



CHETANA

International Journal of Education (CIJE)

Peer Reviewed/Refereed Journal
ISSN : 2455-8279 (E)/2231-3613 (P)

Impact Factor
SJIF 2024 - 8.029



Prof. A.P. Sharma
Founder Editor, CIJE
(25.12.1932 - 09.01.2019)

Sustainable Development Goal and Impact of Technological Innovation on Society

Dr. Pinky Nandwana

Guest Faculty

University College of Social Science and Humanities,
MLSU, Udaipur, Rajasthan

Email - piteesha@gmail.com, Mob. - 9928479294

First draft received: 16.01.2025, Reviewed: 31.01.2025

Final proof received: 24.01.2025, Accepted: 29.02.2025

Abstract

The present study investigates the impact of technological innovation on society under the desire of achieving Sustainable development goals. Paper will try to explain both terms:- Technological Innovation and Sustainable development in present scenario and their relation with society's various aspects. Technology has seen a boost from last few years. From the invention of "wheel" till "AI" (Artificial Intelligence) human has gone through a long way.

Paper will cover all the points related to Sustainable development such as its history, efforts made to achieve them and other facts etc., especially in India. Sustainable development has impact on society directly or indirectly and these two are not away from the impact of technological innovation. These are interrelated to each other. Paper will also try to find the future face of this relationship including both positive and negative aspects. This paper is based on secondary data.

Key words: Technology, Sustainable Development, Society etc.

Introduction

Human is most intelligent species in all the living beings. We always think rationally to make our life easy and comfortable. Human has lots of aspirations to achieve. As a result of this thirst to achieve many destinations various new technologies has been developed. We have come through a long way to be advanced in technology.

These technological innovations are to make our life easy and these have given us a number of useful things such as:- new electronic devices, advanced medical techniques, new production systems, new agricultural techniques, mobile telephony, the computer, electric cars, digital cameras etc. But with the passing time these innovations started creating problems and many issues for mankind. These problems were the results of selfishness of human as human started neglecting nature and started using natural resources in a careless manner. Due to this careless behaviour of human society started to have many issues like- environmental problems, degradation in social values: due to which many problems arises, problems related to over population etc.

These gave birth to the concept of sustainable development which talks about a balanced growth with a proper care of nature and human values. This article is an effort to describe technological innovation and

sustainable development. Besides describing these terms this article will try to explain how we may create balance between these two so that society could get maximum benefit from these.

Technological Innovation

Innovation, is the process of creating new ideas, products, services or process that improve efficiency, meet customer needs or address unmet needs of society.

Technological innovation is an extended concept of innovation. It is the process of using technology to create new products, services or processes or to improve existing ones. It can also involve changing the way activities are carried out to meet human needs. This is a multistage process. Some emerging technologies include:-

- Generative AI
- Quantum computing
- 5G expansion
- Virtual reality 2.0
- Augmented reality
- Internet of things
- Biotechnology in agriculture
- Autonomous vehicles

Technological innovation is defined as the creation and application of new or improved technologies, tools, systems and processes that bring about significant advancements or breakthroughs in various fields. It involves harnessing knowledge, expertise and resources to develop innovative solutions that solve problems, improve efficiency, drive progress and deliver value.

The importance of technological innovation can be seen in several key aspects

- **Improved quality of life**

Technological innovation has a significant impact on improving the quality of life for individuals and societies. It drives advancements in healthcare, communication, transportation, education and other sectors. Innovations such as medical devices, communication technologies, renewable energy solutions and educational tools have transformed the way people live, work and interact.

- **Economic growth and competitiveness**

Technological innovation is a major driver of economic growth and competitiveness. It fosters the development of new industries, job creation and increased productivity. Countries and organizations that prioritize technology innovation can gain a competitive advantage, attract investment and stimulate economic development.

- **Enhanced efficiency and productivity**

Technological innovation drives improvements in efficiency and productivity. By introducing new technologies, automation and streamlined processes, organizations can optimize operations, reduce costs and increase output. This leads to improved efficiency, higher profitability and the ability to deliver products and services more effectively.

- **Addressing societal challenges**

Technological innovation plays a vital role in addressing complex societal challenges. It enables the development of solutions for healthcare access, poverty alleviation, environmental sustainability, food security and disaster management. Innovations in areas like clean energy, water purification, telemedicine and agricultural technologies contribute to creating a more sustainable innovation in the future.

- **Scientific and technological advancement**

Technological innovation fuels scientific and technological advancement. It drives discoveries, enables research breakthroughs and accelerates progress in various fields. Innovations in areas such as artificial intelligence, biotechnology, nanotechnology and space exploration expand the frontiers of knowledge and push the boundaries of what is possible.

- **Sustainable development**

Technological innovation is crucial for achieving sustainable development goals. It enables the development of clean technologies, renewable energy solutions and environment friendly practices. By leveraging technology, societies can transition to more sustainable and resource-efficient systems, mitigating the impact on the environment and fostering long-term sustainability.

Technological innovation has many advantages but it also has its own disadvantages which work as an obstacle for development of society and mankind. Those disadvantages are -

- **Dependence on technological innovations**

Our reliance on technology for everyday tasks is growing. This reliance diminishes problem solving and mental arithmetic skills as digital tools replace manual efforts.

- **Job displacement**

Advancement in technology, automation, artificial intelligence and robotics have the potential to replace many jobs. This trend creates job insecurity for those in positions that can be automated, which can result in economic and social challenges.

- **Privacy concerns**

In the digital age, privacy has become a paramount concern. Personal data can be easily accessed, shared or misused, leading to concerns about surveillance and cybercrime.

- **Cyber security risks**

Increased connectivity can expose individuals and organizations to hacking, data breaches and other cyber threats. Technology enables constant monitoring and data collection, raising concerns about privacy invasion and manipulation.

- **Environmental issues**

While technology offers numerous benefits, its production and production disposal processes can have negative effects on the environment. The production and disposal of electronic devices contributes to a growing problem: electronic waste (e-waste). Additionally the energy consumption of technology, including data centres and crypto currency mining has a significant environmental impact.

- **Health concerns**

Excessive screen time and technology use can lead to various health issues. These may include digital eye strain, poor posture, physical inactivity and even addiction to technology. It may increase problems like: obesity and cardiovascular issues.

- **Required regular updates**

Technological innovation may have security risk in relation to data and fraud; required regular update; can go down or have faults, which can stop all business operations instantly.

- **Social isolation**

The increasing reliance on technology for communication has the potential to isolate individuals. Face-to-face interactions are reduced and there is a risk of reduced social skills and increased feelings of loneliness.

- **Increased risk of job cuts**

The advancement of technology has led to automation replacing traditional jobs, causing concerns about unemployment, particularly for positions that involve repetitive tasks. For example the use of Robots in factories and self check out machines in stores has

reduced the need for human workers in these roles, leading to worries among the workforce.

- **Very costly and time consuming**

Integrating new technology into a business can be costly. Beyond the initial purchase of hardware and software, companies often need to invest in training staff and paying experts for set up and implementation. Additionally, there are on-going expenses such as software updates, hardware maintenance and subscription fees for certain technologies, which can burden small businesses financially.

- **Digital Divide**

Access to new technology can create socio-economic inequalities, as not everyone has the same level of access to technology or the skills to use it effectively.

- **Technology Compatibility Issues**

As businesses adopt multiple technological solutions, compatibility issues often arise, hindering the seamless integration of different systems and software. These challenges can result in data silos and require additional time, money and resources to resolve, potentially slowing down work processes.

Sustainable Development

Sustainable development is made up of 2 words: Sustainable and Development.

Sustainable means: That continues or is continued for a long time and Development means: the process of creating something more advanced.

Sustainable development means: It is an approach to growth and human development that aims to meet the needs of the present without compromising the ability of future generations to meet their own needs.

Definition of Sustainable development as per Brundtland report

Sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their needs, it contains two key concepts within it:

- The concept of “needs”, in particular, the essential needs of the world’s poor, to which overriding priority should be given; and
- The idea of limitations by the state of technology and social organization on the environment’s ability to meet present and future needs.

Aim of sustainable development:

To balance the needs of the economy, environment and social well-being. The idea of sustainable development is based on interconnectedness of social, economic and environmental issues. It recognizes that true sustainability must be simultaneously environmental, economic and social.

History of sustainable development:

The history of sustainable development can be traced back to the 17th and 18th centuries in Europe, when ideas about sustainable forest management began to emerge. The concept of sustainable development gained momentum in the 1970s and 1980s and was formally

defined in 1987. Its emerging journey can be explained in below given stages:-

1972

The UN Conference on the Human Environment (UNCHE) was held and the United Nations Environment Program (UNEP) was established. The UNCHE was the first time that the links between the global environment and development needs were discussed.

1980

The concept of sustainable development was first introduced in the World Conservation Strategy (WCS).

1987

The Brundtland Report, also known as Our Common Future, was published. This report defined sustainable development as development that meets the needs of the present generation without compromising the ability of future generations to meet theirs. The official definition of sustainable development given in this report.

1992

The UN Conference on Environment and Development (UNCED), also known as the Earth Summit, was held in Rio de Janeiro. At the Earth Summit, the Rio Declaration was adopted, which contained 27 principles of sustainable development.

Impact of Sustainable Development on Society

The benefits of sustainable development for society are numerous. If we want a well developed society that can’t be achieved without talking about sustainable development because it’s development with a futuristic vision.

Its benefits for society can be enlisted as:

- **Environmental well being**

Environmental protection is a crucial objective of sustainable development. It seeks to ensure that natural resources are used in a way that keeps them healthy for future generations. This includes reducing greenhouse gas emissions, conserving biodiversity and managing natural resources to maintain productivity.

- **Social justice**

Fair distribution of resources means everyone gets what they need to succeed. Sustainability and social justice are connected: sustainable development ensures fair resource sharing, creates jobs, promotes inclusivity, protects indigenous rights and supports education.

- **Better health**

Sustainability is really essential for preventing disasters like hurricanes, floods and wildfires. By adopting sustainable practices, we create healthier communities, reduce health risks and improve overall well being.

- **Economy**

Economic development is also an essential objective of sustainable development. It aims to promote economic growth that is inclusive and sustainable. This can involve creating jobs, fostering entrepreneurship and investing in infrastructure and innovation. It also requires promoting fair trade and addressing economic

inequality to ensure that economic benefits are distributed equitably.

- **Poverty Alleviation**

Sustainable development aim at reducing the number of people living in extreme poverty. Sustainable economic growth is necessary for poverty alleviation, as it creates income generation and employment opportunities.

- **Sustainable resource management**

Sustainable resource management means managing resources with the future in mind. It can be defined as the application of sustainable practices by managing resources in a way that will benefit current and future generations.

- **Social equity**

Sustainable development promotes social equity by ensuring everyone can access basic needs such as food, water and healthcare. This ensures no one is left behind in pursuing economic and environmental sustainability

- **Ensuring better life for future generation**

Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable development can have several **disadvantages** for society, including:

- **Cost**

Sustainable development can be expensive, requiring a large initial investment in practices like renewable energy and green infrastructure.

- **Limited resources**

Some resources needed for sustainable practices, like wind and solar power, may be limited in certain areas.

- **Cultural barriers**

Sustainable development can face cultural and social barriers, especially in communities with traditional practices.

- **Slow progress**

Sustainable development is a long term process that can be slow and incremental.

- **Political instability**

Conflicts can lead to political instability between nations.

- **Poverty**

Poverty is a challenge to sustainable development.

- **Governmental issues**

Governments may prioritize their country's immediate needs over environmental issues and sustainable development goals.

- **Population growth**

As the world's population grows,more resources are needed to ensure people have access to fresh water,electricity and are out of poverty.

- **Compatibility issues**

Older homes may need extensive renovations to meet green standards,which can be costly.

- **Regional climate variations**

Regional climate variations can make certain green technologies less effective or impractical in some areas.

Goals of Sustainable Development

To get benefits of sustainable development UN has given Sustainable Development Goals (SDGs) which is collection of 17 global goals set by the United Nations General Assembly in 2015. These goals are interconnected and are designed to balance the 3 dimensions of sustainable development: the economic, social and environmental.

Here are the most important goals of Sustainable Development:

- **Eliminating Poverty**

The goal aims at eradicating extreme poverty from across the world and reducing it by at least half the proportion of men, women and children.

- **Zero hunger**

The aim is to create a world free of hunger and prevent diseases and death caused by malnutrition.

- **Good health and well being**

This objective in sustainable living promotes efficient health care,a healthy lifestyle and preventive measures for everyone,

- **Quality education**

To ensure that students have access to free primary and secondary education and affordable higher and technical education.

- **Gender equality**

The aim is to give equal political, economic and social equality for women thereby creating more opportunities.

- **Clean water and sanitization**

To provide clean water to populations across the globe so that they can have better sanitary conditions.

- **Affordable and clean energy**

It helps in energy efficiency and increases in the use of renewables for climate change mitigation and disaster risk reduction.

- **Decent work and economic growth**

According to the national circumstances sustain per capita economic growth. Least Developed Countries should have at least 7% gross domestic product growth per annum.

- **Industry, innovation and infrastructure**

Developing reliable, sustainable and resilient infrastructure to support economic development and social well-being.

- **Reduce inequality**

The aim is to reduce inequalities so that everyone gets an equal chance and collectively achieves sustainable development goals.

- **Sustainable cities and communities**

Ensuring everyone has access to affordable housing conditions and transportation. The aim is to allow sustainable human settlement planning across the world.

- **Sustainable consumption and production**

It involves decoupling economic growth from environmental degradation, promoting sustainable lifestyles and increasing resource efficiency.

- **Climate change**

The aim is to combat climate change and its impacts on saving lives. The aim is to reduce global greenhouse gas emission by 43% by 2030 and net zero by 2050.

- **Life below water**

The aim is to create an understanding oceans and the resources that they offer. It also focuses on learning methodologies to keep our seas clean.

- **Life on land**

The aim is to protect, restore and promote the sustainable use of terrestrial ecosystems, combat desertification and reverse land degradation. It is important to take care of the ecosystem since these provide raw materials and ecosystem services.

- **Peace, justice and strong institutions**

Conflict, weak institution and limited access pose a threat to sustainable development. It is, therefore, important to promote peace and facilitate inclusive societies.

- **Partnerships for the goals**

Government, society, private sectors, UN and civil society must act as global partners to achieve each goal of sustainable development.

Relationship between Technological Innovation and Sustainable Development

Above description clarifies that technological innovation and sustainable development both have vast impact on society, both negative and positive. These two are very much related to each other and their relation effects society.

Technological innovation plays a critical role in achieving sustainable development by providing solutions to environmental challenges, enhancing resource efficiency across various sectors, facilitating information sharing about sustainability issues and enabling the development of green infrastructure, thus contributing to a more environmentally friendly and socially equitable future; however, it's important to consider potential negative impact like resource consumption involved in technology production and use.

Relationship between technological innovation and sustainable development may explain in few points, which are:

- **Enabling sustainable solutions**

Technological advancement can create innovative solutions to address environmental problems like renewable energy sources, energy-efficient appliances, sustainable transportation systems and advanced waste management technologies.

- **Resource efficiency**

Technologies can optimize resource usage across industries, leading to reduced consumption of water, energy and raw materials promoting a more circular economy.

- **Data driven decision making**

Advanced data analytics and IOT sensors allow for better monitoring and management of environmental impacts, enabling informed decision-making for sustainable practices.

- **Social impact**

Technology can facilitate access to information, education and health care in underserved communities, contributing to social development goals.

- **Economic growth**

Investing in green technologies can create new industries and jobs, promoting economic growth while addressing environmental concerns.

There are various **examples of technological innovations** which contribute to sustainable development:

- **Renewable energy technologies**

Solar panels, wind turbines, geothermal energy systems.

- **Smart grids**

Efficient energy distribution networks that integrate renewable energy sources.

- **Electric vehicles**

Reducing carbon emission from transportation.

- **Precision agriculture**

Optimizing water and fertilizer usage in farming.

- **Green building materials**

Sustainable construction materials with reduced environment impact.

- **Digital platforms for sustainability**

Online tools to monitor and report environmental performance.

Technology tool is a powerful tool for addressing sustainability challenges, but it must be developed and implemented with a focus on minimizing negative environmental impacts and promoting social equity.

There are few **challenges and consideration to be taken care** while using technology innovation for sustainable development:

Electronic waste and pollution

Every year tons of E-waste get dumped and only a few percentage of it get recycled. As per 2019 report of Global E-waste Monitor 53 million tons of E-waste gets

dumped and only 17 % of it gets recycled. This situation is a hurdle to get net-zero targets.

Digital divide and inequality

The digital divide is the unequal access to digital technology, including smartphone, tablets, laptops and the internet. It puts those without access at a social disadvantage as well. Here wealth of information is out of reach for people on the wrong side of the digital divide. Those with limited access to digital tools don't have the same opportunities to learn

Energy consumption

Data centres worldwide are modern conveniences for us but they pose an environmental threat. For these we need enormous amount of energy –around 1% of global energy to support infrastructure and day to day activities. By 2040, the ICT sector will likely to account for 14% of global carbon emissions.

Job displacement and insecurity

Technological innovation has the potential to displace jobs and increase job insecurity. AI and automation can replace jobs that involve routine and repetitive tasks, such as self-service checkouts and AI-powered robots in factories. Some studies estimate that AI could displace up to 800 million jobs by 2030.

Market monopolies and power concentration

Technological innovations can lead to market monopolies and power concentration in many ways, such as: Centralized production, Market concentration, Digital monopolies, Intellectual monopolies and Competition policy etc. The monopoly power conferred by new technologies can lead to economic, social and political problems.

Data security and privacy

Technology innovation has outpaced our privacy protection .As a result, our digital footprint can be tracked by the government and corporations in ways that were once unthinkable. Our data are continuously being collected by technology, increasing the need for robust data protection measures to prevent unauthorized access or breaches.

Now the question arises how, to overcome these challenges? There are several ways to overcome the challenges of sustainable development, including:

Reduce, reuse and recycle

This technique helps achieve sustainability goals by conserving resources, reusing products and recycling commodities

Use renewable energy

Renewable energy comes from natural sources like wind, solar and hydro power. It can reduce carbon emission, air pollution and reliance on non-renewable resources.

Implement sustainable practices in urban development

This includes promoting mixed use urban design and prioritizing public transportation.

Improve production practices and consumption habits

This can help reduce poverty and speed-up increased food production.

Invest in infrastructure and sanitation facilities

This can help ensure universal access to safe and affordable drinking water.

Protect and restore water-related ecosystem

This can help ensure universal access to safe and affordable drinking water.

Educate people about hygiene

This can help ensure universal access to educate people about hygiene and related hazards.

Ensure sustainable food production

This can help end hunger and malnutrition.

Maintain genetic diversity of animals and crops

This can help ensure maintenance of various kinds of animals and crops all around the universe.

Suggestions and Conclusion

Technological innovation can be both a boon and a curse, depending on how it's used:

Benefits: Technology can make life more comfortable and improve many sectors, including education, medicine, agriculture, defence and industry. It can also help reduce time, effort and energy.

Drawbacks: Technology can have negative impacts, such as environmental degradation, depletion of resources, stress, social alienation, health issues and cyber bullying.

Technology is like a coin which has two sides, it is like a double edged sword and that it's important to strike a balance between its benefits and harms.

Sustainable development is a noble idea but it may be more of a slogan than a scientific concept in the modern world. While some say sustainable development is a key to the future prosperity, other says that the world is not on track to achieve many of the Sustainable Development Goals (SDGs). Sustainable development is a growth and development approach that aims to meet the need of the present without compromising the ability of future generations to meet their own needs. The SDGs are a call to action to end poverty and inequality, protect the planet and ensure that all people enjoy health, justice and prosperity.

Actually if we want to grow our society we need technological innovations and the development should be sustainable as it should consider the future generations too. Technological innovation and sustainable development are interrelated and they have a combined role in development of society. But to get best out of these two we have to make technological innovations usage environment and human friendly otherwise it may affect society adversely. Sustainable developments goals should be at the ground of reality and should be connected with technological innovations but there should be a proper planning to get rid of the issues emerged due to technological innovations.

References

1. Majumdar Satyajit, Gupta Samapti Guha et al, (2015), Technology and Innovation for social change, Springer Publication.
2. MillerCarla, Lockett Martin, Ladd Ted, (November 2017), Disruption: Technology, Innovation and Society, Research Gate.
3. Raihan Asif, (December 2024), A review of the Potential opportunities and challenges of the digital economy for sustainability, Science Direct, Innovation and Green Development, Vol.3, Issue 4.
4. Sasvari Peter, (December 2012), The effects of Technology and Innovation on Society, Research Gate.
5. Sharma Bharti, Kumar Rajesh, (2024), Dimensions of Innovation and Technology in Rising India, Akinik publication.