

An Empirical Study on Technovation And Its Impact on Sustainable Development in India

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ABSTRACT

Empowering technologies can make a significant contribution to India's economic growth and its efforts to reduce poverty and enable more people to achieve a decent lifestyle, with greater economic opportunities and better access to water, sanitation, education, and health care. At the same time, powerful technological change carries risks for which India needs to prepare; millions of workers whose jobs include tasks that smart systems can perform might need to acquire new skills. The study uses primary data. Only one city that is Chennai has been selected as a sampling unit for the study which uses technovation effectively. Data were collected from the administration of questionnaire and conduct of interviews. In this research, the questionnaire was used to know the impact of Technovation on sustainable development in India. The technologies will transform how Indians work, live, educate their children, travel, and engage with their government in the coming decade. They are only part of the solution to India's challenges; wider reforms and investments are also needed. But adopting these technologies can equip the nation to meet its larger challenges and help the productivity- and efficiency-led transformation that India needs.

INTRODUCTION

Technovation means developing new ideas, products, services, and processes which exploit old technology. It may be driven by a new technology or by needs. At its best, technovation creates valuable products and services. Since 2010, over 28 countries have submitted to Technology and Innovation (Technovation), this makes global changes around the world. Technology means the ability of humans to create things using hands and/or machines. It is the application of knowledge to the practical aims of human life or to changing and manipulating the human environment. Technology includes the use of materials, tools, techniques, and sources of power to make life bearable or more pleasant and work more productive. Whereas science is concerned with how and why things happen, technology focuses on making things happen. Technology can be internal or external .Science; technology and innovation have had a great impact on economic growth and social development in India. The Government moved from scientific policy resolution (1958) to the technology policy statement (1983) to the science and technology policy (2003) and finally to the science, technology and innovation policy (2013).

HISTORY OF INNOVATION IN INDIA

We can look at our 40 year journey, the pre-

liberalised as well as the post-liberalised India. First, India experimented with socialism for more than four decades, which kept out foreign capital and technologies, but spurred local innovation based on indigenous technology. Second, the Indian economy didn't start growing until the 1990s, so local companies were small. Indian entrepreneurs, therefore, developed a penchant for undertaking small projects with indigenous (import substituted) technologies but with huge capital efficiency. Third, local companies knew that while India has both rich and poor people, catering only to the rich limited their market. They were forced to create products that straddled the whole economic pyramid, from top to bottom. Thus affordable inclusive innovation was firmly integrated in to the strategy. And fourth, the most important driver happened to be India's innovation mind-set. Some Indian leaders had the audacity to question the conventional wisdom. The mix of miniscule research budgets, small size, low prices, but big ambitions translated into an explosive combination of extreme scarcity and great aspiration, which ignited the Indian innovation.

Indian technology grew in a denial driven mode in the pre-liberalised India. Foreign technologies were denied because of lack of resource as well as a closed economy in the pre-liberalised era.

They were also denied due to security and strategic reasons. It was through the path of 'technonationalism' that India developed self-reliance through its own technologies in both civilian sectors as well as strategic sectors such as space, defence, nuclear energy, and supercomputers. India developed diverse missiles and rocket systems, remotely piloted vehicles, light combat aircraft, etc. Brahmos is a great example of Indian prowess in a strategic technology. None of these technologies were available to India for love or for money.

Take nuclear energy. The entire range of technologies, from the prospecting of raw materials to the design and construction of large nuclear reactors was developed on a self-reliant basis. India's nuclear fast-breeder reactors emerged from its thrust towards technonationalism.

In at space technology from indigenous development to satellites to launch vehicles, from SLV to ASLV to PSLV to GSLV. India's first moon orbiter project Chandrayan-1, Mars Orbiter Mission or even the recent simultaneous launch of 20 satellites are brilliant examples. No wonder, India is now ranked amongst handful of nations of the world that have a credible capability in space technology. It is the growing technological strength of a nation that increases its access to technology that has been denied to it. The technology denial regime itself underwent

a change as techno nationalism gave India a strong technological foundation. For instance, India's supercomputer journey began, when access to CRAY super computer was denied to India in mid-eighties. In 1998, C-DAC launched PARAM 10,000, which demonstrated India's capacity to build 100-gigaflop machines. In response, the US relaxed its export controls. During the same year, CRAY, which had denied the licensing of technology, itself established a subsidiary in India. In 2008, India signed a key civil nuclear deal with the US, which gave it access to some nuclear materials and technology. Recently, India becomes a member of Missile Technology Control Regime (MTCR), getting access to crucial missile technologies.

OBJECTIVES OF THE STUDY

- To study about the Technological Innovation in India.
- To investigate the major impact of Technological innovation on sustainable development in India.

Here are the top five technology trends you need to know to work in any industry.

- Internet of Things (IOT) One of the biggest tech trends to emerge in recent years is the Internet of Things. ...
- Machine learning. ...
- Virtual reality (VR) ...
- Touch commerce. ...
- Cognitive Technology.

If you've been following the news on exciting tech trends like artificial intelligence, then you're probably aware that emerging technologies are changing the way we work and interact with others. In fact, with things like machine learning and touch commerce becoming increasingly popular across every industry from banking to healthcare, technology is revolutionizing the way we do business and making high-tech approaches an integral part of our lives. We recently sat down with the team at Deloitte to find out how these trends are reshaping the career space.

1. Internet of Things (IOT)

One of the biggest tech trends to emerge in recent years is the Internet of Things. Simply put, the Internet of Things (abbreviated IOT) is the idea that all technological devices can be connected to the internet and to each other in an attempt to create the perfect marriage between the physical and digital worlds. It depends on your industry. For example, for those who work in marketing, advertising, media or business management, IOT could provide a wealth of information on how consumers engage with products by tracking their interactions with digital devices. In turn, this data could be used to optimize marketing campaigns and user experiences.

How it's affecting industries: The really cool thing about IOT is that it's not only changing the way we do business but also the business models we use to do it. For example, according to Deloitte, flexible consumption models are going to become increasingly more popular across all industries as new customer data becomes available.

2. Machine learning

Another exciting emerging technology is machine learning, which is essentially a computer's ability to learn on its own by analyzing data and tracking repeating patterns. For example, social media platforms use machine learning to get a better understanding of how you're connected with those in your social network. They do this by analyzing your likes, shares and comments and then prioritizing content from your closest connections, serving you that content first.

How it's affecting industries: In addition to shaping your day-to-day interactions with friends on social media, machine learning is also changing the way companies do business with customers. According to Deloitte, companies like Google are using machine learning on mobile devices which can continue learning even when offline. The result: Machine learning is reshaping the way businesses interact with their customers in a big way by helping them anticipate and meet customer needs more easily.

3. Virtual reality (VR)

Remember watching movies about virtual reality and thinking how cool it would be if it was actually like that in real life? Well, it's about to be. Although VR has been around since the 1950s, until recently the technology wasn't able to deliver the fully immersive digital experience users have been craving. That's about to change with recent improvements to both hardware and programming, and the effects are going to be felt across almost every industry from retail to education.

How it's affecting industries: Virtual reality has been a popular component of video games for several years and this trend is continuing to expand. In addition to video games, VR is likely to affect companies across the board as they adopt the technology to help them engage customers more effectively and optimize their sales and marketing efforts. It's also a potentially useful tool for learning and is increasingly being adopted by educational organizations.

4. Touch commerce

Being able to buy anything you want with the touch of a finger may have seemed like a fantasy a few years ago, but it's now a reality. Merging touch screen technology with one-click shopping, touch commerce allows consumers to buy products easily from their phones. After linking their payment information to a general account and enabling the feature, customers are able to buy everything from clothes to furniture with just a fingerprint.

How it's affecting industries: According to Deloitte, this is one of the biggest things to hit eCommerce in recent years with purchases of this type expected to increase by 150% this year alone and retailers in almost every industry anticipating an increase in sales directly related to this new technology.

5. Cognitive Technology

Cognitive technology is in the same vein as machine learning and virtual reality except that it's a broader concept. For example, the cognitive technology umbrella includes things like natural language processing (NLP) and speech recognition. Combined, these different technologies are able to automate and optimize a lot of tasks that were previously done by people, including certain aspects of accounting and analytics.

How it's affecting industries: Although cognitive technologies have a broad range of applications, Deloitte predicts that the industry sector most affected by this trend initially will be the software sector with 95% of enterprise software companies projected to adopt these technologies by 2020.

With emerging technologies changing professional industries including banking, eCommerce, healthcare and education, staying up to date on the latest trends will give you a better understanding of your chosen industry and make you a more competitive candidate. Best of all, this knowledge might open up new doors within your field and others.

METHODOLOGY

Type of Data

The study uses primary data. Only one city that is Chennai has been selected as a sampling unit

for the study which uses technovation effectively. Data were collected from the administration of questionnaire and conduct of interviews. In this research, the questionnaire was used to know the impact of Technovation on sustainable development in India.

Sampling techniques

The convenience sampling method was followed and opinions were collected from the respondents of the different cadre who has a clear idea about the technovations. The total number of population in Chennai is more than 1 crore out of which 100 respondents were selected as a sample for the study and distributed the questionnaire to randomly selected 150 respondents and totally 100 respondents returned back the questionnaire and hence 100 respondents were selected as a sample size for the study. The study used the Likert Scale for questionnaire from 1 to 5 representing strongly disagree to strongly agree. The study used the simple regression model to investigate the impact of Technological innovations in sustainable development of India.

Analysis and interpretation

Table 1- Impact of Technological Innovation in India

MODEL SUMMARY				
MODEL	R	R Square	Adjusted R square	Std. Error of the Estimate
1	.943*	.853	.855	.29556

Table 2- Impact technology innovations on sustainable development in India

MODEL SUMMARY				
MODEL	R	R Square	Adjusted R square	Std. Error of the Estimate
1	.365	.232	.245	.42356

The study regressed impact of Technological innovations in sustainable development of India.. From the table 1 and 2 it is vivid that the impact of Technological innovations has strong significance on the positive impact in sustainable development of

India rather than the negative impact which has the maximum value of .943.

TABLE 3

Report			
Impact of Technological innovation in India			
	Mean	N	Std.Deviation
Strongly Disagree	2.0950	3	.0000
Disagree	3.5000	8	.5434
Neutral	2.8543	20	.6580
Agree	4.1230	18	.5342
Strongly agree	4.9000	11	.5360
TOTAL	3.49446	60	.80765

From the above table 3 it is clear that the mean value of Agree and Strongly agree shows a higher value of more than 3 which implies that the impact of Technological innovations has strong significance on the positive impact in sustainable development of India rather than the negative impact.

ADVANTAGES OF TECHNOVATION:

➤ **Financial services.** India's banking sector has used technology to digitalize business operations and to create new delivery models and services, such as online brokerage, mobile banking, and online insurance sales. Disruptive technologies now offer an opportunity to address persistent challenges such as lack of financial inclusion; just 36 percent of Indians have access to a bank account. Technology applications such as mobile payments can bring greater efficiencies; the government pays some \$100 billion per year through paper based channels.

➤ **Education and skills.** Learning outcomes in India's educational institutions are poor due to variable quality of teaching, and vocational training capacity is not adequate for the growing workforce. If these issues are not addressed, India could have far too many low-skill workers in 2025 than the labour market will require. Technology applications can improve the quality of teaching and raise vocational attainment. School performance can be improved through e-administration, digital identity-based attendance systems, and online teacher certification and training. Blended learning with MOOCs (massive open online courses) can bring high-quality

courses to students, and learning simulations can boost hands-on training in nursing and other disciplines. We estimate an economic impact of \$60 billion to \$90 billion per year by 2025 from the higher productivity of more skilled workers. India could have about 24 million more high school- and college-educated workers and 18 million to 33 million more vocationally trained workers by 2025 due to use of digital technologies in the education sector.

➤ **Health care.** Based on international standards, India has about half the doctors, nurses, and health-care centers it needs for its population, and existing facilities are not geared to delivering optimal health outcomes. Disruptive technologies could transform delivery of public health services by 2025, extending care through remote health services (delivering expert consultations via the mobile Internet), digital tools that enable health-care workers with modest skills to carry out basic protocols, and low-cost diagnostic devices that work with smart phones. Using Internet of Things tracking systems to curb counterfeit drugs could be worth as much as \$15 billion per year. The total value of empowering technologies in health care could be \$25 billion to \$65 billion per year in 2025. Of this, the largest share (\$15 billion to \$30 billion) could come from equipping health-care centers and health workers to bring services to some 400 million of India's poor.

➤ **Agriculture and food.** India's agriculture sector has made strides since the Green Revolution but still has immense potential to raise farm productivity and farm income. Hybrid and genetically modified crops, precision farming (using sensors and GIS-based soil, weather, and water data to guide farming decisions), and mobile Internet-based farm extension and market information services can help create more than half the \$45 billion to \$80 billion per year in additional value the sector could realise in 2025.

➤ **Energy.** Under current trends, by 2025, India could become one of the most energy-insecure countries in the world. Energy inclusion is also a major challenge: some 300 million people lack access to electricity. Globally disruptive energy technologies will have tremendous potential to improve sources of power in India as well: unconventional oil and gas, solar technology, and both grid and off-grid and offshore renewable energy sources like wind, solar, and seaweed biofuels. Advanced metering infrastructure, low cost energy storage devices, and energy utilisation technologies can capture efficiencies along the value chain. Collectively, the

technology applications we size in energy could have economic impact of \$50 billion to \$95 billion per year in 2025, including the impact of carbon emissions avoided.

➤ **Infrastructure.** India has a widely acknowledged infrastructure deficit that successive governments have attempted to address. Overcrowded roads, aging rail lines, and port systems using antiquated technology all slow the flow of goods and people and limit the growth potential of the economy; in India, logistics represent 14 percent of the cost of goods, compared with 6 to 8 percent globally. Using sensors, water systems can cut leakage by 15 to 20 percent, helping reduce water shortages. And project-management systems and next-generation building technologies (extensive use of factory-made prefabricated parts, for example) can help India deliver ten million affordable homes by 2025. Together these infrastructure technologies can contribute \$30 billion to \$45 billion per year in value in 2025.

➤ **Government services.** Like other nations, India grapples with the challenge of making its government more effective and responsive to citizens. By our estimate, 50 percent of government spending on basic services does not translate into real benefits for people, and cumbersome government processes are an obstacle to investment and growth. We do not size the economic impact of e-government services, but their positive impact on competitiveness is well established. India has made a good start with its National e-Governance Plan, and it can take additional steps to capture the full potential over the next decade. Reengineering core government processes to simplify them and providing more integration of multiple services on technology platforms are essential next steps.

CONCLUSION:

In spite of some negative impacts, these technologies have a major positive impact which we expect for the sustainable development of India. India needs to create a supportive environment and it has to adapt the following empowering technologies such as Building physical infrastructure for the digital economy, Addressing barriers to technology adoption, Providing effective policies, regulations, and standards, Creating a vibrant innovation ecosystem and a mindset of "going for scale", Fostering more openness and transparency in government, Attracting private-sector R&D investment. These empowering technologies can

make a significant contribution to India's economic growth and its efforts to reduce poverty and enable more people to achieve a decent lifestyle, with greater economic opportunities and better access to water, sanitation, education, and health care. At the same time, powerful technological change carries risks for which India needs to prepare; millions of workers whose jobs include tasks that smart systems can perform might need to acquire new skills. The technologies potentially will transform how Indians work, live, educate their children, travel, and engage with their government in the coming decade. They are only part of the solution to India's challenges; wider reforms and investments are also needed. But adopting these technologies can equip the nation to meet its larger challenges and help the productivity- and efficiency-led transformation that India needs.

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