A REVIEW ON IMPACT OF TECHNOLOGY ON ENVIRONMENT AND NUTRITION POST COVID -19 PANDEMIC

ABSTRACT:

There is a technological impact on environment, food consumption, production and health status of human beings which was more evident during the COVID - 19 pandemic. Standard of living is being progressed due to the increase in technological innovations which in turn is affecting the environment on one side; food production and health on the other side. But without the growth and development in technologies for our day to day living, society would not progress much. At the same time, Pollution levels are increasing, lifestyle diseases are increasing, both food production and consumption are increasing day by day. However, due to COVID 19 - pandemic, surprisingly pollution levels were reduced all over the world. With this background, this paper focused on positive and negative effects of technological advancement in the society, ways of protecting the health of human beings and environment through proper means. This paper would like to voice out that "Our actions are our future in making the environment more habitable". Hence, one must be very thoughtful and do their actions wisely in order to protect the environment and health of the living beings on the planet Earth.

Key words: actions, Future, technology, production, nutrition, environment, life

INTRODUCTION

Action is Hope. There is no Hope without Action.", says a quote by Ray Bradbury. In this context, when there are no actions there are no hopes for a better production, nutrition, environment, and a better life in the future. All the aspects mentioned above are inter - dependent and inter - related to each other. All these have been affected by various factors in the recent decades causing different kinds of problems, and COVID - 19 pandemic created an additional burden to the human life, other living beings, environment and the economy.

"Research says that there are drastic changes seen world - wide in food consumption during the COVID - 19 pandemic. A cross - sectional online survey (n=2,680) conducted on residents of Denmark, Germany, and Slovenia revealed that 15 - 42% of the sample changed their consumption frequency during the pandemic. In all the study countries, highest rates of change were seen in frozen food, canned food, cakes, and biscuits; and lowest rates of change was seen is bread, alcoholic drinks, and dairy products. Sample across all the three countries shopped less frequently during lockdown and there was an overall reduction in the consumption of fresh foods, but an increase in the consumption of food with a longer shelf life was observed in Denmark and Germany" (Janssen *et al.*, 2021). This clearly shows us that the pandemic changed the consumption patterns leading to changes in production, changes in nutrition and health of individuals and changes in standard of living as some people have lost their jobs due to the pandemic and were unable to meet their daily food needs. Due to these conditions, the mental health of the individuals is also being affected. With this knowledge, the present review paper made an attempt to focus on the current scenario of factors affecting the future of world, determinants of food choices, impact of technology on environment and health and a way forward to tackle these issues.

Research also highlights that there is a decrease in pollution levels due to the lockdowns and movement restrictions imposed on people and vehicles. In India, there were many social media uploads regarding these changes too. Such things highlight that our small actions can make a big difference even

in big things like reversing the environmental degradation. People can be motivated to use less vehicles, irrespective of the pandemic and non - pandemic situations. Irrespective of the rapidly changing situations, everyone as an individual and as a society must be motivated to do the right actions for a butter future and give the future generations a hope to live in a peaceful world.

CURRENT SCENARIO

Undoubtedly, the present and future of the world is dependent on these four important elements:

1. Progressing Lifestyles and Standard of Living
2. Health and Nutrition
3. Environment and Technology
4. Production, Consumption and Economy

Analysing the relationship between these four elements is important for every individual and society overall. Mapping the present actions with the future effects in relation to the above - mentioned four elements will help an individual and society to create a road map to a sustainable future.

The following literature depicts the relationships among the four elements mentioned above:

1. Progressing Lifestyles and Standard of Living

The technological advances of the fourth industrial revolution have brought in some drastic and exceptional changes in the global economy. These advances enabled quicker communications, development of new products and manufacturing systems, faster and better transportation systems, and revolution of the construction sector. All these helped in improving the livelihoods and improve the standard of living for the majority. This can be observed from the luxurious working from home options via online platforms, ordering food online, increased use of personal transport services, booking massage and home cleaning services via the internet etc. Most of the developing countries are in the initial stages of adopting these technological transformations; but the developing and under - developed countries also find a chance to transform themselves by adopting the latest technologies which can lead to the economic and social development. Technological advances are often connected to the increased income levels, which can improve the living conditions and long - term visions in poorer countries. On a higher level, technology can also develop livelihoods through increased production and consumption.

On the other side, with respect to the health improvements, cell phones act as a key to open many doors for reaching good heights in terms of health awareness, banking, access to different services and removing language barriers in developing countries. In countries like China, Africa and India, people can now receive awareness alerts about COVID - 19, AIDS, HIV, Tuberculosis, and other diseases; providing information to people who previously had no access to these. Online banking options are also allowing people with health issues to easily set up accounts and make payments to healthcare providers with ease.

The promising uses of technology in the developing world is called as “impact sourcing,” which is considered as an effective market - based solution for poverty alleviation and creating millions of jobs to those living in poverty. Impact sourcing happens when businesses recruit workers who are in disadvantaged situations mainly in the developing countries to do work that require human interaction,

but not the physical presence. Such kind of technologies may have a good and measurable impact, mainly in terms of education (The NYU dispatch, 2018).

But new technologies have a disadvantage of creating a risk to the developing countries. It can widen the digital divide and further broaden the existing inequalities among the developing and developed countries. Apart from this, the environmental degradation may also happen due to the radiations, over exploitation of natural resources, using more amount of electrical energy etc. Hence, the balance between the technological growth and environmental degradation must be in a check, as the imbalances can disturb the lifestyles and standard of living of the people or countries who are in disadvantaged positions.

2. Health and Nutrition

Health, as defined by the World Health Organization (WHO) is "a state of complete physical, mental and social well - being and not merely the absence of disease and infirmity." Whereas, nutrition can be defined as the process of providing or getting the food essential for health, growth and survival; and it is also considered as an important component for human health and development.

Better and healthy nutrition is related to improved infant, child and maternal health, stronger immune systems, safer pregnancy and childbirth, lower risk of non - communicable diseases (such as diabetes and cardiovascular disease), and longevity. Healthy nutrition means consuming foods that stops a person from getting sick and makes a person to live longer. Nutritious means a food that fills a person with enough nutrients (vitamins, carbohydrates, proteins) a body requires to survive.

People with adequate and healthy nutrition are more productive and can create opportunities to gradually break the cycles of poverty and hunger. Malnutrition becomes a significant threat to human health. Currently, the world is facing a double burden of malnutrition that includes both undernutrition and overweight, especially in low and middle - income countries, according to the WHO.

Promoting healthy and nutritious diets, and lifestyles to reduce the global burden of non - communicable diseases and malnutrition requires a multi - sectoral approach. The agriculture and food sector plays a major role in promotion of healthy and nutritious diets for individuals and the total population. Strategies must not solely be focussing at ensuring food security for all but must also achieve the consumption of adequate quantities of safe and good quality foods that make up a healthy diet (FAO).

“Urbanization is one of the important factors that influences both quantity and diversity of food consumption in India. Average consumption is higher in urban than rural areas for fewer than 10% of all commodities. High consumption levels of animal - based products, refined animal fat, edible oil, refined sugar, and alcohol characterize diets in urbanized societies with higher economic development” (Kastner, 2012). “More food consumption in urban areas is associated with increased food availability (Devine, 2003); opportunity cost of women’s time (Dewberry and Ussher, 1994 and Didsdall *et al.*, 2003); access to cooking and availability of facilities for cold storage (Donkin, 2000); and exposure – facilitated changes in tastes and preferences of the consumers” (Drummond *et al.*, 1996).

“But the studies show that the countries in which the urbanization is increasing are rapidly converging to the unhealthy diets, which is creating an increase in the human health risks and leading to

conditions such as obesity and hypertension, and non - communicable diseases such as diabetes, heart disease, and stroke" (Crino *et al.*, 2015 and Tilman and Clark, 2014).

Time constraint is another important factor which is making people go for unhealthy diets. As urbanization is increasing, people moving to cities is increasing, and as they are not having time to cook; people who are living alone or cooking for a group are seeking out for convenience foods which are easy to cook but are not nutritious (EUFIC, 2006).

"Additional health risks due to metabolic impact of overeating under conditions of home confinement were observed in consumers of some countries during the COVID - 19 pandemic. Work from home options and closure of restaurants had a significant and partly opposite effects on food consumption in few countries. On one side, people who lost their jobs during the pandemic decreased their fruit and vegetable intake, due to their higher costs. Other factors which led to these changes are lockdown conditions, and personal factors such as anxiety, stress related to COVID – 19" (Janssen *et. al.*, 2021).

The key driver for eating is hunger but what a person choose to eat is not only based by physiological or nutritional needs. Few others factors which lead to influencing the food choices include (EUFIC, 2006):

- **Biological determinants** such as hunger, appetite and palatability, which is dependent on the sensory properties of food such as taste, smell, texture and appearance.
- **Economic determinants** such as cost, income, availability and accessibility. Accessibility to shops is another crucial physical factor impacting the food choices, that is being reliant on resources like transportation and topographical location.
- **Physical determinants** such as access, education, skills (e.g. cooking) and time.
- **Social determinants** such as social class, social context, social setting (influence of work), culture, family, peers and meal patterns
- **Psychological determinants** such as mood, stress, eating disorders and guilt
- **Personal determinants:** Attitudes, beliefs, optimistic bias, knowledge about food, family life cycle.
- And many more factors which are like an exhaustive list.

A single intervention cannot modify the food choice behaviour of the present world, and it may not be a suitable one for all the groups (age, community etc.) in a population. Hence, interventions need to be pitched towards different groups in a population in consideration of the many factors influencing the decisions on food choice of the individuals and society.

"Education on importance of increasing fruit and vegetable consumption in an affordable way such that no further expense, in terms of money or effort can be an effective solution" (Dibsdall, 2003). Governments, public health authorities, producers and retailers also must put efforts to promote fruit and vegetable products as consumption of these will bring a positive change in health and in having healthy dietary changes (Cox *et al.*, 1998).

"Important policy implications can be made, for example through provision of greater income support for those who cannot work because of the pandemic and/ or for vulnerable households can be beneficial and supportive in improving the health status, nutritional status and betterment in the standard of living. Increasing the accessibility of the agricultural produce, through deliveries or pick - up points at

accessible places, may be a way of increasing the consumption of healthy diets among the people" (Janssen *et. al*., 2021). This will indirectly have an effect on the economy as people will become able to earn money, eat well and lead a healthy lifestyle.

The dietary changes of the consumers are also raising concerns related to the use of technology and environmental degradation. As people are consuming more, the demand for production in the limited land available is created a huge stress on land, water, and energy resources (Ajzen and Fishbein, 1980); increase in greenhouse gas emissions due to use of heavy machinery, appliances and technologies (Ajzen, 1988), unequal access to healthy foods (Becker, 1974), and food security (Berkman, 1995). Hence people must be educated and motivated to adopt healthy diets and sustainable food habits and agricultural practices which are beneficial on a longer run.

3. Environment and Technology

A developing nation seemed to be seen as a country that lacked access to modern technology earlier. Currently, the increasing globalisation implies that fast communication; market forces and lesser import restrictions can help in making a new technology available anywhere and everywhere where it might be beneficial. The picture is not entirely positive. Countries still vary in their ability to absorb new technologies and a technology gap still exists between rich and poor countries. Even within the countries also, the ownership, control and use of such technologies are mostly in the hands of the rich, compared to the poor. But economists and other people express that new technologies are transforming the social and economic prospects globally. A 2008 World Bank report calculated that, primarily as a result of such technologies, the proportion of the population living in absolute poverty fell dramatically from 29 per cent in 1990 to 18 per cent in 2004.

The biggest impact for the modern information society is from the information and communication technologies (ICTs) - computers, mobile phones and satellite communications. Wide disparities in access still exist, due both to economic reasons and deficiencies in physical infrastructure. For example, one of the main reasons for the slow penetration of the Internet in is the reliance on slow, expensive and often unreliable copper wire connections instead of high - speed fibre optic cabling.

Rapid growth of mobile phones shows that, with proper investment and planning, the developing countries may gain many benefits by jumping over some stages in the development process. This has been made possible by the use of telecommunications satellites, that remove the need for investment in costly landlines. In fact, there are many ways in which these satellites are changing the social and economic prospects of the developing countries. For instance, satellite broadcasting can be used to deliver educational materials to remote locations. Farmers are using satellite technology to learn about weather conditions and compare the prices offered for their products in local cities. So satellites are becoming useful in many developing countries are they are now financing, launching and operating their own.

Nanotechnology is finding rapid applications around the world which range from water purification to creating cheaper and more effective drugs. As with any new technology, there are potential downsides, particularly related to effects of long - term human exposure to 'nano-particles'. No technology should be adopted uncritically. Governments must encourage the learnt public to discuss and avoid previous mistakes that happened with technologies. For instance, science based techniques like

chemical pesticides brought into the market without sufficient attention brought many side effects to the environment and people.

Nuclear technology is an another controversial technology. In spite of the huge challenges of keeping this technology safe and dealing with nuclear waste, it offers a substantial potential to meet the climate change challenges.

Wadell says, technology in its broadest sense is now more important than ever in the world. Everyone should act together to develop a system by which technology can be introduced in a way that ensures that it is safe, efficacious, affordable and environmental friendly.

Impact of Technology on Environment: "In today's society more people are working longer hours and utilizing more technology in their everyday life. As a result of these longer hours and increased use of technology, more energy is being consumed" (Hayden and Shandra, 2009). Impact on the environment is large, both in negative and positive ways. It is difficult to deny the benefits which the modern technology has given to the world, industry and in everyday lives of people. With more and more technological breakthroughs, there have been many positive ecological impacts. However, it is also hard to deny that there are considerable negative impacts as well.

(a) Negative Ecological Impacts of Technology: Automobile technology was first developed to make the journey of humans more convenient. But now there serious environment pollution issues due to the increased use of vehicles which are releasing unwanted greenhouse gases into the environment. Hence, the manufacturers are trying to develop more environment friendly automobile technologies which will have less impact on environment. Battery operated cars and autos are examples of such technologies.

"One of the biggest problems that the world faces currently is the huge amount of energy consumption. Almost all the world's businesses are using computer technology to operate, and hence the energy consumption of the industrial world is constantly on the rise. Countries such as the United States where the average employee works more than 40 hours a week, as a result, the energy consumption of a typical office in the United States is likely to be higher than that of an office in a country where the average work week does not exceed 40 hours" (Hayden and Shandra, 2009). According to the International Energy Agency (IEA) "around 4% of the world's energy consumption in 2008 was due to the mass use of information communications technologies. This figure is predicted to rise to an incredible 40% by the time the year 2030 arrives". "By this time, the demands on the world's electricity sources will also double globally and companies will need to have a viable solution to prevent computer technologies from being a major drain on the world's energy resources" (Courtney, 2010).

"Currently many of the organizations are beginning to actively look for greener and ecologically sound methods for producing the energy they need. Many companies are thinking of ways to decrease their carbon footprint" (Courtney, 2010). "But it is not just the information communications technologies that have affected the ecology of the planet. A number of the ecological and environmental problems that are occurring are due to the rapid growth of new industrialized countries such as South Korea and China" (Jorgenson, 2009). "With so many countries now outsourcing their manufacturing to these industrialized nations, more and more factories are being constructed as a result. To run these factories, huge amounts of energy is being used up as many factories as they operate for 24 hours a day. The emissions these

factories produce are amongst some of the highest in the world and contribute significantly to the amount harmful gases that pollute the air" (Hayden and Shandra, 2009).

"In the modern homes, there are numerous high technology gadgets designed to make our lives easier and more pleasant. These gadgets range from the microwave to the electric kettle to refrigeration. One of the largest contributors to gases in the atmosphere is the gases produced by the combustion process used to produce energy" (Williams, 2010). "In the United States alone, 83% of this energy comes from a combustion process" (Williams, 2010). "The combustion process is an effective way to produce energy for a wide range sources. The negative aspect of the combustion process however, is the amount of harmful gases that it produces. These gases can have a devastating impact on the ozone layer and contribute to what is known as the "Greenhouse Effect" and a result the global warming is increasing and climate changes are being noticed all through the globe more evidently and frequently. The thermal imbalance caused by the global warming is affecting the climates and seasons, mainly in the polar regions. The increase in thermal imbalances are making the polar icecaps melt at an alarming rate, causing a significant rise in the water levels of the oceans. This change also is contributing to the increased frequency of natural disasters like devastating floods, volcanic eruptions, tsunamis, earthquakes etc" (Kilian, 2009).

Aviation technologies are giving health problems for their workers and creating serious environmental threats. With the heavy usage of fertilizers soil is losing its natural fertility and several varieties of plants became extinct. All these examples show it is hard to ignore the correlation between the rise in technology use, increased frequency of environmental disasters and their impact on the environment, economy, health and standard of living of people.

(b) Positive Ecological Impacts of Technology: With the help of mobile technology, people are able to communicate with people who are living far away. Internet is creating opportunities to learn new things, do online courses etc. With the help of aviation technology, reaching distant places within hours have become easy. Social networking also plays a major role in improving the communication across the globe. With the help of information technology, sharing information to any part of the world with in milliseconds is becoming possible. With the progressive technologies used in the field of agriculture like obtaining the produce in short periods, using drones for field surveys, collaborative information sharing, improved extension services; the food requirements of people all over the world are being met. Farmers are also being empowered with the latest technological options.

Since the rise of use of technology in the workplaces, various ICT companies have started designing "greener technologies" to fight the ill impacts that computers and related technologies create on the environment. One of the best known organizations is the Green Grid, an organization which has IT companies and professionals from all over the world. The Green Grid is devising ways to improve the way energy is consumed by IT oriented businesses and their offices. One of the biggest achievements of the Green Grid is the Power Usage Effectiveness or, PUE, metric system. This system records data center's energy consumption every 15 minutes. By recording this, the data related to any energy fluctuations can be monitored and checking whether the data center systems are using an adequate amount of energy or not can be done. "The long term goal of the Green Grid is to bring in a standard system that allows businesses and IT operatives to compare the amount of energy they are consuming and if necessary find ways to reduce it" (Courtney, 2010).

"Another technology having positive impacts on the environment is 'low carbon technology', which was developed in China largely because of its low carbon footprint in comparison to other developing countries. This technology aims to balance the amount of emissions polluting the air by using renewable fossil fuels. China is a low carbon economy for two main reasons. Firstly, the number of people that own a car is far lower than the national average of countries like the United States. Currently, majority of the China's inhabitants use public transport or bicycles to move around. Secondly, the high amounts of renewable fossil fuels that China utilizes in its factory productions. Fossil fuels are used due to their high energy efficiency and extremely low emissions. Carbon is not emitted when fossil fuels are used and hence, many of the Chinese factories run on renewable energy that is created from fossil fuels" (Xie, 2009).

"For other countries to develop effective low carbon technologies, they will require different approaches towards their resources than China. This is because, the other countries may have different environments and different natural resources in hand. China's main resource is its extensive supply of coal which it readily burns as a source of renewable fossil fuel. China has rich reserves of renewable energy and is able to not only exploit its coal resources, but also its large amount of renewable hydroelectricity. These renewable resources, if managed properly will go a long way into creating a low carbon future for China" (Xie, 2009).

"Other countries can also diversify into new low carbon options as there are many advances in technology. Bio - fuels, solar power and wind power are no longer a science fiction, but are a science fact. They are more than capable of replacing some of the energy resources currently used that produce harmful gases" (Xie, 2009). These new developments towards a low carbon future are possible only through advancements in the modern technology, which has a positive and beneficial effect on the environment.

"With the ever increasing use of email and electronic communication, paperless offices are now a common occurrence in companies" (Jorgenson and Jorgenson, 2009). "Reducing the need for paper in turn reduces the demand for logging and deforestation, allowing richer lands to create a smaller footprint" (Kilian, 2009). "Development of green technologies like personal computer power management systems and multi - function devices allows a business which rely heavily on technology to reduce the amount of energy consumption" (Courtney, 2010).

"Any commercial and industrial can become more environmentally sound if it employs many of the new energy reducing technologies that are readily available and incorporates them with or eco - friendly practices such as turning off excess lights and using less paper" (Jorgenson and Jorgenson, 2009). "Putting energy management systems into practice can save a company a huge amount in energy consumption. For example, a company combines its 100 physical computer servers into less than 20 servers that operates a virtual server software. It not only saves potentially hundreds of thousands of dollars in server replacements and repairs; it also saves over 6,00,000 kilowatts of energy" (Courtney, 2010).

To conclude, Technology is like a coin which has both positive and negative sides. We are the deciders and we have to choose how to use it. The usage of technology for over exploitation of resources should be always avoided. If technology is used for positive things, it can provide positive effect of human lives and vice versa. Nobody would oppose the technological developments in any sector, but they

must be in a positive way, and have a minimum negative impact on the present or future generations. Through the increase in modern technologies and globalization, there is a also a high increase in energy consumption. This in turn has devastating effects on the climate and air quality. However, without modern technology there would not be the capability to improve energy management systems or to develop environmentally friendly products such as bio - fuels. To make a progressive step towards reducing the amount of damage the technology does to the environment, it is important to find ways to manage new technology correctly so that it can continue to have positive ecological impacts.

4. Production, Consumption and Economy

A driving force for the global economy is the "worldwide consumption and production." But the progress in terms of economy, technology and social development over the last few decades has been accompanied by environmental degradation which is endangering the future development and survival of living beings.

A few facts and figures, as given by the United Nations are:

- Each year, an estimated quantity of 1/3rd of all the food produced globally, which is equivalent to 1.3 billion tonnes and worth around $1 trillion ends up rotting in the bins of consumers and retailers, or spoiled due to poor harvesting, storage and transportation practices.
- If people worldwide switch to energy efficient light bulbs the world would save US$120 billion annually.
- If the global population reaches 9.6 billion by 2050, the equivalent of almost three planets could be required to provide the natural resources needed to sustain current lifestyles.

Conclusion

The COVID - 19 pandemic offers the developing and developed countries an opportunity to build recovery plans that will reverse the current negative effects on the global economy and environmental degradation and this can be aided positively if there is a sustainable change in the food and other product consumption patterns and production patterns which will lead to a more sustainable future and happy generations. Sustainable consumption and production is not only about doing more production and less resources, but it is about decoupling economic growth from environmental degradation, increasing resource efficiency and promoting sustainable lifestyles. Sustainable consumption and production can also contribute substantially to poverty alleviation, improving the standard of living of the people and the transition towards low - carbon and green economies.

FURTURE PROSPECT

The following conclusions or strategies can be developed for a better life and future from the insights given above:

Technologies for environment, or Environmental Technologies?

Technologies for environment and environmental technologies are two different approaches, and it is important to distinguish between the two.

- Technology for environment looks at any and all technologies and their impact on the environment - in their inputs, throughputs and outputs. These include cleaner and resource

efficient technologies which can decrease material inputs, reduce energy consumption and emissions, recover valuable by - products, etc.

- Environmental technologies are technologies developed for the specific purpose of addressing an environmental problem. These include technologies for sewage and waste treatment, water purification, combating waste disposal problems, pollutants processing, proper handling of toxic/ hazardous wastes etc.

To reduce its impacts on the environment, focus on technologies that are:

- ✓ EFFICIENT
- ✓ INTEGRATED
- ✓ INTELLIGENT
- ✓ FASTER
- ✓ SMALLER

Strategies to increase food supply and promoting sustainable food consumption and production

- **Irrigation:** Good irrigation practices can double the amount of food produced.
- **Diversified production and production practices:** Grow different crops and grow them differently.
- **Sustainable Agriculture:** Use of organic farming methods, less use of pesticides, avoiding monocultures etc.
- **New Green Revolution:** Using drought resistant seed varieties, developing varieties which grow in lesser time periods and use less water etc.
- **Urban farming:** Aeroponics and hydroponics. Aeroponics and hydroponics are systems that allow plants to be grown without soil.
- **Biotechnology and appropriate technologies**
- **Sustainable diets:** Cut the meat, reduce food waste, organizing and structuring meals, etc.
- **Increased access to food supply through betterment in communication and transportation systems**

These strategies are our actions to be done for a better future. These actions can surely contribute to a better production, nutrition, environment and a better life.

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