilitate Aadhar enrolment and modification in Aadhar details.
- Technopark has become the largest employment base campus in Kerala and with the commissioning of Technopark Phase III, it became one of the largest IT parks in India with 380 acres of land, 9.7 million square feet built-up area.
- The number of tech start-ups eco system in 2021-22 is 3,650 as compared to 3,143 in 2020-21.

Source: Govt. of Kerala (GOK) (2023), *Economic Review 2022*, Jan., p. 262.

Table I: Annual Plan Outlays of the GOK (FY 2021 to FY 2023)

Sl No	Name of Department/Scheme	Annual Plan 2020-21		Annual Plan 2021-22		Annual Plan 2022-23	
		Outlay	Expenditure	Outlay	Expenditure	Outlay	Expenditure (upto November 2022)
1	Kerala State IT Mission, Akshaya, IT Cell	124.14	87.43	125.13	91.17	131.62	31.92
2	Technopark	2	1.75	24.05	21	26.6	12.00
3	Infopark	10	6	35.55	34.55	35.75	0
4	Cyber Park	0.01	0	12.37	0	12.83	0
5	Indian Institute of Information Technology and Management-Kerala (IIITM-K)	64.2	64.19	20	20	20.6	10.92
6	Kerala Startup Mission	73.5	52.19	68.75	55.77	90.52	31.75
7	Kerala State IT Infrastructure Ltd	212.75	102.29	201.9	87.5	201.09	96.59
8	C-DIT	6	6.43	6	4.6	6	2.69
9	International Centre for Free and Open Source Software	7.5	4.75	7.5	6	7.99	3
10	Kerala University of Digital Sciences Innovation and Technology	0	0	24	14	26	12.68
	<b>Total</b>	<b>500.1</b>	<b>325.03</b>	<b>525.25</b>	<b>334.59</b>	<b>559</b>	<b>201.55</b>

Source: Govt. of Kerala (GOK) (2023), *Economic Review 2022*, Jan., p. 263.

It may be observed that there has been significant improvement in the successive Annual Plans of



the GOK in the IT front over the last three years. The growth rates in the performance of the three IT Parks in Kerala (Techno Park, Info Park and Cyber Park) are particularly appreciable. (Table I). The commendable performances of the all the three IT Parks in Kerala are evident from their performance parameters over the last three years (FY 2020 to FY 2022). (Table II).

**Table II: Performance of the Three IT Parks in Kerala (FY 2020 to FY 2022)**

Technopark's contribution to the State				THE THREE IT PARKS IN KERALA				Physical performance of Cyberpark			
Particulars	Achievements 2019-20	Achievements 2020-21	Achievements 2021-22	Major indicators of performance of Infopark				Particulars	Achievements 2019-20	Achievements 2020-21	Achievements 2021-22
Total turnover (in ₹ crore)	15000	15000	18000	Particulars	Achievements 2019-20	Achievements 2020-21	Achievements 2021-22	Total turnover (₹ crore)	14.75	26.16	55.70
Total export (in ₹ crore)	7890	8501	9300	Total Export (in ₹ crore.)	5,200	5700	8500	Total export (₹ crore)	14.75	26.16	55.70
Total investment (in ₹ crore)	4979	5309	5600	Total Employment (Nos)	47,000	51,000	63600	Total investment (₹ crore)	1.35	2.47	4.35
Total Employment (Nos)	62000	63000	64000	No of Companies (Nos)	427	420	546	Total Employment (Nos)	607	764	1237
No of Companies (Nos)	450	460	465	Total land (Acres)	323	323	323	No of Companies (Operational)	27	58	67
Total land (acres)	659.87	659.87	766.86	Total built up space (million square feet).	10	10	10	Total land (acres)	42.5	42.5	42.5
Total built up space (lakh square feet)	101	106	106					Total built up space (lakh square feet)	3 lakh	3 lakh	3 lakh

Source: Govt. of Kerala (GOK) (2023), *Economic Review 2022*, Jan., p. 217 & 220.

Kerala State Information Technology Mission (KSITM), an autonomous nodal agency for IT implementation under the Department of Information Technology (DIT) under GOK, is providing the managerial and technical support to diverse initiatives of DIT, GOK. The services of KSITM include enactment of ICT related policies, formulation of e-Governance standards and guidelines, etc. The key accomplishments of KSITM include, inter alia, the following major services:

- **Public Wi-Fi** project implemented in 2023 it seeks to ensure Wi-Fi hotspots across Kerala with a view to ensure 'Free Internet to all citizens of Kerala';
- **e-Office** seeks to conduct office procedures electronically thereby making all Government offices paperless and thus use the benefits of digital communication like faster decision-making;
- **Core Infrastructure** includes KSWAN (Kerala State Wide Area Network), SECWAN (Secretariat Wide Area Network), State Data Centre, State Service Delivery Gateway (SSDG);
- **e-District** is a State Mission Mode project under the National e-Governance Plan and it handles high volumes of services at the District level and also back-end computerization operations;
- **e-Government Procurement (e-GP)** makes the e-tendering in respect of all Government tenders over Rs.5 lakhs and is applicable to Government Departments, Boards, Universities, etc.;
- **Friends Janaseva Kendras** are established in all the 14 District Head Quarters and these are single-window, 'no queue' integrated remittance centres to pay all Government taxes and dues;
- **Akshaya** (since 18 Nov. 2002) seeks to bridge the digital divide and provides digital (online) services to the public; there are 2734 Akshaya centres across Kerala that employ 9017 persons;

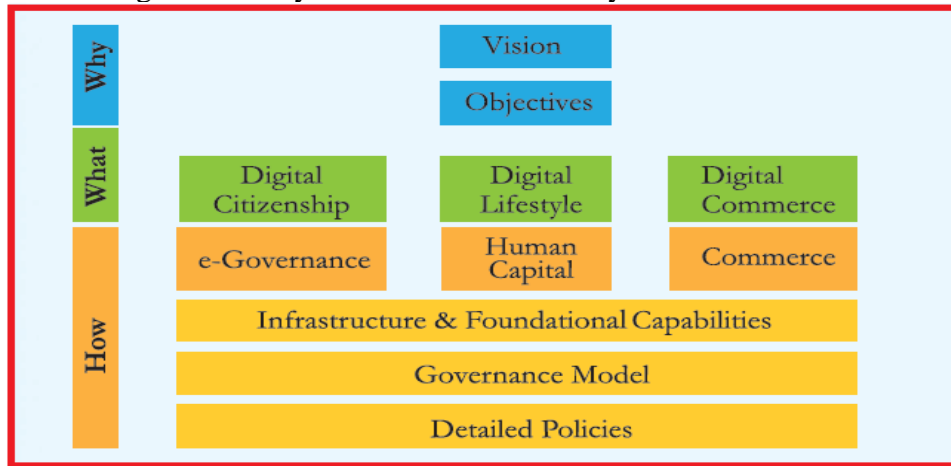


- **Aadhaar** services are provided, KSITM being the UIDAI-approved Authentication User Agency and as of now Kerala could achieve 100 percent Aadhaar generation;
- **Video Conferencing (VC)** facility can integrate video and audio and transmit communications to distant locations, and using the VC infrastructure KSITM conducts about 7500 VCs annually;
- **Digi Locker** facility is integrated into the services of e-District projects (Revenue Certificates), Pareeksha Bhavan, Food and Civil Supplies Department, Motor Vehicles Department etc.;
- **E-SEVANAM / m-SEVANAM:** The Kerala e-Services portal (e-SEVANAM) renders about 711 services of over 70 Departments in online; and of these as high as 546 services can be availed through Mobile Application through the m-SEVANAM platform of the Government;
- **Kerala State Spatial Data Infrastructure (KSDI):** Mapathon Keralam is aimed to create detailed living map of Kerala through a participatory process; using geo-portals FOSS (Free and Open Source Software) and ICFOSS (International Centre for Free and Open Source Software).
- **Kerala University of Digital Sciences, Innovation and Technology:** In 2020, the GOK upgraded IITM-Kerala into a University viz. Kerala University of Digital Sciences, Innovation and Technology through an Act of 2021, and it was formally inaugurated on 20 February, 2021.
- **Consistent Growth in the Performance of Techno Park:** As noted earlier there has been steady growth in the performance of the IT Parks in Kerala. For instance, Techno Park located in the capital of the State viz. Thiruvananthapuram, could register consistent growth in the built area employed, number of companies, number of employees, amount of revenue from exports, etc. The built-up in lakh square feet has steadily increased from 85 in 2016-17 to 106 in 2021-22. So also, the number of companies in Techno Park has increased from 358 in 2015-16 to 465 in 2021-22. So also were the cases of: (i) Revenue from exports (in Rs. Crores) which increased from 5000 (2016-17) to 9300 (2021-22), and (ii) Number of people employed at Techno Park which increased from 51860 (2016-17) to 64000 (2021-22).

## 8. Overview of E-Governance Initiatives in Kerala, Implications, and Growth Strategies

The outline of the IT policy of the GOK is depicted in Figure I, and from that it may be observed that 'e-Governance' is part of a major pillar that seeks to attain 'Digital Citizenship' and accordingly every citizen in Kerala is sought to have a digital identity in the State using which he can avail all the deserving services from the State. Similar to e-Governance, there are two others viz. 'Human Capital' which aims to attain 'Digital Lifestyle' and 'Commerce' which seeks to ensure 'Digital Commerce'. GOK has its 'Detailed Policies' *IT Policy 2017*<sup>[6]</sup> and *IT Policy 2017: Sub Policies and Guidelines*<sup>[7]</sup> as well as similar other policies. These policies form the basis of the Governance model of the State, based on which the State seeks to ensure that requisite infrastructure and foundation capabilities are in place in the State. (e.g. universal internet connectivity and requisite telecommunication facilities). Initiatives like KFON being implemented by the GOK are in the above direction. (Figure I).

Figure I: Policy Outline of the IT Policy 2017 of the GOK.



Source: GOK (2017)<sup>[6]</sup>, *IT Policy 2017*. p.13.

There are four major elements (parts) for the E-Governance architecture as contemplated by the GOK as per its *IT Policy 2017 Sub Policies and Guidelines*. Accordingly, the ultimate objective of the E-Governance system of the GOK is to transform Kerala into a digitally empowered society and a knowledge economy which is sought to be attained through: (i) e-Governance Systems and Services, (ii) State Infrastructure, (iii) Capacity Building, and (iv) Digital empowerment campaign. The four elements of E-Commerce needs to be (Figure II).

Figure II: Elements of E-Governance as envisaged by the GOK.

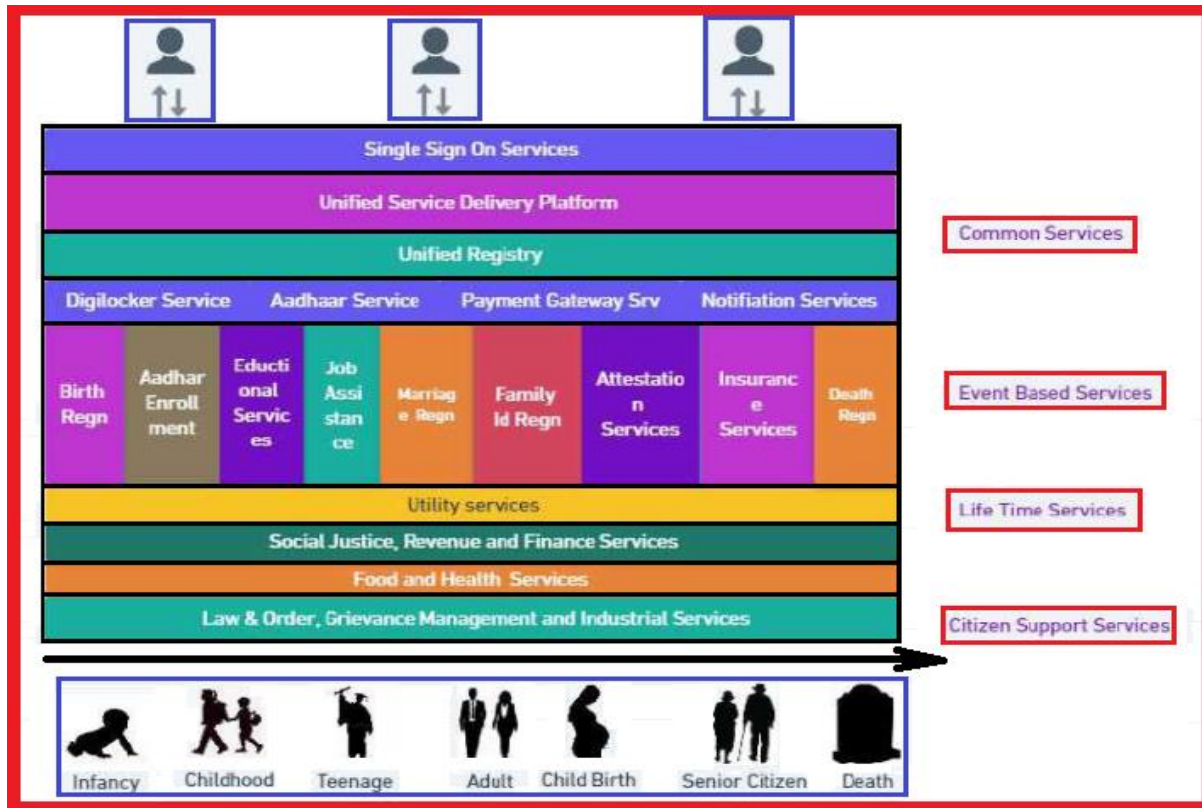


Source: GOK (2017)<sup>[7]</sup>, *IT Policy 2017 Sub Policies and Guidelines*. p.10.

Digital Kerala Architecture (DKA) denotes a prestigious vision project undertaken by the GOK to elevate the State's e-Governance system into the next level. DKA equips the State for being gradually transformed into a knowledge economy. DKA seeks to (i) revitalize public administration, (ii) modernize public management, and (iii) move the public services of citizens so that it becomes more efficient, transparent and accountable. DKA seeks to provide a single-window system for the citizens and to extend the seamless delivery of G2C services through functionalities like SSO, Common Payment Gateway, Common SMS, e-mail services, etc. Throughout the life-cycle of a citizen (from infancy till death) one Government service or the other is certainly provided to all under the proposed new DKA (SEVANAM-2) project of the GOK. (Figure III).



Figure III: DKA (SEVANAM-2) of the GOK



Source: *E-Governance Initiatives in Kerala* (Presentation by the Chief Secretary, 05-05-2023).

One of the major objectives of the IT Policy 2017 of the GOK relates to ‘Haritha Keralam’ and it falls under the ‘IT and Ancillary Infrastructure’ (Para 6). Thus, Para 6.12. of the IT Policy 2017 tells upon leveraging ICT and e-Governance ecosystem for the effective planning, implementation and monitoring of the green initiatives in the State. This policy is conducive for addressing the concerns regarding the ever growing environmental degradation, often irreversibly too (Oommen, 2007)<sup>[62]</sup>. Many sector-based studies(e.g. tourism, agriculture, banking etc.) have further underscored the need ICT promotion for enhanced quality of services and competitiveness on the one hand and preserving the environmental quality on the other hand as ICT usage minimizes the need for felling trees for the production of paper. Paper-less offices, paper-less sales promotions etc. have less adverse impacts on the environment. ICT ensures eco-friendly bank marketing according to Manoj (2016)<sup>[41]</sup> ‘Bank marketing in India in the current ICT era: Strategies for effective promotion of bank products’ *International Journal of Advance Research in Computer Science and Management Studies*.

From a macro perspective, at the national level, to boost domestic production the manufacturing sector needs to be strengthened. Within the industrial sector, the MSMEs form the backbone of Indian industry and MSMEs contribute maximum India’s exports. ICT is a key catalyst for enhancing the efficiency and productivity of the labour engaged in the manufacturing sector. The stagnancy labour productivity is a crucial factor that needs to be addressed, and here ICT-enabled training and skill development assumes vital significance as ICT is an enabler of better efficiency, productivity and competitiveness. As noted above, Para 6 of Kerala’s IT Policy 2017 relates to



‘Haritha Keralam’ which in turn falls under the ‘IT and Ancillary Infrastructure. Para 6.12. of the IT Policy 2017 tells upon skill development (besides, the need for leveraging ICT already discussed). Accordingly, groups are to be constituted with unemployed women with IT skills, following the *Kudumbashree* model so as to ensure ‘work at home’ opportunity. Thus, ICT enhances the earnings of women and also make them more productive at home, even if they do not have any formal sector employment. Thus, ICT could add another dimension to skill development, especially with respect to unemployed women. In fact, ICT-adoption is a vital for effective marketing of products in modern times because the modern discerning customers prefer ICT-based products only, as noted by Manoj (2016)<sup>[41]</sup> ‘Bank marketing in India in the current ICT era: Strategies for effective promotion of bank products’ *International Journal of Advance Research in Computer Science and Management Studies*. Besides, in view of the mounting environmental concerns that affects the sustainability of Kerala’s natural environment, as pointed out by Oommen (2008)<sup>[62]</sup>, like, the persisting sustainability issues due to ‘Ecological Overkilling’ need to be strictly controlled. ICT adoption can preserve the scarce natural resources like trees and hence ICT adoption has got positive consequences on the environment.

Efforts towards modernizing the industries in Kerala using ICT, like, through E-Governance initiatives are very much desirable, including the micro enterprises run by women (such as those run by *Kudumbashree* units). For this, adoption of modern practices like JIT, Lean Manufacturing etc., since such techniques and practices can improve the efficiency and productivity. Because, earlier studies, like, JIT adoption enhances operational efficiency (Manoj, 2011)<sup>[23]</sup> and so also is the case of adoption of Lean Manufacturing, ICT etc. Similar is the benefit of focusing on specific cost elements selectively or using specialized methods (like, EVA for cost management in construction projects), as noted by (Manoj, 2017)<sup>[50]</sup> ‘Construction costs in affordable housing in Kerala: Relative significance of the various elements of costs of affordable housing projects’, and also (Manoj, 2017)<sup>[51]</sup> ‘Cost management in the construction of affordable housing units in Kerala: A case study of the relevance of earned value analysis (EVA) approach’. Requisite skills that enable the technical staff to properly use modern techniques and practices (like, JIT, FMS, Lean Manufacturing etc.) is vital today. The sectors that face greater skills-shortage be accorded higher priority for ICT-based training and skill development. As per the policy of the Govt. of India (GOI), *National Policy for Skill Development and Entrepreneurship 2015* (NPSDE 2015), Ministry of Skill Development and Entrepreneurship (MSDE), there is a skill shortage of 31.13 Million for ‘Building, Construction and Real Estate’ sector and similarly high skill shortage exists in ‘Retail’ (17.35 Million), ‘Transportation and Logistics’ (11.66 Million), and ‘Beauty and Wellness’ (10.06 Million) etc. So, these sectors be accorded top priority in skill development in the Kerala context also. Also, the linkage effects of different sectors be considered. Sectors like ‘Building, Construction and Real Estate’ (as noted above, which has the highest deficit of 31.13 Million) and also such others like ‘Tourism, Hospitality and Travel’ (which too has a high skills-shortage of 6.48 Million) etc. have highest linkages, both forward and backward, and hence these sectors be given the topmost priority. In the Kerala context, both these sectors have very high significance, given the unique features of Kerala (natural environment that is best-suited for tourism, boom in the housing and construction sector, etc.).

Many studies, like, Nasar and Manoj (2013)<sup>[25]</sup> ‘Customer satisfaction on service quality of real estate agencies: An empirical analysis with reference to Kochi Corporation Area of Kerala State in India’ and also Manoj (2013)<sup>[26]</sup> ‘Prospects and Challenges of Green Buildings and Green



Affordable Homes: A Study with Reference to Ernakulam, Kerala' are just two typical studies that have recommended for further investments in housing and real estate. Similarly, many studies have recommended promotion of tourism sector for employment creation and economic growth, and Manoj (2015)<sup>[40]</sup> 'Employment Generation from Rural Tourism: A Field Study of the Local Community at Kumbalangi, Kerala' is just one study. In short, skill development in sectors like housing, tourism, retail etc. are vital in India because of their potential to accelerate the economic growth. Further, it may be noted that sectors or industries that support or facilitate women empowerment, rural development, empowerment of the poor and disabled, and such other disadvantaged segments of the society be accorded higher priority for skill development as a policy measure. Thus, skills that encourage the poor, including the women, the differentlyabled people etc. and also skills that are beneficial to the members of SHGs and such other collectives (especially those of women) must be imparted on a priority basis. The poor, women, and such other vulnerable groups, if imparted with necessary skills could start their own MEs and hence empower themselves. Empirical evidence indicate the empowerment potential of MEs run by women, like, Manoj (2012) 'Potential of micro enterprises in women empowerment: A critical study of micro enterprises run by women under the Kudumbashree Programme in Kerala' has noted that MEs run by Kudumbashree women could empower them. Analogously, industries that support the rural economy in India (like, cattle feed industry which support cattle farmers) be preferred for skill development given their potential for rural transformation, as noted by Manoj (2015)<sup>[35]</sup> 'Cattle feed industry in India: a macro perspective', about cattle feed industry. Special emphasis is desirable on ICT-adoption and ICT-oriented skills at all levels, including adding the ICT-enabled training module in every skill development programme; because Online skill is a key need for any incumbent in today's era of rapid digital transformation. The ICT industry as a whole needs a policy thrust being the prime mover of India's Services sector, notwithstanding the fact that Services sector in India is steadily growing.

ICT industry can ensure faster economic growth and employment creation, besides foreign exchange earnings, observes Manoj (2007)<sup>[14]</sup> 'ICT industry in India: a SWOT analysis'. Besides the skill needs of the ICT industry, skills required by the masses to effectively use the ICT-enabled services, including the Governmental services like the DBT (Direct Benefit Transfer) as in respect the wages to MGNREGA workers, rural customers especially the women etc., as noted by James and Manoj (2014)<sup>[33]</sup> 'Relevance of E-Banking Services in Rural Area–An Empirical Investigation' and so also Joju et. al. (2015)<sup>[38]</sup> E-CRM: A perspective of Urban and Rural Banks in Kerala, and many other scholars. Equally important is the need for specialized skilltraining for the women employees, womenentrepreneurs etc., because women need extra support. AsRajesh and Manoj (2015)<sup>[37]</sup> 'Women Employees work life and challenges to Industrial Relations: Evidence from North Kerala' observes women employees have work-life balance (WLB) issues and these are to be addressed, ICT-based interventions appear to be the best choice in modern days. As noted earlier, rural women too have preferred ICT-based banking products as noted by James and Manoj (2014)<sup>[33]</sup> 'Relevance of E-Banking Services in Rural Area–An Empirical Investigation'. So, needless to mention the rural masses, especially rural women, require skill development, mainly ICT-based skill training so that they can use ICT-based devices useful in day to day life. Widespread adoption of ICT for marketing at all levels is highly desirable, including marketing to the rural customers, rural entrepreneurs like members of women SHGs, etc.



Given the utmost need for sustainability of development as noted by Oommen (2018)<sup>[62]</sup> in the Kerala context (but equally applicable anywhere in India, or even the world), development initiatives should have long-term sustainability and must not adversely affect ecological balance; and in the case of Kerala (in India) the developments efforts resulted in ‘Ecological Overkill’. Skill development that use ICT for marketing purpose instead of paper (use of trees), flex (use of non-degradable sheets) etc. must be totally avoided or banned. Rather, ICT-based tools be preferred for marketing as suggested by Manoj (2016)<sup>[41]</sup> ‘Bank marketing in India in the current ICT era: Strategies for effective promotion of bank products’ whereby ICT-enabled marketing is to be adopted for the convenience of customers and competitiveness for the service providers. ICT-based marketing being the ‘new normal’ specialized skills in this domain is an imperative. Government-owned banks viz. Public Sector Banks (PSBs) have been noted to be using ICT to a lesser extent than their private sector counter parts, viz. Old Private sector Banks (OPBs). PSBs are lagging more behind New generation Private sector Banks (NPBs) and Foreign Banks (FBs). PSBs need more ICT-integration to catch up with their private sector counterparts like OPBs, and more so in respect of NPBs and FBs. CRMs of PSBs (and to a lesser extent that of OPBs), are less ICT-integrated when compared with the most modern CRM systems (now, e-CRM) of the NPBs and FBs. As today’s customers are discerning they prefer only the modern e-CRM systems and not the traditional CRM (and even the less advanced e-CRM) systems of PSBs. So, empirical studies suggest greater ICT integration by PSBs (and OPBs) so as to offer the modern e-CRM services, as noted by Manoj (2018)<sup>[56]</sup> ‘CRM in old private sector banks and new generation private sector banks in Kerala: A comparison’ whereby CRM systems in OPBs are low-tech compared with those in NPBs, and the former needs to catch up by adopting more ICT. So, relatively low-tech PSBs and OPBs must provide skill training to their staff and adopt ICT.

As in the case of PSBs and private sector banks wide updation of ICT and human relations skills is vital for the co-operative sector banks, because they are lagging far behind even the RRBs (Regional Rural Banks); both RRBs and co-operatives being mainly serving the rural masses. Through skill upgradation for the staff along with ICT adoption too, the co-operative banks can serve the masses better just like the RRBs; as per the comparative study by Lakshmi and Manoj (2018)<sup>[52]</sup> ‘Service quality in rural banking in north Kerala: A comparative study of Kannur district co-operative bank and Kerala Gramin bank’ wherein the need for skill upgradation and ICT adoption in co-operative banks has been pointed out. Besides, another earlier study by Manoj (2010)<sup>[21]</sup> ‘Impact of technology on the efficiency and risk management of old private sector banks in India: Evidence from banks based in Kerala’ has observed that ICT adoption can enhance the risk management capability of OPBs in Kerala. An identical observation is made by Joju et. al. (2017)<sup>[55]</sup> ‘Financial technology and service quality in banks: Some empirical evidence from the old private sector banks based in Kerala, India’ wherein the Fin-Tech adoption by the OPBs in Kerala has been noted to improve their service quality. In short, ICT (banking technology) adoption is imperative in PSBs (and also OPBs) so as to enable them to catch up with the NPBs and FBs. Vitally important is the need for skill development for the staff of PSBs and OPBs to properly use the modern ICT tools. Even in this digital or ICT era, there is enough scope for adequate ‘human touch’ and additional thrust on HRM; because entirely ICT-enabled or machine-operated functioning is not preferred by many and there do exist scope for ‘brick and mortar’ banking. The observation by Joju. et. al. (2017)<sup>[54]</sup> ‘Future of brick and mortar banking in Kerala: Relevance of branch banking in the digital era’ is that even while ICT-enabled (digital) banking has good acceptance and also high growth prospects, there is enough demand for ‘brick and mortar’



(traditional mode) banking also. Similarly, the need for ICT-integrated HRM in banks is noted by Manoj (2019) <sup>[57]</sup> 'Dynamics of human resource management in banks in the ICT era: A study with a focus on Kerala based old private sector banks'.

A study by Manoj (2019) <sup>[58]</sup> 'Social banking in India in the reforms era and the case of financial inclusion: Relevance of ICT-based policy options' the vital need for ICT-based delivery channels for social banking has been pointed out. Joju and Manoj (2019) <sup>[60]</sup> 'Banking Technology and Service Quality: Evidence from Private Sector Banks in Kerala' have noted that greater ICT adoption by OPBs in Kerala could enhance their service quality. Skill development of bank staff (especially those of PSBs and OPBs) is vital in HR area (soft skills, communication skills, interpersonal skills etc.) also along with excellent skills for the use of ICT-enabled tools and devices. ICT-based training and skill development in diverse sectors (e.g. tourism, a key sector that heavily contributes to Kerala's GDP) have to be done very selectively. Many studies have noted the need for infrastructure development, including skill development of tourism stakeholders, including the staff of Kerala's tourism Department. These include, Manoj (2015) <sup>[40]</sup> 'Employment Generation from Rural Tourism: A Field Study of the Local Community at Kumbalangi, Kerala' and also Manoj (2015) <sup>[42]</sup> 'Prospects of Responsible Tourism in Kerala: Evidence from Kumarakam in Kottayam District' have both looked into the prospects of rural tourism and responsible tourism respectively in Kerala and noted their high growth prospects. The need for better infrastructure development, including training the staff in ICT skills and other skills, like, interaction skills has been noted in both the studies.

## 9. Concluding Remarks

In view of the foregoing it may be pointed out that ICT-based initiatives of the GOK have been very effective in diverse sectors, particularly in sectors like healthcare. The case of e-Governance, in particular, deserves special mention because Kerala could declare itself as the first fully e-governed State in India. The ongoing initiatives like KFON would ensure rich dividends to the State as they further reinforce the ICT infrastructure in the State and support an efficient e-Governance ecosystem.

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