

## **The Digital Technology as Platform Enabling the Entrepreneurial Ecosystem and Nurturing a Sustainable Venture in Technological Space**

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### **Abstract**

The digital technologies are now playing the important role behind the entrepreneurial ecosystem of India and nurturing the ventures from small to larger group. This paper talks about the how digital technology as platform helping the entrepreneurial ecosystem in India and then nurturing the venture in digital space. Although the increasing of technological paradigm shift to newer technology day by day, month on month and year on year is providing the advantages of robust entrepreneurial ecosystem and nurturing the robust venture in technological space. In line with the context of the objective, the paper talks about the key factors of digital entrepreneurial ecosystem such as internet penetration, adoption of deep-tech or advancement of technologies (AI/ML, Big data and analytics, robotics, 3D printing, AR/VR), availability of funding, volume of deal flow, MNC-startup relationship, pre-existing business relationship and skillset development of manpower. The research paper related to this area is correct and further study can be conducted to explore more insight information about how digital technology is enabling entrepreneurial ecosystem and nurturing the venture for emergence and growth. This paper is useful to study for research scholars, practitioners, management consultants and academicians. Later, the paper presents about the challenges and issues faced by the start-ups or entrepreneurs in digital transformation of business functions and adoption of digital technology in rural sectors.

**Keywords:** *Entrepreneurship, digital entrepreneurship, digital transformation, deep-tech technology, digital technology, digitization, MNC-startup relationship*

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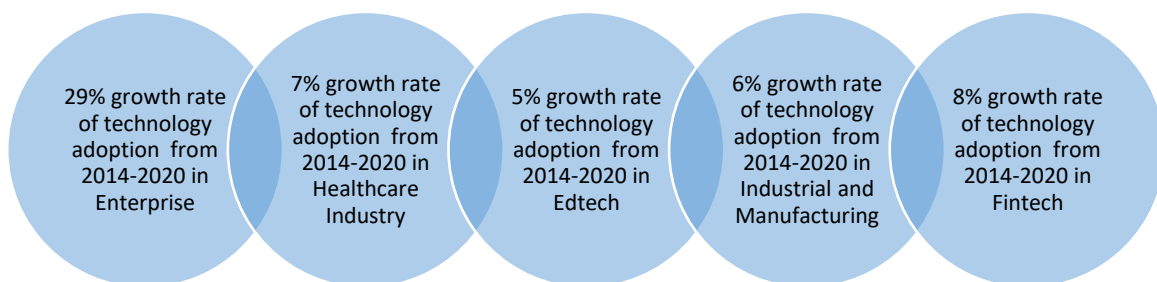
## Introduction

India is currently the third largest start up ecosystem in the world and is home to 21 unicorns valued at \$73.2 billion (**Business Today, 2021**) . Indian tech start up ecosystem has reached trillion dollar economy and this shows how Indian start up ecosystem maintained growth even during the turbulent times in **Covid-19** and it also covers the core growth drivers which have led to the acceleration of India's digital economy ( **Nasscomm,2020**). **Nasscom report, 2020** shows that the rate of digital adoption to enterprise , healthcare industry , Edtech, industrial manufacturing and fintech in last six years has significantly increased .The below **figure-1** shows the adoption of deep technology among the technology start-ups . **Source – NASSCOM Report, 2020**. India is moving towards digital economy enabled country by using deep technology.India has 750 Mn+ internet users in 2020, against the projected 640Mn plus, 2020 provided digital adoption and Digital maturity of Indian enterprise has jumped to 2X growth.

### Highlights of deep-tech adoption since 2014-2020 ( Figure-1).

- The below figure shows that the growth rate of deep-tech adoption in enterprise is 29% since 2014 to 2020.
- The growth rate of deep-tech adoption in healthcare industry is 7% since 2014-2020.
- The The growth rate of deep-tech adoption in industrial manufacturing is 6% since 2014-2020.
- The growth rate of deep-tech adoption in fintech industry is 8% since 2014 -2020.

**Figure-1**



**NASSCOM report ,2020** says that deep tech start-ups can be defined as the active start-ups that can create, deploy or use of plathora of advanced technologies in their products or services and the advanced technologies consists of Artificial intelligence (AI) , Machine learning (ML), Internet of things (IoT) , Block chain , Big data , Augmented realty ( AR) , Virtual realty , robotics and 3D printing . The deep tech innovations are defined as the disruptive solutions built around unique , protected or hard -to- reproduce technological or scientific advances .

### Highlights of Startup’s journey in India since 2014-2020.

- Deep tech and new start up hubs in India continue to growth 40-45% CAGR.
- 11000-12500 start-ups at 8-10% Growth from 2015-2020.
- India is on the track to have 50K + strong Unicorn Club in 2021.
- 19% ( 2100+ ) of start ups leveraged deep tech to build robust smart solutions.
- India has 11000-12500 start-ups @8-10% growth rate during 2015-2020.
- India added 2<sup>nd</sup> highest number of Unicorns in 2020 after USA ( India added 12 ,USA & china added 66 , 8 respectively).
- India is on the track to have 50K + strong Unicorn Club in 2021.
- Bangalore, Delhi/NCR and Mumbai are the three largest start-up hubs in India.
- 1600+ start ups added in 2020/ 12 Unicorns added till 2020 ( OLA, Byzu’s, Zerodha, Paytm, Rivigo, Delhivery , Nykaa, Dream11, Bill desk, Highradius, Druva, Firstcry.
- India has 11000-12500 start-ups @8-10% growth rate during 2015-2020.

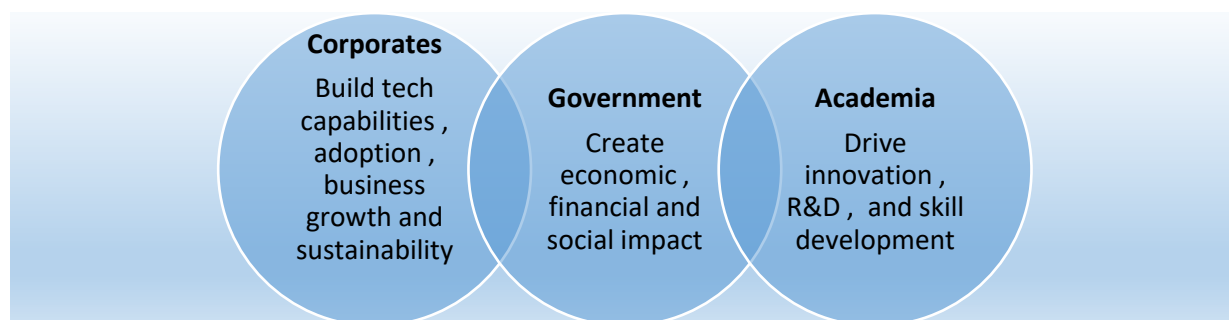
Source:<https://nasscom.in/knowledge-center/publications/indian-tech-start-ecosystem-%E2%80%93-march-trillion-dollar-digital-economy>

**Deep tech technology-** The deep tech is an amalgamation of all emerging or digital technologies such as AI/ML, IoT, Block chain, Big data, Robotics ,3D Printing, AR/VR etc.

**Importance of Deep tech technology:** The deep tech is very much important for corporates, government, and academics. The corporates want to develop technological capabilities for disruptive solutions for sustainability and business growth using deep technology. The government also want to create economic growth and social impact through the adoption of deep technology. In the same way, the academics want to bring innovation in the education system, building research and development and skill development for academician, students, and other employees. It has been expected that AI & data will add \$450-500 bn to India’s economy by 2025 and blockchain will add \$ 5 bn to India’s economy by 2023 (**NASSCOM Report ,2020**).

Figure -2 shows the importance of deep tech to India’s economy. Source: NASSCOM Report, 2020.

**Figure-3**



## Literature Review

These sections present about the definition of different types of digital technologies, entrepreneurship, digital ecosystem, digitization, digital technologies, digital transformation. We also discuss about the factors behind the entrepreneurial ecosystem of India in digital space. In later, we also discuss about the various issues and challenges for digital start up ecosystem in India.

### 2.1 Definitions of different type of digital technologies

**Cell phone** – It is a portable telephone device that can make and receive calls over radio frequency link while the users fall in a telecom service area. The radio frequency link establishes connection to the switching systems of a mobile phone or telecommunication operators over PSTN (Public Switch Telephone Network).

**Internet** – Internet is the global system of interconnected computer networks that uses TCP/IP protocol to share the information between network and devices. The internet carries a vast range of information sources such as world wide web (www), electronic mail, telephone, file sharing.

**Artificial Intelligence** – It is a more than the generalized ability of a machine that can understand and learn any intellectual task that a human can. Artificial Super Intelligence is an ability of machines to demonstrate intelligence and cognitive capability beyond the highest human capability.

**Machine Learning** – The machine learning is a part of artificial intelligence and it is basically representing the study of computer algorithms that develop a sample data to predict and make decisions to achieve a particular task.

**Big data** – The big data describes the large volume of data in a structured and unstructured way. Big data and analytics represent the data processes, data algorithms, and data visualization to investigate the large volume of data to find out the insight information from the large volume of data through advanced analytical programs such as unknown pattern in the data, correlation, and predictions.

**Blockchain** – The block chain is a decentralized, consensus based, temper proof data structure, comprised unchangeable, digitally recorded data in packages called block. Each block connects with another block through chain and then to next chain and so on that uses cryptographic structure. The block chain is used as a ledger, which can be shared and accessed to any one with appropriate permissions.

**3D Printing** - The 3D printing is an alternative to the traditional manufacturing wherein the graphical product design has been taken from a CAD/CAM software and input to a 3D printer. It is basically a graphical representation design of product the has been taken from using CAD/CAM software.

**Cloud Computing** - The cloud computing is a delivery of computing service such as storage, servers, networking, software, analytics, intelligence and IoT over internet.

**IoT**- The IoT (Internet of Things) represents the physical devices to the information from one device to other or many or exchange the information among the devices using embedded technology-based programming, software, and sensors over internet.

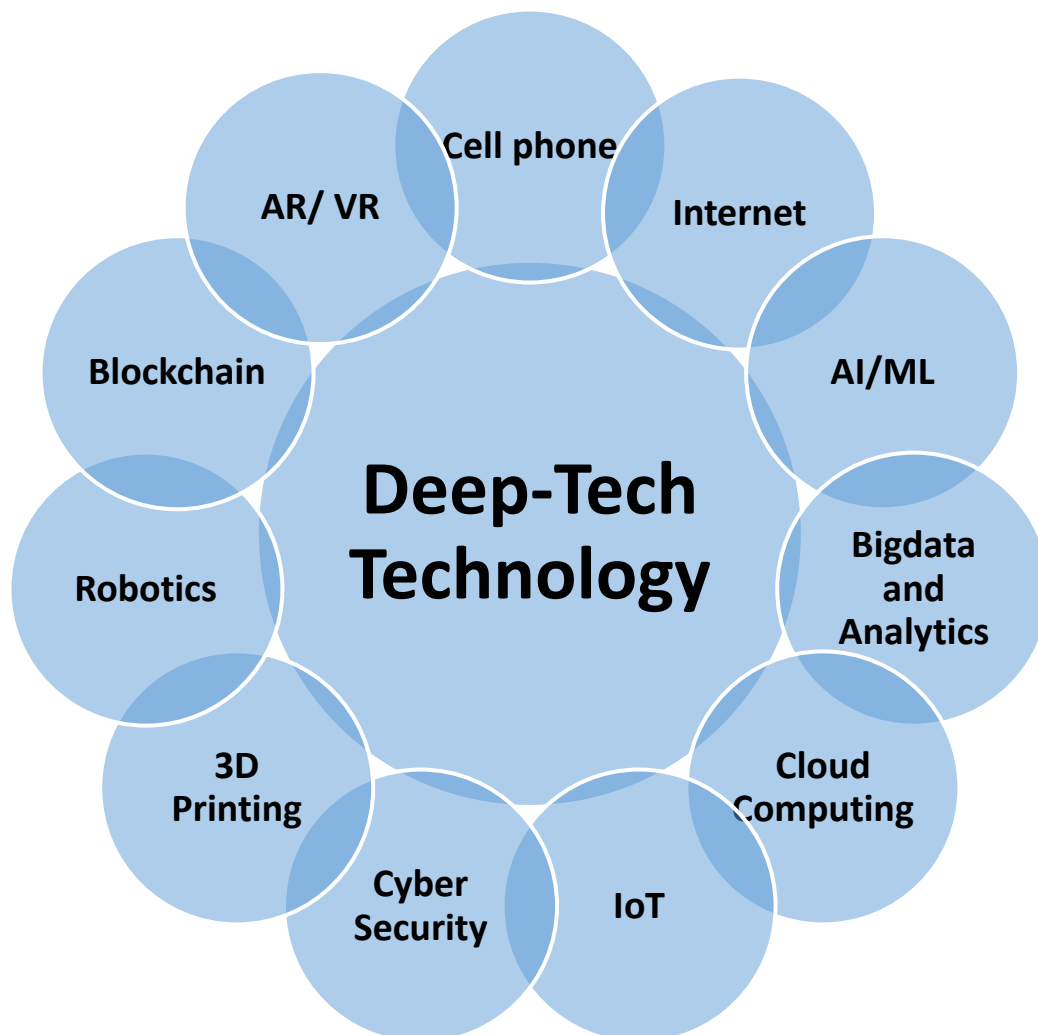
**Robotics** – The Robotics Process Automation (RPA) is an automation processes that interacts with the computer centric processes through the user interface and user objects of supporting applications of those processes. A robot is a runtime environment that executes the different processes to get the task done.

**Augmented Realty & Virtual Realty (AR & VR)** – AR/ VR refer to all real and virtual environment through the interactions between human and machines. It is an artificial realty based on computer generated simulation of a real-life environment of users and give responds to the individual or users in a natural manner.

**Drones** - The drone is flying robot controlled by software from remote site using embedded technology.

The below figure-3 shows the list of deep tech technologies and Source: NASSCOM Report, 2020.

**Figure-3**



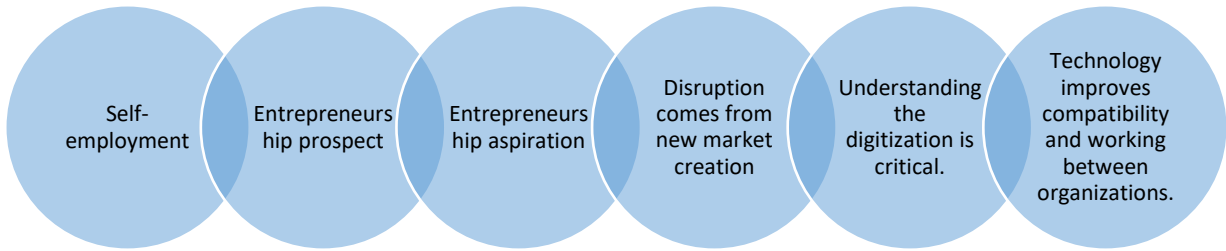
**Nambisan, S., Wright, M., Feldman, M., (2019)** acknowledge that the advent of digital technologies, digital platform and digital infrastructure significantly transform the digitization of innovation and entrepreneurship. Though the advent of digital technologies, digital platform and digital infrastructure plays a significant role for digitization of innovation and entrepreneurship to increase the business productivity and improve the business activities. The digital technologies create concerns related to data privacy and data security to individual users and these concerns can seriously damage to the reputation of corporate and social media. Using cell phone, cloud computing, social media over internet media creates data privacy and security related concern to individual users that affect the relationship between the corporate and individual users, social media institution and individual users. The above concern may damage the trust factors of customers to corporate and social media institution.

**Mason and Brown, (2014)** has defined entrepreneurial ecosystem as the set of entrepreneurial actors ( both potential and existing ) , entrepreneurial organizations ( ( Firms , organizations , venture capitals , business angels , banks) institutions (universities , public sector agencies , financial bodies) and the entrepreneurial process( business birth rate , number of high growth firms , level of block buster entrepreneurship, number of serial entrepreneurs , degree of sell-out mentally within firms and levels of entrepreneurial ambition ) that formally and informally to connect , mediate , and govern the performance within the local entrepreneurial ecosystem or environment.

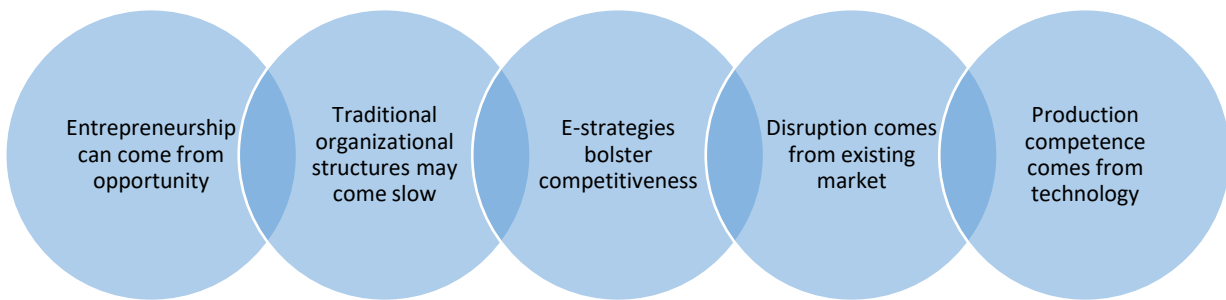
**M.H. Bala Subramanya (2017)** presents that how Bangalore emerge as global tech hub in the world and largest tech hub in India. The author finds out that the components or factors of entrepreneurial ecosystem in Bangalore is very supportive towards tech start-ups for emergence and growth. The components such as domestic industries, MNCs, institutions, lenders, local government support, incubators, mentors have supported tech start-ups to become successful to achieve their business growth and objective. The above components are further supported by the various programs such as startup promotion policy, good weather of Bangalore city, media, and local culture.

**Antonizzi, J and Smuts, H (2020)** presents that there are twenty-one characteristics of digital entrepreneurship and digital transformation that establishes the relationship between them to achieve new venture and transformation of business using digital technologies. The authors then further classified these twenty-one characteristics under three capabilities such as sensing, seizing, and transforming or shifting. Sensing is defined as a capability of digital entrepreneurship and digital transformation to sense and shape opportunities for entrepreneurs. Seizing is defined as a capability to seize the opportunities of digital entrepreneurship and digital transformation. In other way, seizing is a capability to sense the threats of digital entrepreneurship and digital transformation. Transforming is defined as a capability of maintaining the competitiveness in the market using digital technologies.

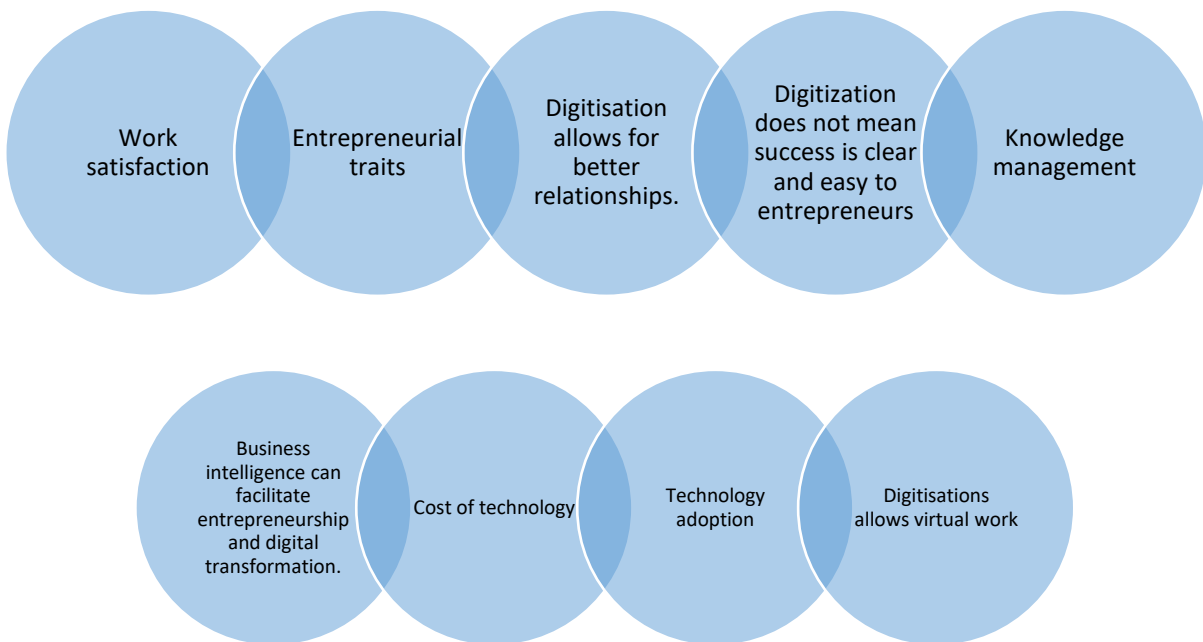
**i) The characteristics of sensing in digital entrepreneurship and digital transformation comprising of below capabilities.**



**ii) The characteristics of seizing in digital entrepreneurship and digital transformation comprising below capabilities.**



**iii) The characteristics of seizing in digital entrepreneurship and digital transformation comprising below capabilities.**



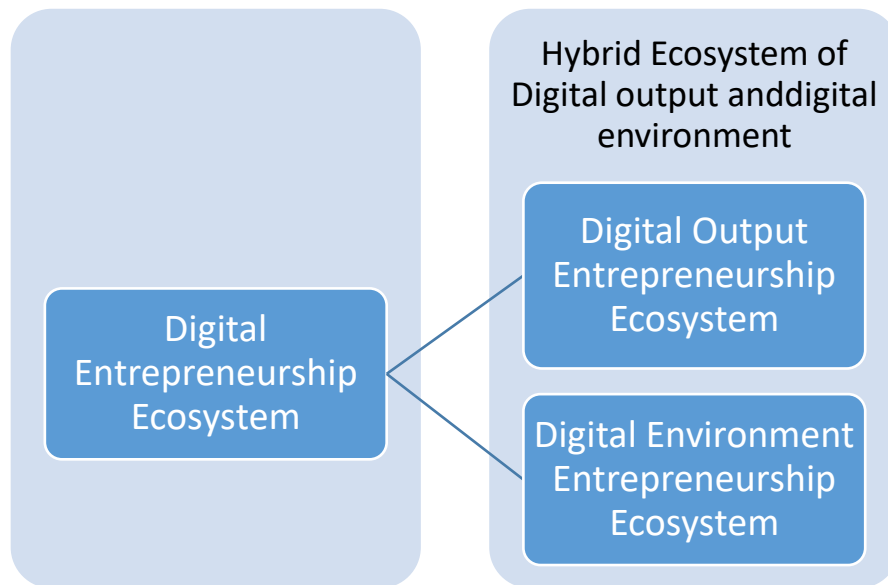
**Recker, J., Briel, F ., (2019)** find out throughout the professional development workshop that the digital entrepreneurship is a intersection of digital technologies and entrepreneurship and gaining importance in the global economy .The authors establish a framework of digital entrepreneurship consist of three fundamental dimensions of the digital phenomenon such as digital technology as enablers of entrepreneurial process (activities such as prospecting , developing , scaling or exploiting), digital outcome of entrepreneurial process ( the intended or realized market offering of new venture) and digital context (the sectoral and regulatory environment ) of entrepreneurial processes. The framework through professional development workshop PDW provide a complementary perspective from a different angle on innovation ecosystems in the entrepreneurial processes. The authors also find out throughout the study that the innovation ecosystems of established firms often create entrepreneurship ecosystems for emerging organizations. Example like - app stores from firms such as Amazon, Apple, Facebook, and Google—many of the app developers that make these platforms become innovation ecosystems in the first place are digital entrepreneurs.

**Elia, G., Margherita, A., Passiante, G (2020)** finds out that the digital technologies and collective intelligence that reshape the entrepreneurial process through the collaboration of using digital technologies and entrepreneurial process. The author talks about the definition of digital entrepreneurship ecosystem in line with the context of digital out and digital environment. The author developed a framework comprising of four dimensions to digital entrepreneurship ecosystem such as digital actors, digital activities, digital motivation and digital organization and the above dimensions are developed from 9 use cases from companies.

The authors also shows that the digital activities are the digital roadmap, information and knowledge sharing and digital solutions. The digital actors are digital organizations, digital agents, company portals, algorithms, software, and applications. The digital motivations are financials, business opportunities, web popularity, social network influence, social impact, and emotional aims. The digital organizations are agent matchmaking, collective decision making, digital crowdsourcing over internet platform. The authors define that the digital entrepreneurship ecosystem is a hybrid ecosystem of digital output and digital environment ecosystem. The digital output ecosystem is an ecosystem comprising of entrepreneurs, organizations, individuals, investors, incubators, accelerators, service providers and institutions involved in the entrepreneurial process within digital world to improve the business productivity and bring innovations in the entrepreneurship to become competitive in the new market as well as in the existing market. The digital environment ecosystem is an ecosystem that provide a platform to run all digital technologies for innovation and entrepreneurship in the line with the same objective to improve business productivity, goal and innovation in processes.



The below figure-4 shows the framework of digital entrepreneurship ecosystem.



**Joshi, K (2014) and Satyanarayana, K (2014)** finds out that Entrepreneurial and firm or start-ups level characteristics are also known as micro factors influencing the high- tech entrepreneurial ecosystem. Micro factors can be further divided in to two sub factors or categories – latent and tangible. Latent factors are the more covert factors associated with entrepreneur’s personality and behavioral attributes and the firm’s adaptability. The tangible factors refer to the characteristics of the entrepreneurial background, firm size etc. and the tangible factors are also observable and measurable. The latent entrepreneurial key factors represent the most influential factors to influence the high tech start up or firm or entrepreneur ecosystem such as need for achievement, risk taking propensity, Locus of control, tolerance of ambiguity, and the desire for personal control. Further, the tangible factors are being responsible for influencing the high tech start up ecosystem or firm level ecosystem or entrepreneurial ecosystem such as previous employment In Firm level or organizational aspects or characteristics, the latent factors which are responsible to influence the high technology start-ups hubs such as the adaptability of start-ups hubs.

**Joshi, K (2014) and Satyanarayana, K (2014)** states that entrepreneurial or firm level characteristics are the macro factors for influencing emergence and growth of the high technology start-ups or entrepreneurs and then further they classified the macro level factors in to four categories such as macroeconomic indicators (infrastructure related factors), regional start-ups ecosystem factors, characteristics of the industrial environment and government policies towards start-ups. The authors have classified the infrastructure related variable in to two subgroups – the traditional physical infrastructure and the modern infrastructure (in terms of internet penetration). The study has found that the traditional infrastructure related variables such as roads, electricity and technical educational institutions are not the significant factors to drive the growth of the new age start-ups but also it is a minimum requirement for any start-ups or any small venture to become truly vibrant start-ups

hub for emergence and growth. Instead of traditional physical infrastructure related variables, the authors find out that the most relevant variable for any new age vibrant start-ups which directly differentiate them from other is the quality of infrastructure and the quality of infrastructure is nothing but the adoption of emerging IT or digital technology. To run this domain such as IT or digital technologies, the telecommunication and internet are the major enablers or backbone for new age start-ups.

**Loganathan, M (2018)** presents that the relationship or engagement between the MNC and the technology start-ups in India has the important drivers to develop the technology start-ups ecosystem in India. MNCs are increasingly entering to Indian market after foreign direct investment announcement and they are increasingly investing money to Indian market for sustainable business growth and efficient production of their machinery, equipment etc. Therefore, they are playing a very pivotal role to develop and nurture Indian start-ups ecosystem for sustainable growth and emergence. There are multiple implications for MNC and start-ups to leverage such symbiotic relationship. The first implication for MNC in any entrepreneurial ecosystem in any situation is to identify the strategic need and engage accordingly with the start-ups to develop new capabilities. The strategic need for MNCs to develop capabilities become opportunities for start-ups in India to garner further resources. The second implication stems from the survival rate of the start-ups because MNC play a very key role to provide exit opportunities for start-ups and that become a hard capability for MNC such as acquisition of capability needs to be orchestrated with considering strategic value to both MNC and start-ups. Acquisition of capability should also timely match the internal and external objective of the ecosystem also. The third implication presents that start-ups add to MNCs a positive cultural engagement, become an important support mechanism for MNCs to thrive ecosystem provided by specialized resources, mentoring technology, and business and then capital like seed funding, VCF etc. Finally, these engagements also bring an opportunity for start-ups to market and position their innovation capabilities along with MNCs.

Though the MNC -start-ups engagement provides support to India's technology entrepreneurial ecosystem but the still the benefits are limited to probe the emergence and growth of India's high-tech start-up's ecosystem. The author talks about five drivers where both MNC & technology start-ups in India will get mutual benefit from each other.

**Table-1 represents the five drivers and their mutual benefits to both MNC, and technology start-ups based out in India.**

MNC -Start-ups Relationship			
Sr. No	MNC Benefits	Start-ups Benefits	Life Stage
1	Encouraging entrepreneurship internally	Resources in early stages	Emergence
2	Growing in a new market	Access to market	Survival
3	Acquiring new capabilities	Resources to build products	Survival
4	Adopting lean and flexible development methodologies	Mentored on industry grade process	Growth
5	Acquiring technology	Exit opportunity	Exit

**Kallinikos (2013)** presents that digital technologies promote openness in digital transformation of innovation and entrepreneurship in various ways and then consequently the digitization changes the notion of openness in terms of degree, scale, and scope. The author also states that several characteristics innate to digital technologies (openness of digital technology) like editability, recomb inability accessibility and transferability make the process over digital platform manageable.

### **Challenges of Digital transformation in India:**

India is a diversified country with population base of 130 crore and have different religion, caste, languages and comprising of 28 states and 8 union territories with total number of 36 entities. Each state has its own specific language, customs, food habits, laws, and tradition.

**Goswami, H (2016)** explains that the complete integration of 36 entities with their own languages through digitally is one of the key challenges while implementing the digital transformation across India. There is different internet protocol policy in different states depending upon the hardware, software implemented across all states may lead to connectivity glitches. Inadequate digital empowered knowledge to villagers and users, unavailability of smooth public internet access across all states, rising of cybercrime over internet and fiber unavailability to across all states for broadband network are some of the hindrances in digital transformation may become challenges for emergence and growth of India's entrepreneurial ecosystem.

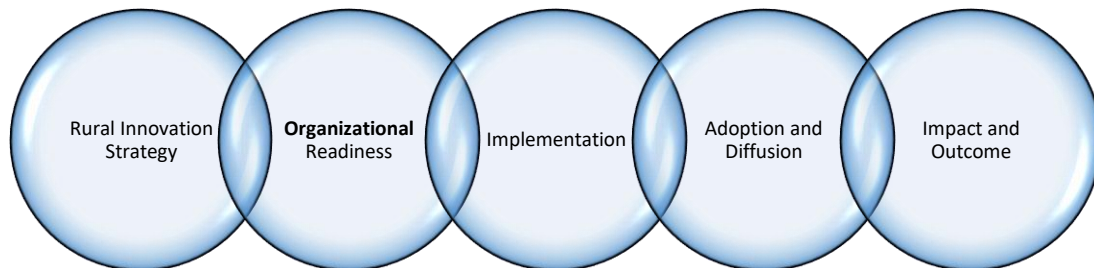
**Antonizzi, J., Smuts, H., (2020)** states that though the digital technology provides a wide range of opportunities to organizations but same cannot be success story to organizations also. There are several issues faced by the organizations like social issues, network requirements, market availability and competitors that will keep the entrepreneurs vigilant and vibrant in the market though the organizations adopt digitized their entrepreneurial processes. Employee involvement, best technology, operations, processes, strategies, partners, and opportunities are also very important for any organization to focus on digital entrepreneurship and digital transformation but the same will be irrelevant for the organization if they do not have anyone (individual, firms, organizations, and industry) to endorse all of these.

### **Adoption of digital technology in rural entrepreneurship**

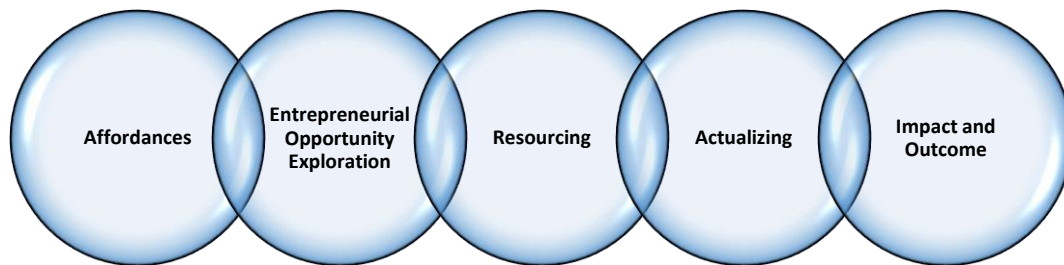
Nambisan (2013) and Yoo (2012) explains that the digital technology as referred as the advent of social media, mobile, analytics, cloud computing and internet of things and the advent of these technologies have provided wide range of opportunities in the rural innovation and rural entrepreneurship. As a result, the entrepreneur or businesses have digitized their processes, business models, products and solutions for emergence and growth. The changes of above all the processes bring challenges in IT entrepreneurship and innovation. However, it also provides an opportunity to new direction of research in digital innovation, innovation readiness, digital technology use, technology led innovation and adoption of innovation in rural entrepreneurship.

Figure-5 and Figure-6 proposes a framework for studying rural innovation and entrepreneurship using digital technologies and it summarizes future direction of research areas in rural innovation and entrepreneurship.

The below figure-5 shows the framework for studying rural innovation using digital technologies.



The below figure-6 shows the framework for studying entrepreneurship using digital technologies.



#### Significance of the study:

**NASSCOM report, 2020** presents that the number of internet subscribers stood in 2020 was more than 750 Mn against the projected of 640 Mn + that push Indian enterprises moving towards more digital adoption to almost 2X in all technological aspects.

- India has become 750 Mn + internet subscribers, against the projected target of 640 Mn+ internet subscribers. (NASSCOM Report, 2020).
- Digital economy is one of the key pillars of India's growth strategy and it is expected to reach \$ 1 trillion by 2025. (NASSCOM Report, 2020) and the platform as being used by the digital economy is internet and mobile phone or cell phone connection.
- The potential for the deep technology in India by 2025 will be \$ 500 bn including AI/ML, Internet of things, Big data & Analytics, and block chain. (NASSCOM Report, 2021)
- Deep tech start-ups base in India is growing at above 40% CAGR over 4 years and the future of deep technology start up is scalable, innovative, and transformational. (NASSCOM, 2021)
- Deep-tech adoption has increased in most verticals such as Enterprise, Health tech, Fintech, Industrial and Manufacturing. (NASSCOM, 2021)

- 14% funding penetration in deep technology start-ups in 2020 and 11 % funding penetration in deep tech start-ups in 2019. It shows that investors are continuously showing trust and interest in Indian deep tech start-ups. (NASSCOM, 2021)
- Making industry automation, building applications across industries, increasing application-based services, digital solution acceleration and more block chain based digital currencies are the reason why deep technology adoption among the start-ups is scalable.

### **Problem Statement**

India is one of the second largest country in the world after USA, has added highest numbers of Unicorns in 2020. More than 1600+ start-ups added in the year 2020, taking the total number of start-ups in India to 12500. Despite the healthy growth rate, the Indian start up ecosystem is struggling to create sustainable start up ecosystems like business models, generating funds, lack of skills, hiring issues lack of innovations etc.

### **Objective of the Study**

- To find out the factors involved in digital entrepreneurial ecosystem and nurturing the ventures.
- To explore challenges of entrepreneurial venture in digital space.

### **Research Methodology**

The purpose of the study is to find out the factors involved in digital entrepreneurial or start-up ecosystem to nurture the venture and explore various challenges or issues of current entrepreneurial ecosystem. We have selected research papers in line with the context of the study from 2010 to 2020, NASSCOM report, 2020, NASSCOM REPORT 2021 and World Economic Forum, 2016 report. The research papers were searched from Google scholar, ResearchGate and internet based on the keywords of entrepreneurship, digital entrepreneurship or entrepreneurial ecosystem, digital start-up, digital technologies, deep tech start up etc.

**Table-2 shows the details of research methodology including author's name, title, year, name of journal, objective, location, and research design.**

Sr. No	Author	Title	Year	Journal	Objective	Findings	Locations	Research Design
1	Patankar, V., (2017)	A Study on Experiences of Indian Entrepreneurial Communities.	2017	Sage Journal	The paper tries to understand the how the entrepreneurial environment of different entrepreneur communities has different perceived business environment, different values/emotions, and different challenges	In Indian entrepreneurship, different entrepreneur communities have different perceived business environment, different business challenges, different values or emotions, and entrepreneurial orientation.	Mumbai	Interview and open-ended question
2	Rosin, A.F., Proksch, D., Subner, S., Pinkwart, A., (2020)	Digital New Ventures: Assessing the benefits of digitization in entrepreneurship.	2020	Journal of Small Business Strategy	To examine the new venture benefit from the digitization.	The authors studied that the digitization is associated with resource savings, higher operational efficiency, and more flexibility. The research paper uses 102 respondents to investigate how new ventures benefit from digitization. High degree of digitization does not reduce or lower the human capital or office space needed in new venture, but it will increase operational efficiency, market flexibility.	Germany	ANOVA
3	Kshitija Joshi, Krishna Satyanarayana	What ecosystem factors impact the growth of high-tech start-ups in India	2014	Bangalore	The purpose of the study is to find out the factors that have been playing significant role of start-ups in India for emergence and growth.	The paper presents about the micro factors and macro factors of entrepreneurship. (entrepreneurial and firm level characteristics) influencing the start-ups to nurture the growth but VC funding, volume of deal size, presence of a pre-existing, critical masses of high technology businesses and skillsets are the most important factors for start-ups ecosystem. In addition to above, the authors find out that the internet is a major enabler to influence the start-ups to nurture the emergence and growth. The authors also classify the start-ups infrastructure in to two groups i.e., traditional infrastructure (road, electricity, and technical educational institution) and modern infrastructure (internet), which is the major enabler for any start-up's ecosystem. The study is limited to six major start-ups hubs in India Bangalore, Chennai, Hyderabad, Kolkata, Mumbai /Pune, and NCR (New Capital Region).	India	Description of data and variables, the sample from secondary data.

4	Srivardhini K. Jha	Entrepreneurial ecosystem in India: Taking stock and looking ahead.	2017	Elsevier, Science Direct, IIMB and Cross Mark	The objective of the study is to find out that positive aspects or factors of the entrepreneurial ecosystem in India.	The paper finds out that the availability of VC funding, large market, highly valued technology like internet of things, reliable connectivity, educated work force, skilling are the critical factors to build up start-up's ecosystem.	India	Theoretical study based on literature
5	M.H. Bala Subrahmanya	How did Bangalore emerge as a Global hub of tech start-ups in India? Entrepreneurial ecosystem-evolution, structure, and role.	2017	Journal of Development Entrepreneurship (World Scientific Publishing Company)	To trace to the factors that contributed to the evolution in Bangalore as an entrepreneurial ecosystem. To understand the critical components of Bangalore entrepreneurial ecosystem. To ascertain and analyze the role of different components of the entrepreneurial ecosystem in the life cycle of tech start-ups in Bangalore.	Prospective entrepreneur and their existence in Bangalore and then primary factors such as education and research institutions, large firms (domestic and foreign), government policy for industry and infrastructure, financier for seed funds, angels, VCs, and PEs, co-working spaces, mentors for both technology and business are the main factors to influence the emergence and growth of Bangalore as number one start-ups hub in India. Apart from above there are secondary factors (government policy exclusively for start-ups, supportive local culture, supportive media, and good weather) are also providing strength to Bangalore as the global tech start-ups hub in India.	Bangalore	Literature Review based on the existing research paper.
6	Muralidharan Loganathan	Exploring MNC-Start-ups Symbiotic Relationship in an Entrepreneurial Ecosystem	2017	Asian Journal of Innovation and Policy	To find out the drivers behind the symbiotic relationship between MNC and start-ups.	The author identifies that symbiotic relationship between MNC and start-ups in India is playing a very pivotal role to improve the start-ups ecosystem India. The drivers are cultural asymmetry, strategic asymmetry, resource asymmetry, complementarity for growth and complementarity for exit.	Bangalore	Case-based method
7	Satish Nambisan, Mike Wright, Maryann Feldman	The digital transformation of innovation and entrepreneurship: Progress, challenges, and key themes.	2019	Elsevier	The objective of the paper is to understand the digital transformation in innovation and entrepreneurship and the implications of digitization of innovation and entrepreneurship.	The authors have developed three key themes related to digital transformation of innovation and entrepreneurship such as openness, affordances and generativity based on 11 research papers.	USA	Study from 11 research papers.

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8	Jan Recker and Fredrick von Briel	The future of digital entrepreneurship research: existing and emerging opportunities.	2019	The Future of Digital Entrepreneurship Research	To identify the key dimension of digital entrepreneurship phenomenon	The paper finds out that there are three key dimension of digital entrepreneurship phenomenon such as digital technology as enabler, digital technology as outcome and digital technology as context of entrepreneurial processes. The framework presented in the paper through PDW study of digital entrepreneurship will contribute to information system (IS) discipline and provide useful guidance to the digital entrepreneurship researchers.	Germany	Professional Development Workshop (PDW)
9	Himakshi Goswami	Opportunities and challenges of digital India program.	2016	International Education & Research Journal (IERJ)	The paper has following objectives. i) To study the concept of Digital India Program. ii) To study the opportunities of the Digital India program. iii) To study the various challenges faced by the Digital India program in its implementation.	The digital India program provides opportunity to people for government services electronically, end for corruption, reducing paperwork, knowledge empowerment and digital banking account to people of country. The paper also discusses about the various challenges like integration of digital technology across country, public internet access availability, fiber network for broadband connectivity and rising of cyber-crimes etc.	Gauhati	Literature review from 12 research papers.
10	Joshua Antonizzi and Hanlie Smuts	The characteristics of digital entrepreneurship and digital transformation: A systematic literature review.	2020	Springer	The objective of the paper is to investigate digital entrepreneurship and digital transformation, their characteristics, and inner relationships	The authors propose a framework based on SLR study where individual and organization can start new companies or adapt existing one with digital age.	Switzerland	Systematic Literature Review (SLR)
11	S Lokuge	Theoretical opportunities for rural innovation and entrepreneurship research	2021	NA	The objective of the paper is to investigate the application of digital technologies like social media, mobile, analytics, cloud computing and internet of things in rural entrepreneurship and IT entrepreneurship innovation.	The authors find out that factors like digital embedded rural innovation at the organizational and individual level involves in the rural entrepreneurship in the information system context and that need to be further investigated by the researchers for rural innovation and entrepreneurship.	India	Existing literature from 2009 to 2019 in rural innovation and rural entrepreneurship context.

### Limitations

There are few literatures available to define the different types of digital technologies, entrepreneurship, digital entrepreneurship, digital transformation, challenges, and issues of digital technologies. This paper explores the factors influencing the entrepreneurial ecosystem over digital platforms using digital technologies based on existing literatures and the paper is needed to research based on primary data, sample, and survey and then the factors to be investigated through the statistical analysis tools. The paper does not discuss in



depth about the risk factors of digital technologies that enable entrepreneurial ecosystem and nurture the ventures from small ventures to large ventures. The paper does not have discussed about the use cases of digitally enabled start up business based out in India and key drivers and challenges faced by start-ups during Covid -19.

**Findings:** Digital transformation is the need of the hour to integrate all business processes over various platforms (cell phone connection, internet, AI/ML, IoT, Big data, Analytics, Robotics, 3D Printing, AR/VR, and other newer IT technologies) to start-ups or entrepreneurs or new ventures for enhancement of the business activity or processes, sustainability, survival, and emergence growth. Data is an oil or heart of any business for sustainability, survival, and growth. The above all emerging technologies are creating massive data explosion across the country and world. Telecommunication is a backbone to above all emerging technologies to run all these activities for business, start-ups, organizations, industry, and people over various digital platforms. Therefore, telecommunication and internet can be a bigger role to play to enable the digital ecosystem for start-ups or small venture for sustainability, agility, efficiency, and business enhancement for growth. Therefore, digital technology will place a crucial role for any start-ups or venture for growth, sustainability, and emergence.

### **Conclusion and Discussions**

The paper is further needed discussions and investigation of exploring more factors enabling the digital entrepreneurial ecosystem in India. Nevertheless, the article offers useful information about the digital entrepreneurship and its ecosystem to the researchers, academician, managers, and others for further investigation in the digital entrepreneurial ecosystem and take it ahead for further study. Digital transformation of business models could create the disruptive business models for the new entrepreneurs and that could create an opportunity for the new entrepreneurs in the existing market. This paper finds out that the factors like internet penetration, advancement of digital technology (AI/ML, Big data, Robotics, Analytics, blockchain, 3D printing, AR/VR, availability of funding, volume of deal flow, pre-existing business relationship and development of skillsets of manpower are the most important factors for any start-ups or new ventures and the traditional infrastructure related factors are the less important factors for any new ventures to sustain in the market. The new venture or entrepreneurs can also find business opportunity in the existing market using digital technology over digital platform that can create disruptive solution for their business model. The disruptive solution builds up through the various digital technology as discussed in this paper can help new ventures to lower the expense and position themselves as the toughest competitors in the competition and gain many opportunities and growth for their business. In other way, it has also created many challenges to the existing business, industries, or competitor to digitize their business model to compete with the new start-ups or new ventures to sustain and survive in the competition.

There are several advantages of digital technology for the start-ups ecosystem, but it has other serious challenges to the industries also like implementation of digital technologies and then integration of all digital technologies with applications, hardware, and software etc. The

challenges like connectivity glitches, different internet protocol policy in different states also lead to problems while implementing the digital technology across the Industry, states, and country. Inadequate digital empowered knowledge to employees, users and people, unavailability of smooth public internet access across all states, rising of cybercrime over internet and fiber unavailability to across all states for broadband network are some of the obstacles in digital transformation may become challenges for emergence and growth of India's entrepreneurial ecosystem. The digital technology provides a wide range of opportunities to individual, organizations and social media but still there are concerns related to data privacy, security at individual, organization, and societal media level. These concerns affect the reputation of organization and societal media partners to individual users or their customers. The entrepreneurs need to be vigilant and vibrant in the market for competition perspective. Though the entrepreneurs adopt digital transformation using digital technology in various functions like marketing, sales, stakeholder's management, products, services, employee involvement, operations, processes, and strategies but some can be irrelevant for the start-ups or small ventures if they fail find anyone (business, organization, firms and individual) who can endorse their digital transformation of functions.

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