



# DAWN TO DUSK DAWN

Environmental Issues and its  
Effects on Human Evolution

**Prof. Pranay Tanwar | Dr. Harpreet Kaur  
Dr. Mohd Atif Wahid | Dr. Kimmi Verma**

# Dawn to Dusk to Dawn: Environmental Issues and its Effects on Human Evolution



**India | UAE | Nigeria | Uzbekistan | Montenegro | Iraq |  
Egypt | Thailand | Uganda | Philippines | Indonesia**  
[www.empyrealpublishinghouse.com](http://www.empyrealpublishinghouse.com)

# **Dawn to Dusk to Dawn: Environmental Issues and its Effects on Human Evolution**

*Edited By:*

**Prof. Pranay Tanwar**

Dean Academics, Delhi Technical Campus, Greater Noida, India

**Dr. Harpreet kaur**

Department of Engineering, Delhi Technical Campus, Greater Noida

**Dr. Mohd Atif Wahid**

Department of Mechanical and Automation Engineering at Delhi Technical Campus,  
Greater Noida, India

**Dr. Kimmi Verma**

Department of Computer Science and Engineering at Delhi Technical Campus, Greater  
Noida, India

First Impression: June 2023

**Dawn to Dusk to Dawn: Environmental Issues and its Effects on Human Evolution**

**ISBN: 978-81-963716-5-4**

**Rs. 1000/- (\$80)**

No part of the book may be printed, copied, stored, retrieved, duplicated and reproduced in any form without the written permission of the editor/publisher.

**DISCLAIMER**

Information contained in this book has been published by Empyreal Publishing House and has been obtained by the editors from sources believed to be reliable and correct to the best of their knowledge. The authors are solely responsible for the contents of the articles compiled in this book. Responsibility of authenticity of the work or the concepts/views presented by the authors through this book shall lie with the authors and the publisher has no role or claim or any responsibility in this regard. Errors, if any, are purely unintentional and readers are requested to communicate such error to the author to avoid discrepancies in future.

Published by:  
Empyreal Publishing House

## **PREFACE**

This book compiles the contemporary hot-button issues in the field of science, technology, literature, finance and fashion. It also explores the impact on environment and human psyche. The book topics includes impact of nanotechnology on humankind, technology and literature, impact of social media on Indian youth, e-waste management, impact of fast fashion and textile waste, Air Pollution Impact on Economy and Health in India, analysis of Indians investing choices and the country's potential cryptocurrency environment, human thought pollution in the environment, Indian economy on world map. The aim of the book is to develop a thought provoking discussion about the significant recent technologies and processes to assess its impact on environment and humankind. Innovative and multi-disciplinary studies promoting an integrated approach to understand, assess, design better technologies and finally pollution free and harmonious environment to live. The book will aid the people in their contributions towards sustainable development in healthier and safer environment.

## **ACKNOWLEDGEMENT**

The Editors would like to thank everyone who contributed to this book, especially the authors and review team members. This book would not have been possible without their help.

First and foremost, the Editors would like to thank all authors for their efforts. We sincerely thank the chapter authors for donating their time and skills to this publication. They gave their knowledge and helpful input in the goal of ensuring the manuscript is of the highest possible quality.

Second, the Editors would like to thank the reviewers for their substantial contributions to the improvement of chapter quality, coherence, and content presentation. Some authors also served as referees; we highly appreciate their double task.

The vision of publishing book could not have been realized without the unwavering support of management and higher officials at the institute level. Their patience and advice made this task possible.

Special thanks go to the book's Editorial and Empyrean Publishing House (EPH) team for their vision in organizing this volume and diligence in compiling the entire book in a professional manner.

**Prof. Pranay Tanwar**

**Dr. Harpreet Kaur**

**Dr. Mohd. Atif Wahid**

**Dr. Kimmi Verma**

## Table of Contents

|                          |  |                 |
|--------------------------|--|-----------------|
| <b>Preface</b>           |  | <b>IV</b>       |
| <b>Acknowledgement</b>   |  | <b>V</b>        |
| <b>Table of Contents</b> |  | <b>VI - VII</b> |
| <b>Chapters</b>          | <b>Title of the chapter</b>  | <b>Page No.</b> |
| <b>Chapter 1</b>         | <b>IMPACT OF NANOTECHNOLOGY ON HUMANKIND</b><br><i>Harpreet Kaur and Manish Prasad</i>   | 1 – 16          |
| <b>Chapter 2</b>         | <b>TECHNOLOGY AND LITERATURE: TANDEM<br/>RELATIONSHIP AND COMPLEXITIES</b><br><i>Vhuyashi Das, Partha Pratim Barua and Shruti Jha</i>                            | 17 – 25         |
| <b>Chapter 3</b>         | <b>DESIGN IMPACT OF SOCIAL MEDIA ON INDIAN YOUTH</b><br><i>Meghana Sharma and Danish</i>   | 26 – 36         |
| <b>Chapter 4</b>         | <b>E-WASTE &amp; THEIR MANAGEMENT</b><br><i>Malvika Chaudhary and Sheetal Kashyap</i>  | 37 – 54         |
| <b>Chapter 5</b>         | <b>IMPACT OF FAST FASHION AND TEXTILE WASTE</b><br><i>Monika Kadam and Taniya</i>  | 55 – 69         |
| <b>Chapter 6</b>         | <b>AIR POLLUTION IMPACT ON ECONOMY AND HEALTH IN<br/>INDIA</b><br><i>Amit Gupta and Kartick Chauhaan</i>   | 70 – 86         |
| <b>Chapter 7</b>         | <b>ANALYSIS OF INDIANS INVESTING CHOICES AND THE<br/>COUNTRY'S POTENTIAL CRYPTOCURRENCY<br/>ENVIRONMENT</b><br><i>Sarita Pundhir, Poonam Gupta and Mohd Akif</i> | 87 – 93         |
| <b>Chapter 8</b>         | <b>THE HUMAN THOUGHT POLLUTION IN THE<br/>ENVIRONMENT</b><br><i>Ajay Pal Indolia and Supriya Tiwari</i>  | 94 – 102        |
| <b>Chapter 9</b>         | <b>INDIAN ECONOMY ON WORLD MAP</b><br><i>Anupama Sharma and Daksh Pratap</i>   | 103 - 113       |

## Chapter 1

### IMPACT OF NANOTECHNOLOGY ON HUMANKIND

**Harpreet Kaur<sup>1\*</sup> and Manish Prasad<sup>2</sup>**

<sup>1</sup>Assistant Professor and <sup>2</sup>Student, Delhi Technical Campus, Greater Noida, India

#### ABSTRACT

*This book chapter discuss about the influence of nanotechnology on human's life. Nanotechnology is rapidly covering and effecting almost every domain of humankind. It has been projected that the new innovative nanotechnology could deliver sustainable way outs to the global issues affecting the society. There are countless domains namely medical, food, electricity, energy conservation, cosmetics and so on in which nanotechnology has resulted in remarkable advancements. In spite of many advantageous impacts, its bad influence cannot totally be ignored. Therefore, this chapter talks about the dark side of blindly adopting nanotechnology as new guiding technology. Finally, the discussion about how to get a balance between getting benefit without risking the safety have been given. Pondering about both of the sides of embracing nanotechnology, one can say it has many advantages and few disadvantages, but surely its impact on humankind is indispensable.*

*Keywords: Nanotechnology, Drug Delivery, Food Science, Cosmetics, Energy Conservation, Filtration*

#### 1. INTRODUCTION

In recent times, “Nanotechnology” has become an acknowledged term in myriads of domains attributed to the remarkable impact it has on our daily lives. Nanotechnology is contemporary science, engineering and technology operational at the nanoscale (1-100 nanometre (nm), 1 nm is one billionth of a meter). To have a clear idea of nanoscale, a single sheet of paper or a human hair which are barely thinnest possible things one can imagine are even 100,000 nm thick. The nanomaterials must have at least one dimension in nanoscale range whereas the bulk materials have their size above 100 nm in all dimensions. The atoms and molecules behave astonishingly different when lies under nanoscale range [1].



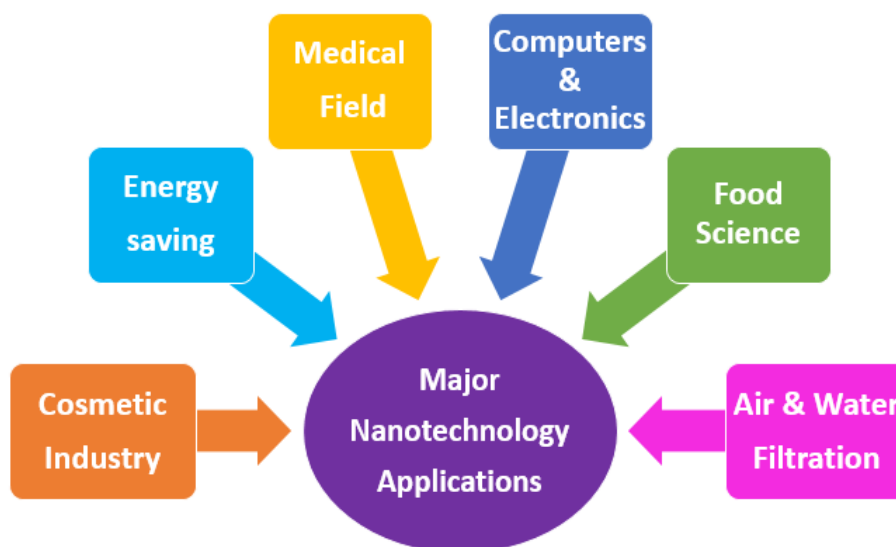
Numerous researchers, scientists and engineers are engrossed in designing excellent nanomaterials and miniaturization of conventional technology at micro or higher level to nano-range. There are diverse fields in which nanotechnology has entered and efficiently improvised their functionalities. Apart from vast number of applications such as fast computing, cost-effective and efficient medical services, automobiles, nano-sensors, nano-devices, nano-filters, advanced nanomaterial based cosmetics, security inks and nano-solar equipment, many new nano-achievements appear almost every day [2-6].

Despite many advantages of nanotechnology, it has a shadow side. Even the companies are not following any standard protocols for handling and marketing of the products containing nanoparticles. Many researchers are suspicious about the potential influence of nanotechnology on health, planet and ecosystems.

Here, in this chapter the author have attempted to discuss about the various domains of human life, where nanotechnology has hugely potentially impacted. As a matter of fact, it is also important to discuss disadvantages of blindly trusting the encroaching technology and few insights are given on how its ill effects can be prevented only by proper database about its functionality. Proper knowledge about the post and long term effects and controlling them is the key to accomplish maximum benefit from the revolutionary and innovative nanotechnology.

## **2. ACCESSING THE MAJOR IMPACT OF NANOTECHNOLOGY**

There are diversity of fields into which nanotechnology has proven to be a boon. The author has endeavoured to take up each applications and how the nanotechnology has impacted its performance Fig 1. shows major applications of nanotechnology.



**Figure 1.1:** Applications of Nanotechnology

## 2.1. Implication of Nanotechnology in Medical Field

National Institute of Health (NIH) at United States stated the nanomedicine as “highly specific medical intervention at molecular scale for diagnosis, prevention, and treatment of disease” [7]. Some of the nano-technological applications in medical field comprise of biosensors, antimicrobial techniques, drug delivery treatments, diagnostic and monitoring techniques and controlling the biological system. The optical biosensors are employed for the various crucial measurements such as blood flow rate, pH, radiation dosage and blood oxygen levels [8].

### 2.1.1. Drug Delivery Treatments

According to NIH, the drug delivery is designing a carrier that facilitates the releasing of healing materials inside the diseased body and thus shooting up the efficiency as well as safety by controlling the rate of release, exact timing and site of release of drug release in the diseased tissues of the body [9, 10]. The nanotechnology endows target-specific drug-delivery nanoparticles, thus helping to deliver drugs to the specific target cell and preventing any side effects, such as damaging the gastrointestinal tract. The new drug delivery systems comprise of targeting and delivery of diagnostic carriers and nanomedicines with the usage of nanoparticles. Through specialized nano-coating, the pharmaceuticals can survive in body fluid such as blood or sebum for a longer time and enables the drug to release at targeted tissues in a controllable way. This novel self-

regulating drug-delivery and excellent releasing capability has declined plasma fluctuation and prevented secondary effects. Nanoparticles incorporate drug, and due to its small size, nano-molecules are effortlessly diffused into the body cells via biological membranes [11].

In the case of drug delivery systems, nanotechnology have played a noteworthy role in augmenting the safety, performance and effectiveness, and most importantly forms the drug-delivery system cost effective than conventional systems. The nanotechnology is efficiently employed as drug delivery systems in the treatment of diseases like diabetics, bone diseases, and cancer and other diseases. Fig. 2 represents major applications of nanotechnology in medical field.



**Figure 1.2:** Applications of nanotechnology in medical field

## **2.1.2. Nanotechnology in the Treatment of Severe Diseases**

### **2.1.2.1. Cancer Treatment**

Numerous scientists are researching on different capacities of drug delivery systems to advance their efficiency. Nanomaterials, have superior drug stability in the bloodstream. It can easily infiltrate into tissues (cancerous cells) and have effortless mobility in the bloodstream, both hydro-phobic/philic drugs can be integrated with the carrying agent,

elevated drug loading capability, and drug release to the targetted site from the nanoparticle matrix can be regulated. Furthermore, a suitable acidic environment is created, for drug release and efficient treatment of cancerous cell can be accomplished [12].

#### **2.1.2.2. Diabetic**

Synthesized nanoparticles incorporated onto the insulin matrix. The nanoparticles are adhered with enzymes, and as soon as the level of glucose inclines in the blood, the enzyme releases the insulin, and control the level of glucose in the bloodstream for quite a few days.

#### **2.1.2.3. Bone Diseases**

Magnetic and silica based nanoparticles have been effectively employed in bone regeneration. Toxic less calcium phosphate-based nanoparticles are utilized in bone tissues. Many bone related diseases such as Arthritis, osteosarcoma, osteoarthritis and metabolic bone cancer have been cured using nanoparticles attached to bisphosphonates [13].

### **2.2. Energy Saving**

The energy sector has also been hugely profited from diverse nano-technological implications, and the influence of such applications have also been observed in energy transmission systems which offer a neat and efficient route. Furthermore, nanotechnologies present more competent 480 Handbook of Nanomaterials for Manufacturing purposes to transport the electrical energy to remotely existing areas or at very long distances. Nanoparticles loaded manufacturing materials are sturdier, and also, acquire very less space than currently used constituents. Hence, nanoparticle comprised making materials lessen the traces required for the production and maintenance of electricity transmitting lines and pipelines [14].

Recently, nanotechnology have presented new opportunities for the conception and development of efficient, cost-effective, and environmental friendly sources of energy with from source of renewable origin such as sun, wind, water tides, biomass and traditional sources viz. fossil and nuclear fuels. Such energy sources based on nanotechnology unveil some extraordinary features when they exist in their nanofom,

marking a pioneering impression on every facet of the value added chain in the sector of energy. Therefore, nanotechnology aids to improvise energy efficiency and provides a cost effective renewable source of energy with optimized technologies of production and innovative technological solutions. In case of energy sector, nano-technological applications are circumscribed to conservation of energy, its storage, distribution, transmission, generation and management. To illustrate, the method of using nano-coated and wear resistance drill probes has appreciably augmented the life span and overall efficiency in petroleum technology, which has proven to be cost saving too.

Moreover, the usage of nanomaterials offers substantial progress in most of the energy sectors, for example, the construction of more sharper and lighter rotor blades for different power plants such as tidal and wind power plants as well as nano-coating of blades with protective layers make them corrosion resistant and much more efficient.

Furthermore, the precise nano-designing of various fabrication layers in component structures, the optimization of morphology of organic semiconductor mixtures and use of quantum dots have been done for improvising the efficiency of solar cells. [15-18]. People have already started using cost-effective and light weight solar plastics, heaters as well as energy generation equipment from sunlight which are constructed on the principles of nanotechnology. Therefore, extending the availability and usage of renewable source of energy i.e. solar energy.

At the nano scale, there is significant improvement in electrical conductivity of materials and can be employed in many ways, for example in power lines and electric cables, energy storage devices i.e. batteries, supercapacitors, nano-sensors and power-electronic components controlling and monitoring the power grids. This superior electrical conductivity is because of large surface areas regulated by nanomaterials, which allows more effective electron movement, and hence enhances the electrical conductivity and consequently boosting the computing speeds of nano-computers. Therefore, the nanotechnology has brought a revolutionary and beneficiary change in energy sector [19-22].

### **2.3. Cosmetics Industry**

Multitudinous cosmetic products with enriched quality and performance have been developed by incorporating bioactive nano-constituents of cosmetic formulation with novel nanocarriers; liposomes [23], Niosomes [24], solid lipid nanoparticles [25] nanocapsules [26], micelles [27], dendrimers [28] and metal nanoparticles [29]. Nano technological advancements in cosmetic industry has supported to develop cosmetic products with extended incense, enhanced UV protection, and better anti-aging properties. Such enriched properties are due to the utilization of nano size bioactive constituents incorporated with nanocarriers which also have facilitated the better therapeutic effect. (Lohani et al., 2014). Higher stability as well as better fit to act as active carrier constituents owing to their smaller size, have also improved the shelf life of such cosmetic products.

Many studies claim the higher penetration of such creams and beauty products into our skin. L'Oréal has developed an anti-wrinkle cream, which contains polymer nanocapsules for better delivery of active ingredients into deeper layers of skin. Modern sunscreens prepared of nanoparticles such as titanium dioxide (TiO<sub>2</sub>) and zinc oxide (ZnO), in the size range of 20 nm, showing better efficiency to prevent skin from dangerous ultraviolet rays.

### **2.4. Nanotechnology Revolutionizing the Food Science**

Nanotechnology is proven to be a boon if one talks about food science owing to the range of innovative techniques it has offered for packaging and processing of the food [30]. Nanoparticles offers synthesis techniques with changed physical features, beneficial for the food technology [30]. The nanomaterial adds to its nutritional value. The expert of nanotechnology associates with the food industries to improvise the shelf life, enhance the nutritional value as well as flavor of dietary products. Nanotechnology also facilitates the detection of toxins/pathogens/pesticides present in the food items and thus enhancing the food security with the help of sensors. Many significant achievements have been accomplished on the name on nanotechnology in the various fields of food industries majorly regarding packing and preservation of food items [31].

In addition, the encapsulation of functional food ingredients to carry, protect and deliver at particular action sites are also the concerned areas of nano technological service in food industry [32]. Food nanotechnology is a developing field which enables the food industries to advance both on the scale of quantity and quality of food. It also offers the evaluating the safety of food.

Food packing nanotechnology including nanoclays are proven to very helpful in preventing the pathogen or toxin formation and therefore ensuring the maintenance of the quality of packaged food. Additionally, the use of nanoclays has prevented the usage of antimicrobial agents such as  $TiO_2$ ,  $ZnO$ , Ag and other bio-nanoparticles. The contemporary development in food engineering has been majorly categorized in two ways—nanostructured food ingredients and food nano-sensing [33].

Furthermore, innovations in nanotechnology have considerably modified agricultural producers, food and dairy manufacturers as well as consumers [34, 35]. Table 1. Summaries the impact of nanotechnology on food science.

**Table 1.1:** Various impacts of nanotechnology ion food science.

| <b>Properties</b>         | <b>Applications</b>  |
|---------------------------|--|
| Food Processing           | • Nano-filtration  |
|                           | • Micro-encapsulation                                      |
| Food Designing            | • Micro-dispersion of water and air                        |
|                           | • Top Gastronomy   |
| Health and Well Being     | • Delivery of Bioactive components                         |
|                           | • Weight control and improved bioavailability of nutrients |
| Protection or Convenience | • Smart Packaging  |
|                           | • Improved Barriers  |
| Food Safety               | • Nano-sensors for detection of contaminants               |
|                           | • Traceability   |

## **2.5. Nanotechnology in Computing and Electronics**

Nanotechnology has the great potentiality to revolutionize the electronics industry. Much powerful and faster computers consuming less energy used nowadays, composed of circuits made from carbon nanotubes fabricated at nanoscales. Moreover, another kind of nanoparticles that are quantum dots, which are extremely small light-generating cells, have been enormously researched for their applications in lighting device and display screens. Almost millions of components can be fabricated on a single silicon chip. However, this advantage of fabricated million components on single chip may increase the risk of non-functioning of whole circuit, if even by any chance a single tiny molecule is out of position. Nanotechnology will potentially provide platform for constructing circuits with great precision at the atomic level.

## **2.6. Nanofilters for Better Water and Air Quality**

### **2.6.1. Water Filtration**

There are numerous water purifiers available within the market which use distinct techniques like chlorination, boiling, distillation, sedimentation, filtration, and oxidation. Recently, nanotechnology plays a critical role in water purification strategies. Nanotechnology is the science of manipulating atoms on a nanoscale. In nanotechnology, nano membranes are employed to introduce softening in the water and pollutants removal inclusive of physical, organic and chemical pollutants. There are kind of techniques in nanotechnology which makes use of nano particles for supplying safe drinking water with a high level of effectiveness. Commercialization of some strategies have already been done. For improved water purification or treatment tactics nanotechnology is favored. Many different types of nanomaterials or nanoparticles are utilized in water treatment methods. Nanotechnology is beneficial with reference to remediation, desalination, filtration, purification and water treatment. The primary functions that make nanoparticles powerful for water treatment are

1. More surface area and small volume i.e. higher surface to volume ratio
2. Stability and durability has been increased due to the higher surface area
3. Electrical, optical, physical, chemical, or biological features of materials are unique and unusual at the nano level



#### 4. Ease of chemical and biological reactions at nano scale

The LifeSaver bottle, Lifesaver Jerrycan, Lifesaver Cube, Nanoceram, and NanoH<sub>2</sub>O are some of the recent commercialized water purifier utilizing nanotechnology are gaining much interest in the market.

#### **2.7.2. Air Filtration**

In air filtration packages, substances which includes excessive efficiency particulate air (HEPA) filters are utilized to eliminate particulates and different contaminants from the air. The usage of nanofibers on filters can be predicted to expressively enhance their performance, with expanded filtration performance following only a moderate upward push within the pressure drop (Barhate and Ramakrishna, 2007; Qin and Wang, 2006). Certainly, maximum air filtration media are fabricated from nonwoven microfibers having a low initial filtration efficiency because of their big pore dimensions. The use of nanofibers in such filters can significantly improve the filtration of submicron particles, and the nanofibers may be incorporated in a composite or layered design (Podgórski et al., 2006) with existing microfibers to take full advantage of differently sized fibers with a purpose to achieve the excellent combination of features to efficiently trapping of nanoparticles alongside different dispersed micrometer-sized aerosol particles.

### **3. CONSIDERING DARK SIDE OF NANOTECHNOLOGY**

Nanotechnology has found innumerable applications in day to day life of humans owing to its countless benefits. It is employed in variety of products, including electronics, energy conservation, cosmetics, food, packaging, and lighting, improving air and water quality as well as majorly in healthcare. But, notwithstanding all of the virtuous benefits that nanotechnology can provide, there may be continually the possibility of constructing evil. An assessment system and quality assurance parameters has to be set up to prevent inappropriate abilities and research management. Notwithstanding the advantages and improvements that nanotechnology fetches to the world, there are nonetheless some severe disagreements approximately how significant it have to be. The potential risks and downsides of it have accordingly lately been expected over the globe. The potential at the same time as enriching the lifestyle, nanotechnology has also led to a rise in pollution, such as air and water contamination. Some research studies

claimed that several nanomaterials are toxic to algae, invertebrates and fishes to a certain extent, which even get transferred across many generations in plants and animals.

Nano pollutants is the word used for contaminants brought on via nanotechnology. For alive creatures, this form of pollutants is extraordinarily harmful. Right here, only a few drawbacks of nanotechnology are mentioned. Because of advances in science and technology, the requirement for human exertions has drastically reduced. As a result, many employed people have lost their jobs because of their tasks shifted to nanotechnology. Engineering nanotechnology has increased the abilities of machines and eliminated labor exclusive jobs, specifically within the realm of chemistry. The possibility for huge infection through the years. Inhaled nanoparticles might also accumulate inside the brain and lungs, notably raising inflammatory and stress-associated biomarkers.

They may in all likelihood have considerable negative outcomes on people's fitness in the future who utilize them as potential consumers. Atomic guns could be less complicated, and new guns will also be produced. One ability is the so-known as "smart bullet," a computer based projectile that could be directed and aimed with very high precision. Those improvements might profit the military, but in the event that they ended up within the evil hands, the consequences might be disastrous. Atomic weapons and bio guns would be less difficult, and new weapons may also be produced. The real and potential risks associated with nanotechnology raises much concern, although controlling the risks by not ignoring the potentials side effects is the way to get full benefit from the sensational technology based on nanoscience.

#### **4. CONCLUSION AND FUTURE PROSPECTS**

Medical diagnostic equipment have become more accessible, faster and accurate with aid of nanotechnology. In medicine, nano-sensors have proven phenomenal in identifying particular cells/substances in the body. The famous "Lab on a Chip" which facilitates testing in real time and accelerates the delivery of urgent medical care has only become possible due to nanotechnology. The modern implants employing the nanomaterials surfaces have replaced the conventional methods to resist various types

of infections. Plentiful of pharmaceutical products comprise of nanoparticles, which enhance their absorption rate within our bodies. The precisely engineered nano carriers are utilized to deliver chemotherapeutic drugs to adversely affected cancer cells. Besides, nanotechnology has profited massively the vehicle fuel efficiency. The automobile spare parts prepared of nanocomposites materials are sturdier, lighter and better in chemical resistance as compared to metals.

The nanotechnology not only limited to major fields like fast computing, medical diagnostics, pharmaceuticals, and automobile industry, but also extended and impacted almost every facet of human life. To illustrate, the usage of nanoparticles in textile industry has revolutionized the whole game of designing stain, water and fire resistance fabrics without compromising or even improvising its weight, thickness or stiffness.

Water filter are available in markets within the nanometre scale (15-20 nm) are highly efficient to eliminate all harmful viruses and bacteria. Thus, innovative and cost-efficient water treatment systems based on nanotechnology is enhancing the quality of portable water, also in turn contributing majorly to individual health to an appreciable level. Nanoparticles or nano-filters can clean up toxic chemical spills and air-borne pollutants and hence saving the humans from many airborne diseases.

Most of the renowned cosmetics companies are mainly researching and launching products based on suspending and encapsulating assorted ingredients into nano-spheres and nano-emulsions. Nanotechnology carry huge potential in the betterment of human life. Huge diversified chemical sensors are programmable and made available to efficiently locate a particular chemical with amazingly low traces—for instance, a single molecule can be detected out of bulk quantity. This functionality is ultimate for surveillance and safety structures at labs as well as business sites and airports. It is an innovative science and the long term effects of their influence on the environment are barely known. Therefore, we must be informed about this upcoming technology. The more people know about this new technology, the more likely the makers and concerned people will be motivated to take into consideration health and safety standards.

In conclusion, the nanotechnology require much more focused research and several domains look forward to further innovation solutions. Experts of nanotechnology have

motivated their research in almost every arena of science and technology and therefore inducted a scientific quest for the gross utilisation of nanoparticles and providing pristine opportunities to the world. Therefore, nanotechnology has great potential for a sustainable future owing to admirably improving almost every aspect of human life.

## REFERENCES

- [1] R. P. Feynman, There is plenty of room at the bottom. *Eng Sci* 23 (1960) 22-36.
- [2] K. Arivalagan, K. Ravichandran, K. Rangaswamy, R. Karthikeyan, Nanomaterials and its potential applications. *Int J Chem Technol Res* 3 (2011) 534-538.
- [3] S. Raghav, R. Painuli, D. Kuma, Multifunctional nanomaterials for multifaceted applications in the biomedical arena. *Int J Pharmacol* 13 (2017) 890-906.
- [4] D. Jain, H. K. Daima, S. Kachhwala, S. L. Kothari, Synthesis of plant-mediated silver NPs using papaya fruit extract and evaluation of their antimicrobial activities, *Dig J Nanomater Biostruct* 4 (2009) 557-563.
- [5] J. Jiang, D. R. Chen, P. Biswas, Synthesis of nanoparticles in a flame aerosol reactor with independent and strict control of their size, crystal phase and morphology. *Nanotechnology* 18 (2007) 285603-285611.
- [6] J. P. Jolivet, C. Froidefond, A. Pottier, C. Chaneac, S. Cassaignon, E. Tronc, et al. Size tailoring of oxide nanoparticles by precipitation in aqueous medium. A semiquantitative modelling. *J Mater Chem* 14 (2004) 3281-3288.
- [7] S. Bamrungsap, Z. Zhao, T. Chen, L. Wang, C. Li, T. Fu, et al. Nanotechnology in therapeutics a focus on nanoparticles as a drug delivery system. *Nanomedicine* 7 (2012) 1253-1271.
- [8] Q. Quan, Y. Zhang, Lab-on a-Tip (LOT), where nanotechnology can revolutionize fibre optics. *Nanobiomedicine* 2 (2015) 1-5.
- [9] K. K. Jain, Drug delivery systems: an overview. Humana Press, (2008) 1-50.
- [10] C. K. H. Noel, C.T. C. Tin, F. Y. H. Emily, L. T. K. Queenie, Nano targeted drug delivery system, *Univ Hong Kong*, (2015) 1-2.

- [11] Y. Zhang, H. F. Chan, K. W. Leong, Advanced materials and processing for drug delivery, the past and the future, *Adv Drug Deliv Rev* 65 (2013) 10420.
- [12] Y. H. Bae, K. Park, Targeted drug delivery to tumors, myths, reality and possibility, *J Control Rel* 153 (2011) 198205.
- [13] W. Gul, C. Wu, J. Chen, Y. Xiao, Nanotechnology in the targeted drug delivery for bone diseases and bone regeneration, *Int J Nanomed* 8 (2013) 230517.
- [14] P. A. Nelson, J. R. Owen, A high-performance supercapacitor/battery hybrid incorporating templated mesoporous electrodes, *J Electrochem Soc* 150 (2003) A131317.
- [15] T. Kyotani, N. Sonobe, A. Tomita, Formation of highly orientated graphite from polyacrylonitrile by using a two-dimensional space between montmorillonite lamellae, *Nature* 331 (1988) 3313.
- [16] N. Sonobe, T. Kyotani, A. Tomita, Formation of graphite thin film from polyfurfuryl alcohol and polyvinyl acetate carbons prepared between the lamellae of montmorillonite, *Carbon* 29 (1991) 617.
- [17] R. Ryoo, S. H. Joo, S. Jun S, Synthesis of highly ordered carbon molecular sieves via template mediated structural transformation, *J Phys Chem B* 103 (1999) 77436.
- [18] S. H. Joo, S. J. Choi, I. Oh, J. Kwak, Z. Liu, O. Terasaki, et al. Ordered nanoporous arrays of carbon supporting high dispersions of platinum nanoparticles, *Nature* 412 (2001) 16972.
- [19] Z. Li, M. Jaroniec, Colloidal imprinting, a novel approach to the synthesis of mesoporous carbons, *J Am Chem Soc* 123 (2001) 92089.
- [20] T. Kyotani, Z. Ma, A. Tomita, Template synthesis of novel porous carbons using various types of zeolites, *Carbon* 41 (2003) 14519.
- [21] J. Garcia-Martinez, T. M. Lancaster, J. Y. Ying, Synthesis and catalytic applications of self-assembled carbon nanofoams, *Adv Mater* 20 (2008) 28892.

- [22] P. Simon, Y. Gogotsi, Materials for electrochemical capacitors, *Nat Mater* 7 (2008) 84554
- [23] V. Soni, S. Chandel, P. Jain, et al., Role of liposomal drug-delivery system in cosmetics, *Nanobiomaterials in Galenic Formulations and Cosmetics*, ed A. M. Grumezescu (William Andrew Publishing)10 (2016) 93-120.
- [24] M. I. Yeh, H. C. Huang, J. H. Liaw, et al., Dermal delivery by niosomes of black tea extract as a sunscreen agent, *Int. J. Dermatol.* 52 (2013) 239-245.
- [25] E. B. Souto, and R.H. Müller, Cosmetic features and applications of lipid nanoparticles, *Int. J. Cosmet. Sci.* 30 (2008) 157–165.
- [26] V. Rosset, N. Ahmed, I. Zaanoun, B. Stella, et al., Elaboration of argan oil nanocapsules containing naproxen for cosmetic and transdermal local application *J. Colloid Sci. Biotechnol.* 1 (2012) 218-224.
- [27] M. N. Yukuyama, D. D. Ghisleni, T. J. Pinto, e al. Nanoemulsion: process selection and application in cosmetics—a review *Int. J. Cosmetic Sci.* 38 (2012) 13-24.
- [28] L. Mu, and R. L. Sprando, Application of nanotechnology in cosmetics. *Pharm. Res.* 27 (2010) 1746–1749.
- [29] P. J. Lu, S. C. Huang, Y. P. Chen, L. C. Chiueh, et al., Analysis of titanium dioxide and zinc oxide nanoparticles in cosmetics. *J. Food Drug Anal.*, 23 (2015) 587–594.
- [30] J. Weiss, P. Takhistov, D. J. Mc Clements, Functional materials in food nanotechnology, *J Food Sci* 71 (2006) 10716.
- [31] N. Duran N, P. D. Marcato, Nanobiotechnology perspectives. Role of nanotechnology in the food industry: a review, *Int J Food Sci Technol* 48 (2013) 112734.
- [32] S. Srividhya, C. Chellaram, Role of marine life in nanomedicine, *Ind J Innov Dev* 1 (2012) 313.

- [33] Q. Chaudhry, M. Scotter, J. Blackburn, B. Ross, A. Boxall, L. Castle, et al. Applications and implications of nanotechnologies for the food sector. *Food Addit Contam* 25 (2008) 24158.
- [34] C. F. Chau, S. H. Wu, G. C. Yen, The development of regulations for food nanotechnology, *Trends Food Sci Technol* 18 (2007) 26980.
- [35] T. V. Duncan, Applications of nanotechnology in food packaging and food safety, barrier materials, antimicrobials and sensors, *J Colloid Interface Sci* 363 (2011) 124.

## Chapter 2

### TECHNOLOGY AND LITERATURE: TANDEM RELATIONSHIP AND COMPLEXITIES

**Vhuyashi Das<sup>1</sup>, Partha Pratim Barua<sup>2</sup> and Shruti Jha<sup>3</sup>**

<sup>1</sup>Assistant Professor, Delhi Technical Campus, Geater Noida

<sup>2</sup>Independent Researcher, New Delhi

<sup>3</sup>Student, Delhi Technical Campus, Geater Noida

#### ABSTRACT

*The narrative of technology in today's life is indispensable. Its representation in day to day life augments a push of forward civilization, a necessary evolution which at once has its technological utopias and dystopias in literature. The impact of digital technologies on reading and learning, teaching and research practice is a necessary evil. The pendulum shift between past and present modes and influences of technology can't be negated nor its influence on different genres of literary narratives. This paper promises to read the complex relationship between technology and its narratives.*

*Keywords: Literature, technology, culture, fiction, social media*

#### 1. INTRODUCTION

##### 1.1. Life and Times of Literary Texts: Pre and Post Digitalization

"Literature adds to reality, it does not simply describe it. It enriches the necessary competencies that daily life requires and provides; and in this respect, it irrigates the deserts that our lives have already become." ~ **C.S. Lewis**, a British scholar and novelist.

Literature is an opportunity to be humane and practice humanity and developed sense of literary engagements drives the civilization forward. Literature polarizes from legal senses to historical, philosophical to literary, fiction to non-fiction, poetry to scientific. The ideological reception of literary scores is simple. To improve the mind of the man with wisdom and knowledge, an everlasting deep impact of understanding life as



mirrored by the society and otherwise. It helps understand the different facets of existence by an honest insight of moments of time in linear and non-linear propositions.

Do we even bother to realize the last time we spent with our books and by this the idea of kindle comes easily in our times? And that is just an advanced e-technology of what we are and always been habituated with – a physical book.

It is easy to understand how technology progressed and processed a way for literature to be accepted more widely and in a better way than before but how many of us are even aware of Literature writing the narratives for technology to follow?

According to **Frances F. Steen** from University of California, “Literature, then, is a technology, a set of techniques for exploiting certain relations between embodied minds, rather than a body of knowledge. Literature works. It doesn't transmit information, it acts in the psyche, moves you, plays on you like Hamlet's flute.”

Literature is a reservoir of massive knowledge and the groundbreaking developments in every field imaginable is only possible because there is a presence of tremendous technology which has been aided to relate to humans and help authenticate the virtues of helping mankind.

“Science fiction is the most important literature in the history of the world, because it's the history of ideas, the history of our civilization birthing itself. ...Science fiction is central to everything we've ever done, and people who make fun of science fiction writers don't know what they're talking about.” — **Ray Bradbury**

The development of a society is the result of a blooming literary movement, a developed society has at its roots a strong literary foundation based on human experiences of emotions and desires. An educated youth sows the seeds of development of happiness and humanity and genuineness and the country reaps the fruit in gross happiness index.

But we must also understand that literature alone can't go ahead and march further, it needs the bold confidence of technology to leap ahead in confirmed steps of true success. Both complement each other and complete too. Language connects literature with technology and it needs technology and literature both to work in tandem to

provide everything that has to be done at the right opportune because a man's lifetime is never enough to accumulate the knowledge by own and at human time-pace. An exposure to good devices of literary scopes provided by technological competence might always strive to flaunt the given strength.

## **2. POST-TRUTH IN POST-MODERN COMPLEXITIES**

During modern times as such when life has become quick and time and space cramped and compressed, technology have come to the rescue. To adapt to the quickness of the speaking, sometimes the journalistic shorthand comes short. During such moments of enabled-disability, technology comes handy with the right tools to ease the passage for comfort communication. Texting has become the indisputable way of channeling communication making it even shorter than what real literature could have afforded. We are not even talking about complex or compound sentences here but of very basic and simple sentences. Simple sentences and expressions have been compressed further. "TTYL means: Talk To You Later", "AYT means: Are You There?"

We must not have the misconception that literature cannot survive without technology but for it to advance to a wider audience and survive better too, we needs the tools and advantages of what technology have had to offer to us.

In the words of **Cleanth Brooks**, an American literary critic and professor, "...Computers are programmed by human beings..." and for that to happen in a healthy and successful manner you need a script of literature to engage with the machines; a set of programming languages which again are developed by a human using his skills of understanding of literature and language to enhance the uses of technological comforts. The desires of the people are same as before but only the etiquettes of their behavior towards the same have changed. Technology has affected the ability to understand literature in a new way. It has changed the time of engagements. From reading prints on a page has changed, for most, to reading the text on a screen, literature has changed the way it was perceived from the sensory drives. And there have been adaptations of the same in radio or play. Before it was only the senses of sight that projected the passage of literature to us, now, it has included the technological delights of auditory and visual senses too.

In this post-truth era of twenty-first century, time and space with interests have become compressed in loops of constraints. The morphological growth of literature can be traced from the technological arrival and advancements of the internet to the feature and smartphones further in the future to that of tablets, laptops and satellite and cable on-demand televisions.

It's stupid to gloss over the technological advancements and think that it has made literature what it is today. It is true that the way literature is represented to us has changed over the ages but to say the quality has increased only because of the existence of technology is exaggeration. Rather, it will be right to say that literature and technology walked in tandem to build an experience of interesting time and a possibility of rich plethora of mediums of interpreting literature. The new technology engages as a catalyst to enrich the version of literature we grew up with to have more depth and meaningful and range of audience approach. Literature have indeed flourished from its old morphology and garnered an edge that was never evident before.

Though the technological advancements are unprecedented and overwhelming, there is an emotional credibility which only the comfortable musty pages of a book assures. This connection is soul-epoch and needs a deeper psychological acceptance teamed with an understanding – so, basic and raw and genuine.

The technological advancements of cinematic adaptations changed the original order of scholastic needs. It necessitated a new branch of study which compelled a requirement of a relationship between required desire and audience. And technology became a medium of engagement, an initiation of a new relationship.

Science and technology can be made to agree be an inspiration for literature to grow in abundance of wild developments, a checked carefree. In science fiction, usually, we see the two results in copious copulation where the literary imagination meets the scientific mind to create a world of wonderful possibilities.

### **3. NOVELISTS AND NOVEL TECHNOLOGIES NOVELTIES**

Count Count Lev Nikolayevich Tolstoy was fascinated by the new modern technologies of the times including cinema and celluloid unusual daguerreotype cameras.

"You will see that this little clicking contraption with the revolving handle will make a revolution in our life-in the life of writers. It is a direct attack on the old methods of literary art. We shall have to adapt ourselves to the shadowy screen and to the cold machine. A new form of writing will be necessary. I have thought of that and I can feel what is coming."

The reflection of mores and ideas developed an inherent core of depth in itself and got willfully tangled in the coaxed arms of logic when technology brought scientific temperament into play. And evidently, the pre-scientific religious beliefs and philosophies mated with the post-scientific human intelligence to build up mankind's rich literary heritage.

Literature has an inherent nostalgia about it. As Julia Powell, a celebrity chef, points out how the weightiness and the awkwardness of some books bring alive the "personal touch" of literature in virgin territory and even a purple stain is welcoming for her. E-books and iPad will never provide those luxuries.

#### **4. TECHNOLOGY EXPOSED INTROVERT LITERATURE**

Technology has helped Literature bloom in opulence [1]. Technology has a grab on literature in a way that has also impacted other august fields of desired utilities. Society and culture have seen an increased craving for different desires and forms of literature. Conversations have become rich with rich literary influences and aided by technology the acquired methods have become easier to imagine.

There opened a flood-gate of easy access of literature like never before and in varied conditions of forms. The shyness of anonymity that had some hidden from the wider public gaze has shattered. Literature has become a focal point of discussion in technological mediums such as twitter, facebook, booktube- all of these unique and at one time, unimaginable wonders and marvels of modern technological boon. The tie with the internet has broken down the regional as well as international boundaries of non-cooperation. The writer became closer to its readers and the readers at times become the master of the narration of the readers. The literature as a writer's sole work has changed a huge shift, a unique one at that.

New avenues of literary developments sprung from technological mitigations in forms of elitist “literary art” realm and other literary causations such as photographic realism could see the light of the day only because of the presence of technological advantages of the times. And with technological developments of cinematic expressions literature jumped into forms of technical outpourings of rhetoric prestidigitation. The stimulation one used to get from reading literature developed into multiple sensed stimulants’ which further helped literature come alive in the form of cinematic expressions and thus develop a wonderful reader’s relocation from literature to technological renderings and back again. And the magic became interdependent.

## **5. A CONJOINED RELATIONSHIP**

Modern adaptations of literature into forms of script for plays or movies are a wonderful example of how technology and literature have become interdependent [2]. But it is important to know and realize that no amount of bad literature or any compromise of it can enhance any chanced kind of technological productions of it. Literature must not be taken in lighter vein. It was important and it is, even now, an important medium of interaction for humans. New technologies have imbibed new methods and tools to peer a connection with literature and vice versa.

American poet **Frederick Seidel** during his interview with the Paris Review mentioned how his modes of producing and enhancing his literature became a beautiful instance. He mentioned, "The computer was enormous and filled the room but it had such a tiny screen. I typed out the beginning of my poem *Homage to Cicero* and was hooked then and there. What hooked me was the way you could instantly change the shape of the stanza, the length of the line. It was the instantly part that got me." Marveling and agreeing at the ease of juxtaposing his love for literature with that of technological know-how’s. It made his indexing easy, saving easier, copying and pasting and all other essential parts of putting his works together better. He was amused by the wonderful organisation to that of shaping sentences where there are visible traces of flexibility; paragraphs promises an easy switch too, the lacunae of working with a typewriter are somehow missing as there seems to be a wonderful advance of technological improvements. And writers swear by this honesty in their work as reflected.

No matter science and technology profoundly affected the production and reception of literature. Technology is a major player in this connection. There is a great fear taking the wider impact of technology on written literature. The question is being asked, why we should continue with the current form of literature. Rapidly growing influence of technology has altered the way in which we live and think.

## **6. TECHNOLOGY: BOON OR BOOM**

Technology has scribbled a passionate intimacy for itself with literature and together they have played a major role in connecting a unique bond of reception, which can be received by multiple ways of modes [3, 4]. Though there is always a fear that technology might harm literature and sadly, that has been true too. In a way Technology has developed the idea of instant gratification for the people and that has harmed the traditional modes of developing and presenting literature. In the very popular social media like Facebook, there has erupted not of late but surely a evolved child of Post-modern literature, a form of literature. How serious is the medium of Facebook as a literary modes of expression is what still needs to be taken into serious discussion but nevertheless, there has erupted a mini-version of few lines literary stories. Famously called – **“Terribly Tiny Tales”** – these very mini-versions of a one line story promises to give instant gratification. The consumption time of such pieces from the moment the writer or the author, for that matter, publishes it in the online media it gets to its accorded reader instantly. Whether the readers respond to it instantly or not is something their interest in the piece invested says.

Another social media platform, Twitter, which is professed to be the hybrid of the oral and literature. The scary predicament is that platforms such as twitter and facebook does away with the real literate soul of a literature. Both experiences promises a healthy vocabulary interface but somehow the seriousness of the real dynamics at play as opposed to a old world literature medium is sadly missing. Social-media is a continuation of a bygone rich oral era but it doesn't match up to the charm of the former. In the public sphere, the oral psychodynamics doesn't hold the strength and the conviction that it needs to be enriched.

Twitter-rides via web advocating literary sense is killing true literature [5]. The quality of a work nowadays depends on the demand for the desire. And the low-quality of the types of the demand hardly augments a positive herald for any writer, mint or broken. Traditional methods of writing at length are an entirely different world, altogether [6, 7]. It has a rich modality of thought at process and it advocates for a unique kind of enriched discourses and its exchanges. The resettlement of such ideas that is developed when taken this laborious method is what makes technology a useful entity otherwise; Twitterverse is actually a frustrating byproduct for real literature lovers who don't want to compromise on their technological benefits too. As media theorist and cultural critic, **Neil Postman** said, "...writing and the spread of the printed word through literacy and the printing press created a culture in which it is possible to debate ideas at length and produce analytic thought which can be produced, advanced, discussed, refuted, rejected, improved and otherwise churned through the public sphere..."

Technological appreciation is only possible when it helps than curbs the power of associates.

## 7. CONCLUSION

Science fiction writers, sci-fi authors and culture creators have created avenues of possible dreams where they imagine the future in terms of technological advancements. From stratosphere towers they were once dreams to aeroplane and submarines which were once in imagines pages of fiction only. Fiction gave way to action and with the advancements of technologies it became possible. To call science fiction as facile views in prose will be an insult because history has proved that otherwise.

This article is written keeping in sight the attitudes of people belonging to purely technical world have for literature. They consider it as an alien minority segment and not related with what they have had to engage with in their relational work in daily basis.

## REFERENCES

- [1] Scholz, R. T. (Ed.). Learning Through Digital Media: Experiments in Technology and Pedagogy. [https://clalliance.org/wpcontent/uploads/files/Learning\\_Through\\_Digital\\_Media.pdf](https://clalliance.org/wpcontent/uploads/files/Learning_Through_Digital_Media.pdf).
- [2] Gunn, E. (2014, May). How America's Leading Science Fiction Authors Are Shaping your future.
- [3] Heilbron, J. L. (2012, September 7). The literary and scientific Galileo.
- [4] Bakker, R. S. (2011). The Future of Literature in the Age of Information. <https://rsbakker.wordpress.com/essay-archive/the-future-of-literature-in-the-age-of-information/>
- [5] <https://people.rit.edu/vvrsp/Essays/SciLit.htm>.
- [6] Hallström, J. (2022). Embodying the past, designing the future: technological determinism reconsidered in technology education. *International Journal of Technology and Design Education*, 32, 17-31. <https://doi.org/10.1007/s10798-020-09600-2>
- [7] Luckhurst, R. (2016). Modern literatures and technology. May 25, 2016, <https://www.bl.uk/20th-century-literature/articles/modern-literature-and-technology>



## Chapter 3

### DESIGN IMPACT OF SOCIAL MEDIA ON INDIAN YOUTH

Meghana Sharma<sup>1\*</sup> and Danish<sup>2</sup>

<sup>1</sup>Associate Professor and <sup>2</sup>Student, Delhi Technical Campus, Greater Noida, India

#### ABSTRACT

*The impact of social media on youth creates new challenges and opportunities. The article is based on findings from various reports, discussions on social forums, documentaries, and interactions with youth from different walks of life. Social networking sites provide a platform to discuss burning issues that have been overlooked in today's scenario. Social media benefits youth in education, social media worsens social norms and social media negatively affects youth studies. Social media promotes unethical images, video clips and images among youth and anti-religious posts and links create hatred among people from different communities, negative use of social media worsens relations between countries, and social media plays a key role in creating political awareness among youth. Social media is the newest form of media and has many functions and features. It has many features on the same channel, such as communication, text messaging, image sharing, audio and video sharing, quick publishing, worldwide connectivity, and direct connection. it is also the cheapest fast access to the world, so it is very important for all age groups. Its use is increasing at a high rate every day all over the world, and that is why depending on the type of social media use, it can bring a very positive or a seriously negative impact on society.*

*Keywords: Indian youth, Communication, Social-media, Education, Connectivity.*

#### 1. INTRODUCTION

Social media has become an important and integral part of society and the young population in general. Today's youth are the biggest consumers of social media, and this is the group that has fueled the rapid growth of social media around the world. The excessive use of social media to the point of addiction has sparked a debate in society about whether social media is a tool that helps improve the health of society by

connecting people without any conditions or boundaries, or whether it has become a tool that is corrupting our generation [1-3]. different ways. In this article, we will touch on various aspects of social media and how it affects our society and youth. Like any technological tool, social media has its advantages and disadvantages, a lot depends on how it is used. Some of them have made massive careers as influencers, vloggers, or simply content creators. It's no wonder social media organizations are some of the biggest in the world. But some have used it to waste time, get influenced by wrongdoing, and spoil their future. Let's start by touching on the positive effects of social media on youth.

## **2. POSITIVE EFFECTS OF SOCIAL MEDIA ON INDIAN YOUTH**

### **2.1 Stay Updated and Connected to the World**

Social media has empowered people by making information available to everyone. News, good or bad, goes viral within minutes. Social media has helped fuel many protests and actions for noble causes, the Arab Spring is a classic example of how social media connected the youth of Arab countries to overthrow dictatorial regimes and establish the rule of democracy. Even in our country, the case of Nirbhaya or Black Lives Matter in the USA helped to change people's thinking thanks to social media. There are tools like Facebook "Mark yourself safe" which will update all your contacts in case of any natural disasters within seconds. News spreads quickly using Twitter and similar platforms where people are updated on events in real-time and has information on who and where to contact in case of accidents. In this way, social media will come to the aid of society by uniting it and providing it with information to act quickly [4].

### **2.2. Find new Friends, Communities, and Like-Minded Groups**

Social media has succeeded in breaking down all geographical and cultural social boundaries, allowing users to make friends beyond their physical reach. This has helped people with similar interests come together to do creative things, build great companies, or just have a friendship for good times. People who are shy or introverted in the physical world find solace in the virtual world, happy to connect without prejudice. They feel valued and their opinion is understood by like-minded peers. A great example is the LGBTQ community, which has managed to develop an ecosystem of like-minded

people through social media, a community otherwise looked down upon by society. Similarly, scientists, doctors, entertainers, and others have come together to make amazing projects.

### **2.3. Construction Business. (Promoting Sales, Improving Customer Experience).**

Social media is widely used these days and helps in business management. Social media can target very specific customers through its technology and can provide data to businesses. Businesses in turn use this to create targeted marketing plans. The power of social media is that it allows businesses to create tailored sales propositions on an individual level. Various new ways of marketing have evolved through social media, such as the use of influencers, vloggers, paid promotions on popular YouTube channels, and sponsorship of certain content on social media [5]. The role of social media the importance of media in marketing is not to limit the brand to purchases, sales, revenue generation, and brand promotion. It also enriches the customer journey. How does this all happen? Today's marketers are thinking from a broader perspective. Getting the customer to complete the purchase is a thoughtful and valuable task. But to get a customer his elf is smarter than others. Many marketers now believe in letting their customers experience their brand. Social media webinars and social media blogs are defining new social marketing standards for all digital marketers [6]. The role of social media in marketing is to help brands really enrich their customer experience.

### **2.4 Help with Learning and Training**

Social media has proven to be a boon to the education sector. Social media has the power to empower people who have otherwise been deprived of the knowledge and content necessary for their success and growth. There are many educational channels, article content available for free on social media, and possibly thousands of hours of content available to help people prepare for competitive exams, do research work or simply help with distance learning. This came to the rescue of students during covid times when everything was under lockdown, content creators were able to keep things moving by uploading their study materials on social media sites. This benefited the students and they were able to keep up with the learning process even during the lockdown. A great example is that schools have been able to move quickly to online

courses using tools like google meet and Zoom etc. This has advanced the learning process even in covid times.

### **2.5. Encourages Creativity**

Social media has given new and emerging artists platforms that no other platform has been able to in the past. Because it's free for everyone, anyone with a creative idea can become popular and successful. Today, there are thousands of content creators posting interesting content every day, which was unheard of in the past. Most of the time, it's free for creators, so creators can spread their ideas freely to a very diverse audience without risk. Just imagine if you were a good singer in the past, you might have to find a music director and a record label to then convince hundreds of people to release your work, and in most cases, it's too much to pay to reach your first audience. listen to your songs. In the age of social media, if your content is good, you can post it on YouTube or Facebook for free and the response, good or bad, is immediate. We all know that people have become stars after their work went viral on social media, whether they were singers, dancing comedians, amateur chefs, or simply technicians [7].

### **2.6. Entertainment in your Pocket**

In the age of social media, your phone or tablet has become your entertainment companion on the go. Now there is no need to wait for newspapers or television to know what is happening in the world. Just refresh your Twitter feed and you have all the latest news with you. Likewise, you don't have to be glued to the TV to watch your favorite shows at a certain time. With YouTube in hand, you can watch your favorite shows anywhere, anytime. There is no need to download songs or videos anymore, and thanks to the internet available today even on airplanes, you can access your entertainment anytime, anywhere. It's a great tool to pass the time when you're traveling, waiting in line, or just relaxing outside.

### **2.7. Ensures Better Engagement**

You can find a button called “share” on any social media platform. Social networking sites give everyone the ability to share informative content, articles, or videos with everyone. It helps everyone in the world to reach teachers, trainers, and all professionals without facing any difficulty.

## **2.8. Increases Communication Speed**

With the introduction of social media in today's world, we don't feel the need for snail mail, telegrams, etc. to convey messages from one place to another. Just click and the message will be sent to the person you wanted to send it to. When there is breaking news, social media can help a company get the attention of the person they want to have close contact.

## **2.9. Builds Aroductive Aocial Relationships**

Many people find it easier to communicate online than in person. By chatting with anyone virtually, you get to know more about them and it helps build credibility. It also gives the feeling that distance is just a word. Social media helps people who want to stay in touch with their old friends just a click away. This creates a remarkable positive effect of social media.

## **2.10. Teachers and Students have Benefited Greatly from Social Media**

Nowadays, one can easily get knowledge from many reputed professionals and experts from various social media platforms. You can follow and subscribe to each of the experts and view their videos to expand your knowledge. It doesn't matter what education you have, you have an obligation to acquire different knowledge without paying for it.

## **2.11. People Can Realize Potential**

One of the other important positive effects of social media is that it helps people realize their potential.. Who does not know the famous singer Justin Bieber? But one thing most of us don't know is that the singer was first discovered on YouTube. Social media has helped identify many emerging artists, singers, dancers, and other talents.

## **2.12. Improves Writing Skills**

Many students' writing skills are still not up to par. Students nowadays are very poor at writing essays or academic papers. Thus, blogging is an efficient and technological solution where students can write their own thoughts without the fear of being severely graded. By starting a blog, a student can improve both his writing and analytical skills.

### **2.13. Assists in Academic Performance**

Nowadays, many academic sections of any educational institution have their own social media group and account through which they can exchange important information related to their studies. For teamwork, social media is one of the easiest platforms. For example.

If you are tasked with doing research on a certain topic with a group, it is easier to do it through virtual meetings than by meeting in person [8-10]. Classmates/groups can communicate with each other for the purpose of studying through social networks. Teachers can use social media platforms to participate in and communicate any changes in the curriculum, share lectures online, and get feedback from students.

## **3. NEGATIVE EFFECTS OF SOCIAL MEDIA ON INDIAN YOUTH**

Like any other technology, social media has its fair share of negative impacts on society. Excessive use of social media by young people presents new challenges, limits their productivity, creates a gap in society spreads misinformation, and also poses health problems.

### **3.1. Social Media is Addictive**

One of the biggest concerns about using social media is that it can become addictive to the point of being dangerous. The amount of unproductive time youth spend on social media is becoming a pandemic in society. This time could otherwise be used for something productive, such as sports, research, exploring the "physical world" or simply building relationships. This addiction can lead to other physical and mental problems that are very damaging to the overall well-being of the youth in the long run.

### **3.2. Leads to Depression and Anxiety**

Spending too much time on social media can adversely affect your mood. Chronic social users are more likely to report poor mental health, including symptoms of anxiety and depression. It doesn't take much thinking to see why. Social media allows you to see the carefully selected best parts of everyone else's life, which you then compare to the negatives in your own life (which only you can see). Comparing yourself to other people is a sure path to anxiety and unhappiness, and social media makes it a lot easier.

### **3.3. Unhealthy Sleep Patterns**

Apart from increasing cases of anxiety and depression, another bad thing about social media is that you spend too much time on it, which can lead to poor sleep. Numerous studies have shown that increased use of social networks worsens the quality of your sleep. If you feel like your sleep patterns are erratic, leading to a drop in productivity, try reducing the amount of time you spend on social media. This is especially true when using your phone in bed at night. It's all too easy to tell yourself you're going to spend five minutes checking your Facebook notifications, only to realize an hour later that you've been mindlessly scrolling through some Twitter nonsense you don't even care about.

### **3.4. Fear of Missing Out (Fomo)**

Fear of Missing Out (FOMO) is a phenomenon that became prominent around the same time as the rise of social media. Unsurprisingly, this is one of the most widespread negative impacts of social media on society. FOMO is exactly what it sounds like a form of anxiety you get when you fear missing out on a positive experience someone else is having. For example, you can constantly check your messages to see if anyone has invited you, or focus on your Instagram all day to make sure no one is doing something cool without you. You may also see pictures of something fun your friends might have done and feel like you can't go because you have other responsibilities [11].

### **3.5. Sets Unrealistic Expectations**

Social media leads to setting unrealistic expectations in our minds about life. Most social media sites have a serious lack of online authenticity. People use Snapchat to share their exciting adventures, post on Facebook how much they love their significant other, and load their Instagram page with heavily staged photos. But you really have no way of knowing if it's all a hoax. Even if it looks great on the outside, this person could be in deep debt, on bad terms with their significant other, and just desperate for Instagram likes as a form of validation.

### **3.6. Negative Body Image**

Speaking of Instagram celebrities, if you look at popular Instagram accounts, you will find incredibly beautiful people wearing expensive clothes on their perfectly sculpted

bodies. And to no one's surprise, body image is now a problem for almost everyone. Of course, when you see so many supposedly perfect people (by society's standards) on a daily basis, you realize how different you are from those images. And not everyone will come to healthy conclusions in this situation. It's really important to remember that everyone is human. No one wakes up every day looking like a supermodel, and while many people put a lot of effort into working out their bodies, that's not the case for everyone who looks fit. Many people have taken unhealthy paths to appear more attractive in their quest for social media fame.

### **3.7. Insulation**

A study at the University of Pennsylvania found that heavy use of Facebook, Snapchat, and Instagram increased rather than decreased feelings of loneliness. Conversely, the study found that by reducing your use of social media, you can feel less lonely and isolated and improve your overall well-being.

### **3.8. Cyberbullying**

Bullying used to only be possible in person, but now it's possible to bully others on social media - anonymously or not. Cyberbullying is already known today and most of us have seen what it can do to a person. While social media makes it easier to meet new people and make friends, it also allows people [12] with little empathy or consideration for others to inflict emotional pain. Bullies can use the anonymity that (some) social networks provide to gain people's trust and then hurt them in front of their peers. For example, they may create a fake profile and act friendly to a classmate, only to later publicly embarrass and humiliate them online.

### **3.9. Self-Absorption**

Sharing endless selfies and all of your innermost thoughts on social media can create unhealthy self-centeredness and distance you from real-life connections.

### **3.10. Reduces Face-To-Face Interaction**

When you're on social media more often, you're not only spending less quality time with the people who are physically present in your life, but you'll quickly resent them when you're mindlessly scrolling through social media platforms instead of paying attention to them. Social media can be great for finding support when you're unable to interact face-



to-face with the people around you, but being physically present with someone offers a level of comfort and support that social media will never be able to compete with. When talking to someone face-to-face, non-verbal cues are just as important as what we say. In social networks, non-verbal cues are eliminated, which complicates communication and causes misunderstandings, even between best friends.

### **3.11. Distracts From Life Goals**

It's so easy to get caught up in what's happening on social media that people neglect their real-life goals. Instead of pursuing a dream job by acquiring useful skills, people tend to pursue internet stardom. Achieving your goals requires hard work and a good dose of motivation. Social media provides an easy path that can distract us when we don't feel like working hard, and we can end up on a path where we just don't get things done because it's too easy to find distractions [13].

### **3.12. They Spread False News that Could Lead to Hatred and Violence**

One of the evils of social media is that it becomes a medium for spreading fake news at lightning speed. There are many cases where social media has helped spread fake news leading to violence on college campuses. Hatred is widespread on social media and young people identify with one identity or another and then start hating people of other ideologies. There is no effective way to identify the authenticity of the content on social media and if it is not there is a high chance that anti-social elements can manipulate the minds of the youth and influence them to do bad things.

## **4. CONCLUSION**

Social media is used well and in a controlled way can be of great benefit to the youth, but the negative aspects associated with it are causing concern in society and currently, the only way to control it is through educating the youth to self-discipline when using social media. and use it for self-improvement and creativity improvement rather than killing your precious time with unproductive things.

## **REFERENCES**

- [1] "Impact of Social Media on Adolescent Behavioural Health in California." Impact of social media on Adolescent Behavioural Health in California | National Clearinghouse on Families & Youth. N.p., 2011. Web. 20 Feb. 2017.

- [2] Bhasin H, CEO Marketing 91, <https://www.marketing91.com/the-positive-impacts-of-social-media/> Aug 23, 2020.
- [3] Mohapatra D, <https://educationasia.in/article/6-ways-social-media-is-affecting-students-positively> , Sep 24, 2019
- [4] <https://mbaroi.in/blog/impact-of-social-media-on-youth/>.
- [5] Prajapati V, The Negative Effects of social media On Teenagers, Youth, or Adolescents, Mar 10, 2017
- [6] Asmelash L, <https://www.cnn.com/2019/08/13/health/social-media-mental-health-trnd/index.html>, Aug 14, 2019
- [7] Walton A, <https://www.forbes.com/sites/alicegwalton/2018/11/16/new-research-shows-just-how-bad-social-media-can-be-for-mental-health/#77df47e87af4>
- [8] Rettner R, <https://www.livescience.com/62718-social-media-habits-depression.html> , June 1, 2018.
- [9] Stegner B, <https://www.makeuseof.com/tag/negative-effects-social-media/> July 29,2022
- [10] Hunt, Melissa G., Rachel Marx, Courtney Lipson, and Jordyn Young. “No More FOMO: Limiting Social Media Decreases Loneliness and Depression.” *Journal of Social and Clinical Psychology* 37, no. 10 (December 2018): 751–68. <https://doi.org/10.1521/jscp.2018.37.10.751>
- [11] Riehm, Kira E., Kenneth A. Feder, Kayla N. Tormohlen, Rosa M. Crum, Andrea S. Young, Kerry M. Green, Lauren R. Pacek, Lareina N. La Flair, and Ramin Mojtabai. “Associations Between Time Spent Using Social Media and Internalizing and Externalizing Problems Among US Youth.” *JAMA Psychiatry* 76, no. 12 (December 1, 2019): 1266. <https://doi.org/10.1001/jamapsychiatry.2019.2325>
- [12] Anderson, Monica. (2018, September 27). A majority of teens have been the target of cyberbullying, with name-calling and rumor-spreading being the most common forms of harassment. Pew Research Center: Internet, Science & Tech. [https://www.pewresearch.org/internet/wp-content/uploads/sites/9/2018/09/PI\\_2018.09.27\\_teens-and-cyberbullying\\_0-01.png](https://www.pewresearch.org/internet/wp-content/uploads/sites/9/2018/09/PI_2018.09.27_teens-and-cyberbullying_0-01.png)

- [13] Kross, Ethan, Philippe Verduyn, Emre Demiralp, Jiyoung Park, David Seungjae Lee, Natalie Lin, Holly Shablack, John Jonides, and Oscar Ybarra. "Facebook Use Predicts Declines in Subjective Well-Being in Young Adults." PLOS ONE 8, no. 8 (August 14, 2013): e69841. <https://doi.org/10.1371/journal.pone.0069841>

## Chapter 4

### E-WASTE & THEIR MANAGEMENT

Malvika Chaudhary<sup>1\*</sup> and Sheetal Kashyap<sup>2</sup>

<sup>1</sup>Associate Professor and <sup>2</sup>Student, Delhi Technical Campus, Greater, India

#### ABSTRACT

*With the rapid development of information & technology, electronics & communication E-Waste is the fastest-growing pollution in the world. Many developed & underdeveloped countries are facing this problem due to the increased use of electronic devices in the both IT sector & domestic level<sup>[1]</sup>. E-waste also affects the economy of any country as most of the electronic products contain many valuable metals like platinum, bismuth, silver, gold, copper & other rectifiable materials that instead of being rescued for treatment and reuse, were primarily burned or discarded.*

*Keywords: E-waste, electronic device, rectifiable materials.*

#### 1. INTRODUCTION

According to the global E-Waste monitor report 2020 published by the United Nations Environment Programme (UNEP) in 2019 around 53.6 million metric tons of E-waste were produced worldwide [1, 2].

This report also figures out that global electronics waste – outmoded goods like VCRs, tape recorders, and mobile chargers – will reach 74 Mt by 2030, almost a doubling of e-waste in just 16 years. This results from e-waste being the world’s fastest-growing domestic waste tributary, the equipment is upgraded frequently, and the cost of repair is more than the purchase price because there are few resources available [3]. This is the reason for to increase in consumerism in the electronics & communications sectors, people give preference to purchasing new devices in spite to repair.

**“E-waste includes electric & electronic devices & gadgets that are unwanted & unusable”**. This applies to both functional and damaged things that are discarded in the trash or given to a charity retailer like Goodwill. The item will frequently be thrown away if it is unsold at the store. E-waste is particularly hazardous because it contains

poisonous compounds that, when buried, naturally leach from the metals inside. “Digital rubbish,” a consensus formed around the simple word “e-waste.”

Due to the fact that e-waste contains both valuable materials and metals as well as hazardous and toxic compounds, it is both a problem and a huge business prospect

According to Wildmer (2005), around 60% of electronic items contain metals like gold, iron, copper, etc., while 2.80% contain additional harmful contaminants (Widmera, et al., 2005). Recovery of these metals will decrease the need for heavy metal mining and the greenhouse gas emissions associated with the production of new products (Cifani, 2017). Therefore, handling e-waste is essential for obtaining these valuable materials as well as from an environmental standpoint. Both developed and underdeveloped countries struggle with managing e-waste [4-9].

E-waste is very dangerous to the environment & human health also as it enters the food chain & destroyed the environmental harmonies due to the presence of toxic metals, additives, or hazardous substances such as mercury, lead which lead to the Minamata diseases & in the human brain and/or coordination system.

According to research by The Associated Chambers of Commerce and Industry of India (ASSOCHAM), 80% of Indian workers who handle e-waste have respiratory problems like breathing issues, irritation, coughing, and choking because of inadequate safety measures [10]. Workers and children are typically among those who are most frequently exposed to harmful gases since they lack protective facemasks and have bare hands. Lead, mercury, and cadmium are released into the air when toner cartridges, motherboards, and tube lights are burned on open flames.

In India, the daily production of municipal solid garbage reaches 1,60,000 Metric Tons (MT). Depending on the population density, cities generate between 0.2 kg and 0.6 kilograms of garbage per person every day. According to estimates, this will rise by 1.33 percent annually. In total, around 260 million tons of trash will be produced yearly by 2047. More than 1,400 km<sup>2</sup> of land, or the size of Delhi, would reportedly be needed in the nation by the year 2047 for the generation of waste if it is not disposed of in a more organized and scientific manner.

An estimated 100 million tons of non-hazardous solid waste are produced annually by India's industrial sector, with more than 70 million tons coming only from thermal power plants' coal ash. In India, hazardous waste is produced at a rate of about 8 million tons annually; of this amount, it is believed that 4.8 million tons are recyclable and the other 3.2 million tons are not. In India, 1.5% of all electronic trash is recycled through formal channels or through institutional processing and recycling, while the remaining 8% is deemed useless and ends up in landfills [4].

Examples of E-waste items: - Desktop computers & their monitor, CPU, cathode-ray tube, Microwave Smartphones, and Cell phones .Laptop. Circuit boards, Mobile charger, DVDs. Video games, Stereo systems, Fax machines, Printers, Landline phones, etc. The report states that Asia produced the most electronic garbage in 2019 (24.9 Mt), the Americas (13.1 Mt), and Europe (12 Mt) were in second & third position respectively.

## 2. E-WASTE PRODUCTION IN INDIA

With the high demand for the latest technologies, advanced equipment & day to day increasing consumption of electrical & electronic devices, India also comes in the queue of a highly e-waste-generated country. In India, there is a shortage of proper management & recycling processes used for E-Waste [5]. In the past 12 years, e-waste become a major problem. In the major cities of India, the production of e-waste is increasing daily by a contribution of 70% of discarded computers & 12 % from telecommunication. Some cities with e-waste generation are listed below.

**Table 4.1.** Annual e-waste generation in main cities of India

| Country   | E-Waste Generation (Annually) MT |
|-----------|----------------------------------|
| Mumbai    | 1, 20,000metric tones            |
| Delhi     | 98,000                           |
| Bengaluru | 92,000                           |
| Chennai   | 67,000                           |
| Kolkata   | 55,000                           |

### **3. E-WASTE MANAGEMENT ACT 2016**

Over 1.85 million tonnes of electronic waste were disposed of in India, or nearly 12 percent of the total quantity created globally. India is currently the fifth-largest producer of electronic waste globally. Computer equipment makes up over 70% of all electronic trash, with the telecom industry providing 12%, the healthcare profession 8%, and the power industry 7%. Only 16% of e-waste comes from individual households, with the majority coming from the government, public sector organizations, and private sector corporations. Mumbai, New Delhi, Bangalore, and Chennai are the cities that produce the most electronic waste.

The top three Asian nations with the highest absolute levels of e-waste creation are China (6.1 Mt), Japan (2.2 Mt), and India (1.8 Mt), according to a collaborative paper titled "Rethinking Waste- Scaling Opportunity in India," which was published on September 15, 2017.

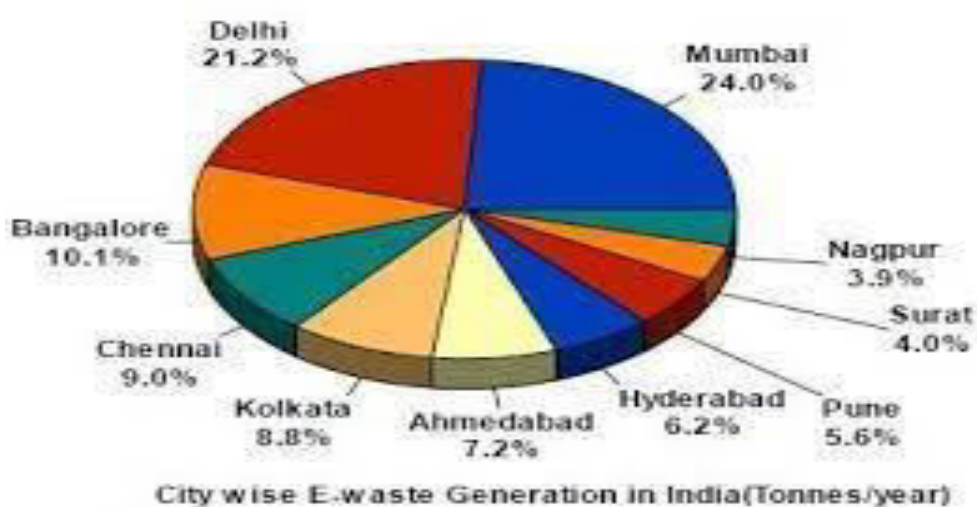
### **4. GENERATION OF E-WASTE**

E-waste is produced in India from different sources, including the institutional, manufacturing, residential, public, and private sectors. The household contributes 15%, while the government and private sectors account for 70%. Computers and their parts make up 68 % of t Mobile phones came in second with 12%, electrical equipment third with 8%, medical equipment fourth with 7%, and domestic e-waste fifth with 3%.

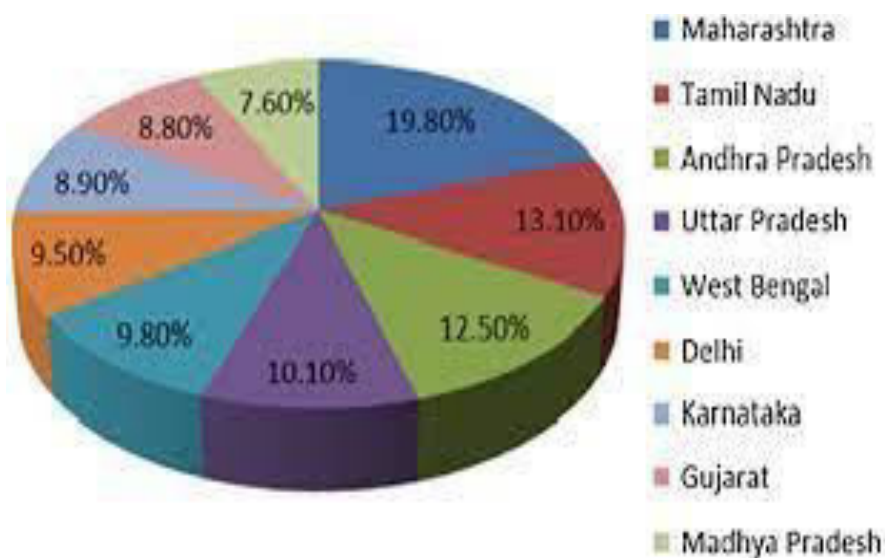
- **Domestic Area:** - household appliances like microwave, washing machine , electrical press ,mixer grinder ,LEDs ,dishwasher,microwave etc.
- **Telecommunications Equipment:** - Mobile phones ,Desktop ,laptops ,printer ,scanner ,photocopy machines etc.
- LEDS & fluorescent lights.
- **Gym Equipment:-**Tread mills, cardio exercise machine.
- Electronic toys cars & other toys operated by batteries.

**Table. 4.2.** Generation of e-waste by various electronic equipment

| Electronic equipment  | Generated e-Waste |
|-----------------------|-------------------|
| Computer Equipment    | 68%               |
| Telecom Communication | 12%               |
| Electrical equipment  | 8%                |
| Medical equipment     | 7%                |
| Domestic e-waste      | 3%                |



**Figure 4.1.** City-wise e-waste generation in India



**Figure 4.2.** State-wise e-waste generation in India



## 5. EFFECT OF E-WASTE ON ENVIRONMENT & HUMAN HEALTH

### 5.1. Impact of Toxic Metals on Our Body Enzymes

Enzymes are biological catalyst with much different protein molecules which is required for the smooth functioning of our body as our body is composed of many different cells, tissue & organs, some of them released different types of chemicals to speed up the many biological process & chemical reactions in our body. Enzymes play a vital role in many processes like respiration, digestion & metabolism, etc.[6] Heavy metals distract the working of enzymes by forming the complex with the active site of the enzymes, by this modification enzymes unable to function properly which leads to the breakdown of that particular cell or tissue. Some toxic metals may replace the similar central metal of enzymes, Ex. Sulfhydryl(-SH) is replaced by Arsenic metal from pyruvate & succinate oxidation pathways.

Hazardous and toxic compounds such as lead (Pb) and cadmium (Cd) are used in printed circuit boards (PCBs). The primary sources of lead are found in all electrical components and goods, including cathode ray tubes (CRT). Cadmium is present in monitors and CRTs, while mercury may be present in switches and flat-screen displays. Mercury is also included in CFLs, relays, and a number of other specific products. Cadmium is utilized in computer batteries in addition to plating metal components. Polychlorinated biphenyls are present in capacitors, transformers, circuit boards, plastic casings, cable, insulation for PVC cable, and PBD/PBDE in plastic electronics components [7].

**Table 4.3:** Harmful matter release by different equipment

| Metals  | Used in equipment                                 | Adverse Health Effect   |
|---------|---|---|
| Lead    | To attach PCB & another electronic device         | May have an impact on a number of body functions, including the reproductive, central, and peripheral neurological systems. |
| Mercury | Batteries, switch/housing & printed wiring board. | Harm the peripheral nerve system and the genitourinary system.  |

|  |                                      |  |
|--|--------------------------------------|--|
| Cadmium                                | infrared detectors & semi-conductors | The human body accumulates toxins from the cadmium complex, mainly in the kidneys. |
| plastics including poly vinyl chloride | Circuit board & wires                | It harms the immune system and affects reproductive and developmental disorders.   |

### 5.2. Leeching Poisons Nearby Water

These items are also dangerous for human health, the atmosphere, animals, water & air. as many of them contain many harmful metals which will be harmful to human beings & environment. Through the process of landfill trace of toxic metals leaches into the soil & groundwater leading to the disturbance in the ecological food chain.

As the traces of toxic materials increase in the groundwater the contamination of freshwater also increases in the nearby water bodies.

### 5.3. Information Theft Caused by E-Waste

Perhaps you've heard that important documents, serial numbers, and other data need to be destroyed before being thrown away. You are surely aware that this is being done to prevent identity theft and unauthorized credit card applications. A laptop or phone can be thrown out or donated similarly.

The hard disc in your computer or the memory card in your cellphone is a big liability for both people and businesses. Simply plugging it into a new computer is all that is required. There are numerous disposal techniques, however, most of them aren't ideal. Your electronics must physically be destroyed or disassembled to be destroyed.

### 5.4. Pollution by E-Waste

**(i) Air Pollution:** - The most frequent impact of e-waste on the atmosphere is air pollution. Burning electronic waste can cause the emission of hydrocarbons into the environment, causing air pollution.

**(ii) Soil Pollution:** -E-waste could have an adverse effect on the soil. As e-waste breaks down, dangerous heavy metals are discharged. Adverse metals including cadmium, lead, and arsenic is among them. When these chemicals get into the soil, they affect

plants and trees. As a result, these chemicals may end up in people's food supplies, which could lead to a number of health problems, including birth defects.

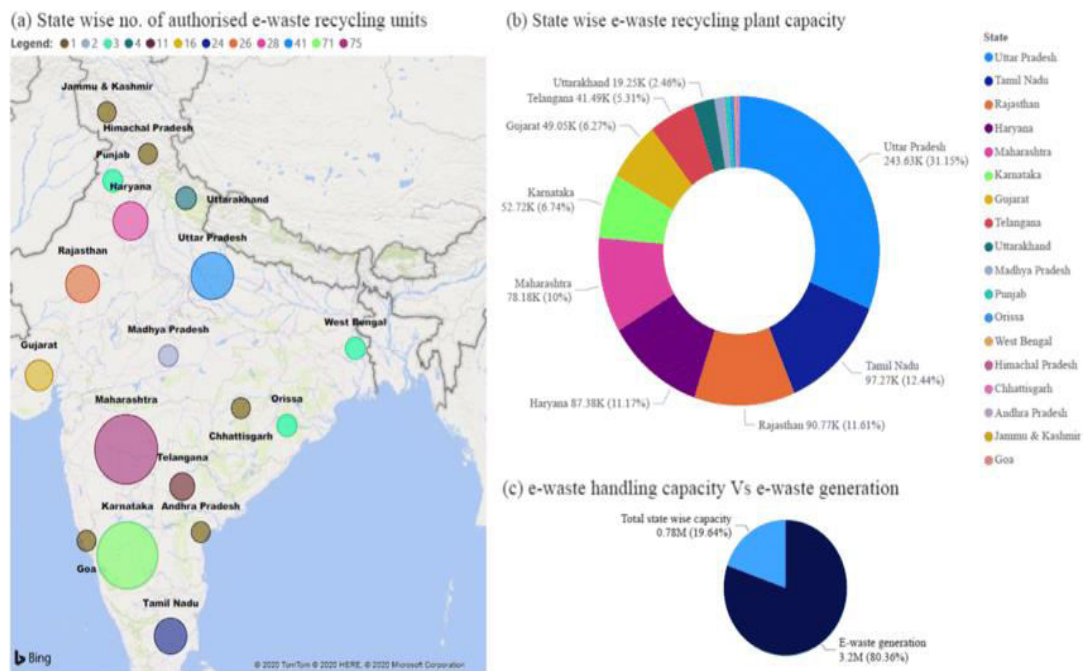
**(iii) Water Pollution:** - When heavy metals like mercury, lithium, and lead used in electronics, such as mobile phone and computer batteries, are improperly disposed of, they can seep from the soil into the groundwater and eventually emerge as streams or small ponds of water.

## **6. INDIA'S E-WASTE RECYCLING TECHNIQUES**

Particularly, e-waste includes motherboards, computer visual display units, cell phones and chargers, televisions, headphones, refrigerators, air conditioners, and other appliances. According to the global e-waste reveal 2017, two million tons of e-waste have been produced, placing Germany in fifth place among all countries worldwide behind the United States, Japan, China, and Germany<sup>[8]</sup>. India only manages a maximum of 0.036 MT of e-waste (Bhat and Patil, 2021). According to estimates, 90 percent of India's e-waste gets recycled in an unofficial setting. To put it another way, 90 percent of the e-waste in India is recycled.

## **7. INDIA'S ENVIRONMENT AND E-WASTE MANAGEMENT**

It is possible to say that the regulations for the storage, transportation and recycling of e-waste are formal rules for their management and handling. Extended producer responsibility, or EPR, is another novel idea that is introduced. Raising the financial and practical responsibility for controlling and disposing of electronic waste is said to be important for preserving the policy..



**Figure 4.3.** India has state-by-state e-waste recycling facilities with installed capacity  
(*Source:* Shailendra et al. 2021)

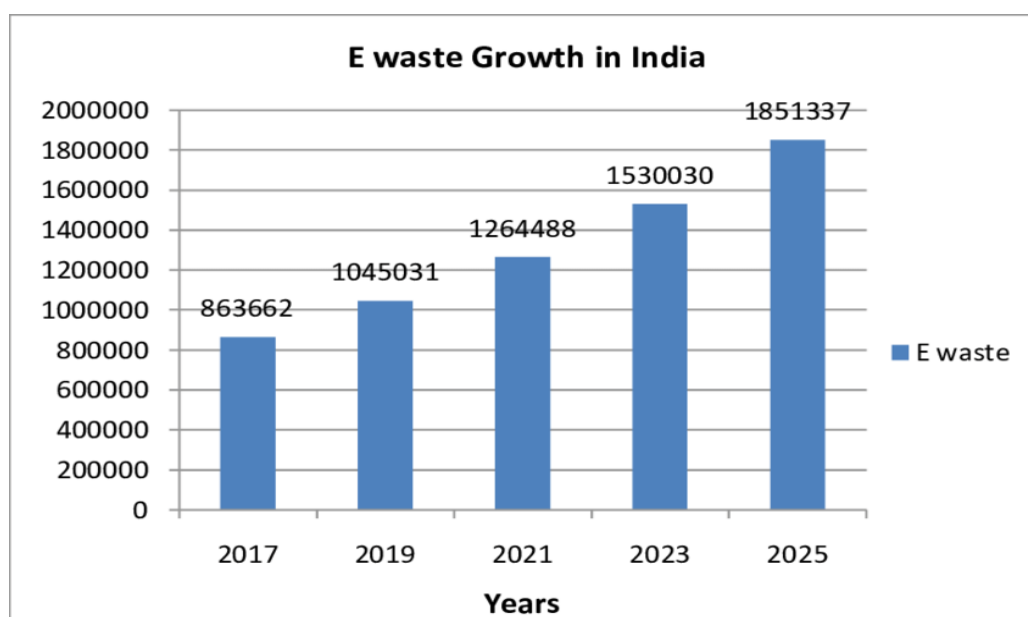
E-waste must be produced or have a dedicated third party to be properly collected and recycled, according to the procedure of this rule. The rule governing the collection of e-waste objectives annually for maintaining the processes and EPR was amended in 2018. The experts determined that beginning in 2023, there will be a significant improvement in the collection of e-waste with about 70% of the product being made in India. In some regions of India, this policy instrument has been successfully applied, sparking a discussion about a reasonable target for e-waste collection.

The Central Pollution Control Board (CPCB) was surveyed in 2005. In 2005, the country produced an estimated 1.347 million metric tons (MT) of electronic waste, and by 2012, that amount is predicted to rise to over 8.0 million MT.

However, an inventory of e-waste from three products—computers, mobile phones, and televisions—was conducted in 2007 by the Manufacturers' Association for Information Technology (MAIT) of India & the GTZ of India. 3, 32, 979 Metric Tons (MT) of electronic trash were produced in India in the total year 2007 (Computer: 56324 MT, Mobile Phones: 1655 MT, and Televisions: 275000 MT) (Report on "E-waste inventorisation in India", MAIT-GTZ Study, 2007).

**Table 4.4.** E-waste produced by different sources in metric ton (Source: MAIT,GTZ, 2007)

| S.no | Item  | Weight (MT)   |
|------|---|---------------|
| 1    | Domestically production.  | 332979        |
| 2    | Purchases goods from others countries.  | 50000         |
| 3    | Total   | <b>382979</b> |
| 4    | Waste Electrical and Electronic Equipment available for recycling                   | 144143        |
| 5    | Waste Electrical and Electronic Equipment available for recycling actually recycled | 19000         |
| 6    | Projected quantity of WEEE by 2011 (without including the imports)                  | 467098        |

**Figure 4.4.** Graph showing e-waste growth in India

## 8. E-WASTE MANAGEMENT & RECYCLING PRACTICES IN INDIA.

E-waste is a significant problem that India's environment and public health are currently dealing with. Enhancing the rubbish list for electronic waste is necessary [9]. Seventy percent of the E-waste generated by the telecom and private IT sector comes from computer devices that are exclusive to India (Afroz et al. 2020). It's critical to realize

that maintaining India's rapid e-waste growth is necessary for managing environmental sustainability. E-waste contains a variety of toxic materials that must be maintained and are potentially very damaging to both human health and the stability of the environment. There are some measures that should be adopted & implemented for managing e-waste.

### **8.1. Technology Development for Recycling e-waste**

There are affordable ways to recycle valuable polymers and materials to make them environmentally safe, including special technology that can recycle 1000 kg of PCB per day which must be handled according to legal environmental regulations.

Purchase ongoing process improvement for appropriate e-waste processing that will aid in the establishment of an Eco-Park in India (Fayustov, 2020). A unique recovery method for e-waste plastic that is used in value-added products is also successful in India. About 25% of plastic in e-waste can also be considered to be a conversion.

### **8.2. Rules & Regulations**

It is essential to recognize that many policies have been implemented in India to reduce e-waste & these regulations are put into practice to verify whether e-waste is properly managed or not.

According to the 2011 e-waste handling and management standards, there should be reliable importers and manufacturers of electronic goods who would properly manage electronic trash (Fayustov, 2020). The quantity of e-waste that is provided by the organization is important, which forced producers to create suitable E-waste collecting facilities [11]. E-waste management regulations from 2016 have indicated that the stakeholders are expected to implement their tasks effectively by upholding laws that are based on the generation of e-waste.

In India, specialized procedures are used, such as recycling procedures including manual disassembly and acid attraction from metals. There is evidence to suggest that those who work in this field are more likely to experience birth defects, child mortality, tuberculosis, blood diseases, immune system anomalies, kidney and respiratory system malfunctions, lung cancer, impaired brain development in children, and damage to the nervous and blood systems

Leaching of lead into groundwater may result from the disposal of electronic waste. According to Trick (2002), "One cell phone battery contains enough cadmium to contaminate 600 m<sup>3</sup> of water" [12].

The nearby soil then absorbs the cadmium that has leaked. They represent a substantial risk to both people and the environment if improperly managed.

### **8.3. Applying Extended Producer Responsibility (EPR)**

The extended producer responsibility (EPR) idea was formally accepted by the Swedish Ministry of Environment and Natural Resources (SMENR). According to the ministry, EPR is "an environmental protection approach to accomplish an environmental aim of a decreased total environmental impact from a product by making the developer of the product liable for the whole life cycle of the product, in particular for the take-back, recycling, and final disposal of the product."

India's formal and unofficial sectors manage the majority of its e-waste. A new regulation known as Extended Producer Responsibility (EPR) was established in 2016 and initially applied to both industries [13-14]. Waste disposal is mostly controlled by the unregulated informal sector in India. EPR struggles in this market because of how chaotic it is. Numerous factors that operate as a deterrent to the failure of the EPR have been discovered after the influence of EPR on the informal sector has been examined. The results show that EPR has a negligible effect on India's unorganized sector. For the implementation of EPR to be successful, much work remains. The minimum impact of this regulation is a result of the expected difficulties India would have managing its e-waste. To overcome these difficulties, integration between the formal and informal sectors is necessary. To accomplish this, however, it is necessary to comprehend the market's dominant informal sector, which transacts in e-waste. It is necessary to embrace and use modern methods and tools. These two sectors should be considered while creating appropriate structures and programs. Furthermore, to have a sufficient e-waste management system in India, social and economic issues must be recognized and handled.

#### **8.4. Governing Body Responsibilities**

The state government in India is now responsible for overseeing manufacturers, producers, and recyclers to make sure that standards are upheld and that they reach e-waste collection goals as a result of the EPR rule (Anon., 2018). The state government must also see to it that enough industrial space is allocated so that effective e-waste management procedures like recycling and disassembly can be carried out (Sharma, n.d.).

#### **8.5. Manufacturer's Obligation**

It will be the duty of manufacturers to gather any electronic waste produced during the production of electrical and electronic equipment and direct it toward recycling or disposal. During the collection and transportation of e-waste, they must make sure that no environmental harm is done.

The responsibility for collecting any electronic waste generated during the manufacture of electrical and electronic equipment and directing it for recycling or disposal will fall on the shoulders of the manufacturer. They must take precautions to prevent any environmental harm from occurring during the collection and transportation of e-waste [15]. They are accountable for keeping records of how they generate, handle, and dispose of electronic trash. These records must be submitted to the State Pollution Control Board (Sharrma, n.d.).

### **9. INDIA'S ENVIRONMENT AND E-WASTE MANAGEMENT**

It is possible to say that the regulations for the storage, transportation and recycling of e-waste are formal rules for their management and handling. Extended producer responsibility, or EPR, is another novel idea that is introduced. The policy is described as being necessary for maintaining electronic waste by raising the financial and practical responsibilities for managing and disposing of the E-waste.

E-waste must be produced or have a dedicated third party to be properly collected and recycled, according to the procedure of this rule. The rule governing the collection of e-waste objectives annually for maintaining the processes and EPR was amended in 2018 [16]. The experts determined that beginning in 2023, there will be a significant improvement in the collection of e-waste with about 70% of the product being made in



India. In some regions of India, this policy instrument has been successfully applied, sparking a discussion about a reasonable target for e-waste collection.

## **10. INDIAN E-WASTE RECYCLING TECHNIQUES**

### **(i) Non-Formal Sector**

In India, only 5% of the entire amount of electronic waste is processed in a formal facility, while 95% of it is recycled in the non-formal sector. About 3000 units are working in Kerala, Andhra Pradesh, West Bengal, Rajasthan, etc. in and around India's major cities.

Non-formal **organizations** usually follow procedures like collecting e-waste from rag pickers and disassembling items to find their usable parts, components, and modules that have a marketable worth. The remaining components are chemically processed to recover precious metals. It may result in the leaching of dangerous compounds into the air, land, and water due to insufficient methods. This recycling procedure is ineffective, and only valuable metals like gold, silver, **aluminum**, copper, etc. are recovered using it. It was unable to recover other materials like tantalum, cadmium, zinc, palladium, **etc.**

### **(ii) Formal Sector**

There aren't many official recyclers working in India. The techniques used in the formal sector are mostly limited to the size reduction, grouping, and disassembly of printed circuit boards (PCBs). To reduce the size of PCBs, a shredder is used. The pre-processed PCB is shipped to precious metals smelting refineries in developed countries for further precious metals recovery, including copper, silver, gold, aluminum, palladium, tantalum, ruthenium, platinum, etc., as well as treating the slag byproduct in an environmentally friendly way.

Units in the formal sector recycle or recover valuable chemicals in protected environments and with proper care to limit any harm to society or the environment. Metals are recovered effectively thanks to the application of cutting-edge techniques and technologies. The formal sector will be able to afford recovery technology because the volume of products can spread the high cost of capital equipment and necessary processes.

In the formal sector, it is also possible to recover metals in small concentrations with high efficiency of recycling & recovery process. Some technology utilizes a zero-landfill strategy [17].

### **11. SOME AUTHORIZED DISMANTLERS/ RECYCLERS, REGISTERED WITH CPCB**

- Earth Sense Recycle Pvt.Ltd., Maheshwaram Mandal, Andhra Pradesh with the recycling capacities-1800,mt/year
- Surface Chem Finishers, Bangalore-600kg/year
- Ramky E-waste Recycling Facility, Maheshwaram Andhra Pradesh-10000Mt/Year
- Jhagadia Copper Ltd., Jhagadia, Gujarat (Shredded PCBs/Mother Board only)-12000Mt/ Year (source: <http://www.cpcb.nic.in/divisionsofheadoffice/hwmd/e-Waste.pdf>).

### **12. Indian EPR Management Challenges**

Even with the advent of EPR, the controlling of e-waste in India remains a significant mission due to the numerous concerns and problems that exist in this industry. The poorly organized sector has continued to provide a barrier to the e-waste economy even after the adoption of EPR.

### **13. THE SOLUTION TO THE HANDLING OF EPR**

- Adopting efficient legislation and providing rewards is necessary. This will allow employees to handle e-waste legally and for centralized removal.
- Integrating the unorganized industries into an open framework for effective e-waste management in India.
- Proper management of e-waste depends on consumer awareness. Making people aware of proper e-waste treatment and disposal is therefore vital. Consumers in households and institutions are less likely to return their garbage to the formal sector due to a lack of information about e-waste and the expense of doing so when returning end-of-life equipment to official collection sites (Rama Mohana R. Turaga, 2019)

- Those manufacturers who have EPR authorization are allowed to import electrical items.

#### **14. SUPPORT FROM GOVERNMENT AND PUBLIC**

- The contribution of the government, as well as citizens, are also required for improved e-waste management, the government, city administration, and residents may all contribute. The management of e-waste involves the involvement of citizens. Numerous people publicly burn the collected rubbish, which includes various small appliances and abandoned trash.
- In managing e-waste, the general public is fundamental. Numerous individuals publicly burn the accumulated rubbish, which includes numerous small devices and abandoned e-rubbish. Only enterprises that were registered with MOEF should receive up to 50% in subsidies, according to the Union Department of Information and Technology.

#### **15. CONCLUSION**

The globe faces a serious social and environmental challenge as a result of the misuse of technological goods and items in recent years. The demand for efficiency in an incredibly quick workplace, the attraction of clever advertising, the tendency of necessity to luxurious, and the mass production of innovative high-tech devices like tablets, electronic & smart watches, cell phones & different types of chargers for different devices, and laptop have all contributed to an increase in the consumption of electronic goods. Electronic device manufacturing uses hazardous materials that are harmful to both human and environmental health. Therefore, it's imperative to properly and safely dispose of these electronic items. E-waste is great business potential because it contains a number of valuable minerals and metals. Market demand for these metals is extremely high. Therefore, any country must have effective e-waste management.

In India, the majority of e-waste is recycled in unorganized facilities with a sizable labor force.

By using crude methods, recovering metals from PCBs is an extremely dangerous deed. To give those who depend on this for their livelihood better means, proper education,

awareness, and most crucially alternative cost-effective technology, must be made available.

**There** is still more work to be done before EPR is successfully implemented in India. It is important to recognize that the e-waste market is dominated by the informal sector. The development of suitable policies and programs must take into account both of India's e-waste sectors. Challenges in the social and economic sectors must be addressed and resolved. It is necessary to use the selection of goods, methods, procedures, and equipment that have been accepted by other industrialized nations. As a result, India's formal and unofficial sectors must be integrated while taking ERP laws and policies into account.

## REFERENCES

- [1] ABC News. (2011) 90% of India's e-waste is recycled informally – when will gov't policy recognize this?[Online]. Available at: <https://www.apc.org/en/news/environment/90-india039s-e-wasterecycled-informally-%E2%80%93-when-wi>(Accessed August 2020)
- [2] Bryman, A., & Bell, E. (2011) *Business Research Methods*. Cambridge; New York, NY: Oxford University Press
- [3] Cifani, S. (2017) *E-Waste Management: The Importance of Recycling E-Waste*. [Online] Available at: <https://www.dumpsters.com/blog/effectively-manage->
- [4] Pankaj R. Kaushik, *International Journal of Environment and Waste Management* · January 2020 DOI: 10.1504/IJEW.2020.10027003
- [5] Manda, B. M. K., June (2008) *E-waste Management Policy in India*. IIIIEE Theses.
- [6] Bhaskar, K. and Kumar, B., 2019. Electronic waste management and sustainable development goals. *Journal of Indian Business Research*, **11**(2), pp. 120-137
- [7] Bryman, A., & Bell, E. (2011) *Business Research Methods*. Cambridge; New York, NY: Oxford University Press

- [8] Chatterjee, S. (2007) National Scenario of Electronics Waste in India. Department of Information Technology; New Delhi, India
- [9] Chaturvedi, D. R. (2010) Mainstreaming the Informal Sector in E-Waste Management.
- [10] G. Gaidajis, K. Angelakoglou and D. Aktsoğlu, *Sci. Technol. an Int. J* , 3 (1) (2010) 193-199. <http://www.assochem.org/index.php>.
- [11] N.Garg,D.K Adhana, *Int J Technol Manag* . Volume IX, Issue I, JANUARY/2019 ISSN NO: 2249-7455,Page No:2803 .
- [12] Ganesan, R., Ramesh, B. and Teja, C., 2021. Awareness of Reuse Reduce Recycle & Dispose of EWaste in Chennai. *Journal of Physics: Conference Series*, **1964**(7).
- [13] Hinchliffe, D., Frommann, J., & Gunsilius. (2017) E. Waste to Energy Options in Municipal Solid Waste Management
- [14] Kulkarni, G., 2018. Mini occupational health services for un-organized labor markets in India. *Indian Journal of Occupational and Environmental Medicine*, **22**(1),
- [15] Manish, M. A. & Chakraborty, D. P. (2019) E-Waste Management in India: Challenges and Opportunities.
- [16] Electronic Waste and India Dr. S. Chatterjee Scientist-E Department of Information Technology Electronics Niketan, 6, C.G.O. Complex New Delhi-110 003, India, sandip@mit.gov.in
- [17] Shashi Arya, Sunil Kumar. "E-waste in India at a glance: Current trends, regulations, challenges and management strategies",*Journal of Cleaner Production*, 2020

## Chapter 5

### IMPACT OF FAST FASHION AND TEXTILE WASTE

Monika Kadam<sup>1\*</sup> and Taniya<sup>2</sup>

<sup>1</sup>Assistant Professor, Delhi Technical Campus, Greater Noida, India

<sup>2</sup>Student, Delhi Technical Campus, Geater Noida

#### ABSTRACT

*Fashion is an art which has impacted every person on this planet. The daily update of “trending styles” is being followed by models and actors from high status to the middle-class people. Fast Fashion explains the involvement of environment friendly methods which can be used in the process of handling the textile waste which has been produced during the manufacturing of fashionable garments. In this article, we will discuss the impact of fast fashion and textile waste on the environment and the steps to be taken by the government, business entities and citizens towards a more environment friendly and sustainable environment.*

*Keywords: Fast fashion, sustainable fashion, textile waste, rapid fashion, environmental impact.*

#### 1. INTRODUCTION

The term "fast fashion" is a slang in fashion, sustainability, and environmental awareness discussions. To capitalize on current trends, the term is used to describe "cheaply produced and priced garments that copy the latest catwalk styles and get pumped through stores quickly." The fast fashion model involves the quick design, production, distribution, and marketing of apparel. Because of which, shops can draw vast amounts of a broader range of products, giving customers access to more fashion and product distinction at a lower cost.

Fast fashion has altered individual purchasing behavior and patterns to discard clothing since it offers affordable, widely accessible, and trendy items. Fast fashion is a prominent business model by offering vast amounts of apparel at low prices, which has driven up clothing consumption. While this change is frequently hailed as

"democratizing" fashion by making the newest trends accessible to all consumer classes, the threats to human and environmental health posed by inexpensive clothes are concealed throughout each garment's lifespan. The phrase "fast fashion" is used to characterize the easily accessible, cheaply created clothing of today. The term "fast" refers to how quickly shops can transition fashions from runway to store, keeping up with the ongoing desire for new and distinct styles. "With the emergence of globalization and the expansion of a global economy, supply chains have become worldwide, relocating the production of fibers, textiles, and clothing to regions with lower labor costs. Each year, 80 billion new pieces of apparel are bought worldwide, amounting to \$1.2 trillion for the global fashion business. While the United States purchases more apparel and textiles than any other country in the world, the majority of these products are assembled in China and Bangladesh [1, 2].

In the context of Sustainable Development Goal (SDG) 12, which calls for sustainable business practices, consumer behavior, and the decrease and eradication of fast fashion, sustainable consumption and production are emphasized in national and sectoral programs.

## **1. THE IMPACT OF FASHION ON THE ENVIRONMENT**

The fashion sector significantly contributes to our economy, with a global economy of over 2.5 trillion dollars and over 75 million employees. The industry has had phenomenal growth in recent years, with the manufacturing of apparel doubling between 2000 and 2014. Despite purchasing 60% more clothing in 2014 than in 2000, people only wore their dresses for 50% as long (McKinsey & Company, 2016).

Although the fashion business is rapidly growing, a growing number of harmful environmental effects to be addressed are coming to light. Water resources are depleted, rivers and streams are polluted, and 10% of humanity's carbon emissions come from the fashion industry. Additionally, according to UNECE (2018), 85% of all textiles are disposed off in landfills annually, and washing certain types of clothing releases a sizable amount of microplastics into the ocean. Fast fashion also has a human cost; textile workers, especially women, are sometimes paid pitiful pay and made to work long hours in horrible circumstances in developing nations (UNEP, 2018; WRI, 2019)

[3,4]. These circumstances lead to violations of human rights in numerous locations (Human Rights Watch). Serious health issues are brought up by the use of chemicals in clothing production for both customers and industry personnel. Pollution has other effects on health in addition to those already mentioned.

We must reconsider fast fashion in light of the industry's negative environmental and social impacts, which also highlight the need for more sustainable business models and operations. Additional details on the environmental effects of fashion and possible change approaches are provided in the resources listed below.

### **2.1 Textile Waste**

Textile waste is created during every stage of the production of textiles, including spinning, weaving, dyeing, finishing, and the creation of clothing, as well as at the consumer level. They can be categorized as, Soft waste is the result of combing, drawing, and spinning.

### **2.2 Plastic in Textile**

Following World War II, the fashion industry underwent a radical change thanks to the creation of synthetic materials like polyester and nylon. In 2018, more than 60 million tonnes of synthetic fibers were consumed worldwide, up from only a few thousand tonnes in 1940. Polyester has been the most widely used fiber in textiles since the late 1990s. Nowadays, synthetic fibers are thought to make up 70% of home textiles and 60% of clothing.

Due to the emissions of greenhouse gases and other pollutants, these plastic-based textiles have a substantial effect on the environment and climate throughout the course of their entire life cycle. Due to the creation of synthetic fibers using around 1% of crude oil, the textile industry is a growing contributor to climate catastrophe. Additionally, the industry plays a significant role in plastic leakage into the environment. Every year, between 200 000 and 500 000 tonnes of microplastics from textiles are released into the ocean.

## **2. THE FAST FASHION NARRATIVE**

The term "fast fashion" refers to stylish, low-cost, high-turnover apparel and accessories produced quickly to satisfy consumer demand. The ecology, trash, and human labor



were not taken into account when making these clothes. Consumers didn't bat an eye when this was a normal practice for years, but now preferences are changing, and they want more ethical products.” As more and more sustainable fashion firms appear and start to take over the market, it is critical to comprehend the history, environmental effects, and societal effects of fast fashion in order to decide what practices to avoid and how to proceed as a sustainable brand and customer [5].

### 3.1 Stats on Toxic Chemicals and Brand Performance

- Each year, 43 million tonnes of chemicals are used to dye and treat our garments, and 8,000 different chemicals are utilized in the production of clothing.
- Textile dyeing is ranked as the second-largest global water polluter by Green America. Even though cotton production uses only 3% of the world's arable land, it is responsible for 24% of insecticides and 11% of pesticides.



Figure 5.1. Comparison of major apparel brands on the basis of chemical usage in them.

### **3. FASHION'S ENVIRONMENTAL FOOTPRINT**

One of the most polluting businesses in the world, fashion uses massive amounts of raw materials, produces major pollution, has a large carbon footprint, and produces worrying amounts of trash. "One kilogram of cotton requires 20,000 liters of water to manufacture, according to the World Wildlife Fund (2019). Furthermore, the textile sector generates a staggering quantity of industrial waste; according to some estimations, this sector is responsible for 17–20% of the world's industrial water pollution (Kant 2012). Additionally, industrial wastewater from the textile industry frequently includes high concentrations of hazardous dyes and other chemicals that may be toxic to aquatic life and harmful to people's well-being, particularly as some dyes have been found to include carcinogens that have been shown to trigger a variety of cancers (Ghaly et al. 2014) [7, 8].

The global fashion sector is responsible for 10% of the carbon emissions in the world, with considerable emissions occurring during both production and its supply chain (Conca 2015). This is in addition to its detrimental effects on water supplies. According to the Ellen Macarthur Foundation (2017), the industry's estimated 1.2 billion tonnes of greenhouse gas emissions in 2015 were more than what was emitted by all international aircraft and ocean ships put together [6]. Additionally, fashion companies operate a high-carbon transportation network as a result of their reliance on intricate supply chains that span the globe and "just-in-time" production cycles, which result in the development of clothing that ultimately finds its way into stores all over the world from raw materials that travel from one nation to another.

#### **3.1. Fast Fashion**

The "fast fashion" concept, which provides consumers with replicas of the latest trends frequently before the originals actually hit the stores, has found the perfect environment thanks to the concomitant decline in manufacturing costs and acceleration of production pace (Beebe 2010). Companies like Zara, H&M, Forever21, and Topshop have revolutionized the traditional fashion sector with their quick production and swift, efficient supply chains (Cline 2012). While these innovations have helped to democratize fashion by enabling a wide range of consumers to purchase affordable

imitations of the most exclusive and expensive designers, the fast fashion business model has severely diminished the value of the designers' intellectual property, significantly increased the industry's carbon footprint, and encouraged a culture of waste. The fast fashion approach, which is driven by trends and customer behavior rather than the fashion industry's traditional focus on developing new ideas, aims to provide lower-cost clothing that is either inspired by or simply copies the newest trends. Therefore, numerous quick fashion retailers have been charged with undermining designers' intellectual property and decreasing consumer motivation to spend money on more expensive original products. As a result, the quick fashion model might actually impede originality and creativity, as well as hinder young and up-and-coming designers in favor of well-known companies that often set the trend for fast fashion imitations.

#### **4. IMPACT ON THE ENVIRONMENT**

Almost every area of environmental concern is affected by the fashion industry's damaging effects on the environment.

##### **4.1. Pre-Production**

Toxic fashion pre-production generates a considerable amount of trash and pollution. According to a study, 15% of the fabric used to make clothes is wasted; this percentage is influenced by the type of clothing, the fabric's design, the cutting of the fabric, and errors in assembly. Before clothing and materials are ever created, there is already a significant environmental strain. The initial fiber extraction process uses the most energy and produces the most carbon emissions over the life of a garment, which is especially true for fabrics made from petroleum. Additionally, the production of materials like cotton and linen requires a lot of labor and water, as well as the use of hazardous pesticides that endanger the health of both farmers and workers.

##### **4.2. Deadstock**

"Deadstock," or clothing that is unsold returned (particularly after being purchased online) and then disposed of as waste, makes up a large portion of pre-consumer waste that is sometimes overlooked. Unsold goods from H&M are reportedly valued at \$4.3 billion and are being stored in warehouses before being burned at a waste-to-energy facility in Denmark. A waste-to-energy facility's burning of deadstock may recover

some of the energy that would otherwise be lost while the materials sat unused in a warehouse, but it also increases air pollution and GHG emissions. The biggest environmental impact comes from the energy, materials, water, and chemicals used in the garment's creation, not from mass incineration, which may conjure images of massive waste and emissions.

### **4.3 Emissions**

The largest emitters of greenhouse gases per unit of material are textiles and aluminum. An estimated 4-5 billion tonnes (8-10% of the annual global carbon emissions) are produced by the fashion sector.” The source of energy used in manufacturing accounts for a sizeable portion of the high carbon footprint of the fashion sector. For instance, factories in nations like China, where the vast majority of clothing is produced through outsourcing, are coal-powered and have a 40% greater carbon footprint than textiles produced in Europe.

### **4.4. Water**

With 79 trillion liters of water consumed annually, the hazardous fashion sector is second in terms of water consumption. To put that into perspective, it takes 2,000 gallons of water to make one pair of trousers and 2,700 gallons of water to make one cotton shirt. One shirt uses the same amount of water that the average person uses in two and a half years' worth of drinking water. Additionally, “it contributes 20% of industrial water pollution caused by the dyeing and processing of textiles. Raising cattle takes enormous amounts of grain, water, land, and fossil fuels, which are all needed for the manufacturing of leather. The accompanying tanning process uses hazardous chemicals, including formaldehyde, coal tar derivatives, mineral salts, oils, and dyes that are not environmentally friendly and are a further contributor to river contamination. For every 900 kg of animal hides that are tanned, it has been estimated that 300 kg of chemicals are added.

### **4.5. Plastic**

The fabrics themselves, which are made of synthetic fibers like nylon, polyester, and acrylic and take thousands of years to biodegrade, are another big polluter. Additionally, washing garments alone sends 500,000 tonnes of microfibers—equivalent to 50 billion

plastic bottles—into the ocean every year. In total, hazardous clothing causes 190,000 tonnes per year, or 35%, of the world's ocean microplastic contamination.

#### **4.6. Waste**

Even more garbage is generated by the fashion sector, which generates 92 million tonnes of textile waste annually, most of which is disposed of in landfills or burned. Every year, 85% of all textiles end up in landfills. More than \$400 billion is wasted each year as a result of these abandoned clothes [9].

#### **4.7. Social Effects**

Every stage of the garment production process is impacted by toxic fashion, including the workers. The effect on women in nations with developing economies is the most negative. In low-income nations where women have limited access to rights, women between the ages of 18 and 24 make up almost 80% of all clothing. The fashion business was discovered to have forced child labor in 2018 in Argentina, Bangladesh, the Philippines, and Turkey. China, Indonesia, Vietnam, Brazil, and other nations are included. Due to their access to cheap labor, tax incentives, and lax rules regarding pollution, operations, and labor, developing nations make great locations for hazardous, fast fashion manufacturers.

### **5. RESOURCES FOR LEARNING ABOUT HARMFUL FASHION**

Retailers and customers can educate themselves about the disastrous effects of toxic fashion and how to improve their practices using the many resources that are accessible.

A list of toxic fashion documentaries is shown below:

- **The True Cost- Netflix, YouTube**

The complexity of the fast fashion industry is examined in this movie.

- **The Machinists- Youtube**

The three stories of women who make clothing are the subjects of this film.

- **Minimalism- Netflix**

This film examines how to live more effectively on a limited budget.

- **River Blue- Amazon Prime**

The fast fashion industry's contribution to water pollution is the subject of this movie.

- **Unravel- Youtube**

This documentary explores the final destinations of clothing as well as the viewpoints of individuals who work there to explain why Western culture wastes so much clothing.

### **5.1. The Price of Fast Fashion- BBC, Youtube**

BBC describes the steps taken in producing clothing, from cotton growers to factories to designers, emphasizing those who are at the forefront of the sustainable fashion movement.

Although the garment business has been plagued by toxic fashion, brands are defying convention. Fast fashion has substantial negative effects on the environment and society, and consumers want firms to adjust their ways. Customers hold the authority to limit their support to businesses that follow ethical fashion standards and to pressure businesses to change their business practices to be more environmentally friendly.

### **5.2. Collaboration on Sustainable Fashion Internationally**

International cooperation is crucial to promote sustainable fashion since fashion value chains are becoming increasingly globalized, and the sector has a substantial impact on the achievement of the UN Sustainable Development Goals (SDGs). The UN Alliance for Sustainable Fashion, which was established at the fourth UN Environment Assembly (UNEA-4), aims to end the environmentally and socially harmful practices of the fashion industry. By examining UN organizations' efforts to promote sustainable fashion, identifying problems and gaps in their efforts, and presenting these results to governments to spur policy, the Alliance is enhancing collaboration among UN organizations. Additionally, the UNECE, FAO, and partner-led Forests for Fashion Initiative fosters creative fashion solutions by using materials derived from sustainable forests. Other international associations are aiming to promote more sustainable fashion on a global scale.

### **5.3. What Impact does Rapid Fashion have on India's Environment?**

Garments made of synthetic materials cannot decompose in landfills. The amount of textile waste that could be recycled annually is up to 95%. Every year, 92 million tonnes of textile and clothing waste are thrown out. Within a year, more than half of fast fashion clothing will be thrown.

The production process itself is yet another significant obstacle. Many fashion businesses use the fast fashion business model, which puts speed and cost over sustainability. Inadequate labor practices, excess production, and waste can result from this.

#### **5.4. Companies Battling Textile Waste**

The average American produces about 80 pounds of textile trash annually. A few manufacturers have begun making an effort to prevent garments from ending up in landfills by modifying how their fabrics are produced and by offering consumers better options to dispose of them as a result of environmentally concerned consumers and activists advocating for change in this sector. Here are some of the most compelling instances we've recently observed:

##### **(i) H&M**

In order to prevent its customers' unwanted clothing from ending up in landfills, H&M, a well-known contributor to the fast fashion industry, has at least started providing recycling services at more than 4,200 stores. The first fashion brand to launch a global clothing collection effort was H&M. According to the company, tonnes of textiles are disposed of each year, even though up to 95% of them might be reused. We aim to provide a simple way for our consumers to donate their used clothing to H&M while also helping the environment. H&M will accept any brand's old or new textiles and ship them to the closest recycling facility. Customers receive a discount card good for 15% off their subsequent in-store purchase for each bag of textiles they drop off. According to H&M, the company gathered 20,649 tonnes of textiles in 2018—103 million T-shirts' worth—for reuse and recycling, up 16% from the previous year.”

##### **(ii) The North Face**

The North Face encourages customers to donate used clothing and shoes to participating retailers in order to lessen their impact on the environment. The North Face takes clothes through its Clothes The Loop program and distributes them to Soles4Souls, whose goal is to distribute shoes and clothing to alleviate poverty and generate sustainable jobs. Customers will receive a \$10 incentive on their subsequent purchase in

return for their donation. Customers have sent in 95,000 pounds of worn and/or recyclable apparel and footwear so far.

## **6. How can we Minimize the Ecological Impact of Fashion?**

### **6.1. Make Less Buys**

Even the greenest clothing still requires resources during production and shipping to your home, having an influence on the environment. One cause of the issue is our overconsumption: we buy 10 things when our grandmothers only bought two. We frequently believe that acquiring new clothing will make us happier. We might want to reevaluate some of the tenets of our way of life.

"The jacket you already have in the wardrobe is the most environmentally friendly option.

### **6.2. Buy Clothes from Sustainable Brand**

More and more fashion companies are considering how their products will affect the environment and society. Going to the nearby shopping center to restock your clothing is simpler and more affordable. But as demand for sustainable apparel grows, more will become available, just as it was formerly challenging to buy organic food. Today, the majority of supermarkets carry it.



**Figure 5.2.** Sustainable clothes brands

Sustainable clothing costs more than fast fashion, and now we are conscious of the reasons for such incredibly low pricing. However, the price of sustainable labels won't necessarily be more than that of name-brand clothing. We frequently pay high costs for image but infrequently for quality or sustainability.



### **6.3. Buy Better Quality**

People tend to compromise quality over affordability, when the current clothing are worn out or loses its charm, we get the new ones. Most of the times, people experience disappointment of purchasing pricey products only to discover two months later that they already appear worn, cheap quality or have holes in them. Stopping our purchases of inferior goods will encourage businesses to raise the caliber of their clothing leading us retain our clothing for longer, benefiting both the environment and our wallets.

### **6.4. Consider Twice Prior to Disposing of your Clothes**

Avoid placing your clothing in the regular trash cans! The majority of them are made of synthetic, non-biodegradable fiber, and they will simply accumulate in landfills. There are additional choices:

- Attempt to fix them. A ripped garment can occasionally be repaired or even completely redone with a little creativity.
- Give your used clothing to a charity or to friends, relatives, neighbors, etc.
- Sell them using applications for used clothing, like Poshmark.
- Some clothing stores accept worn clothing from other brands or even from their own line.
- Put them in the recycling container for textiles. Clothing can be made from recycled textiles.

### **6.5. Thrift Clothes, Swap Them and Rent Them**

Take a look at these alternatives to buying new clothing:

- **Second-Hand Stores/Thrift Shops:** It's not a brand-new idea! Secondhand stores can be found all over the world. Numerous websites and applications also provide a variety of second-hand clothing options, from the least expensive to name-brand garments.
- **Change Outfits:** The number of these efforts is increasing everywhere. Participants exchange their used clothing for new clothing by bringing their old clothing. This is a

cost-effective and environmentally friendly way to restock your wardrobe. Additionally, you can plan it with your pals.

- **Rent Clothing:** The renting of clothing is a developing industry. This is a fantastic alternative, especially for clothing that you won't wear frequently or for a long time (party dresses, baby or pregnant garments...). Some businesses also charge a monthly subscription, enabling clients to regularly update their wardrobes [10].

## 7.6 Be Conscious of Your Washing

Our washing habits have a big effect on the environment. Nearly 200 loads of laundry are done by the typical European home each year, using 15,000 liters of water. The drying cycle and heating the water for washing also consume a lot of energy.



**Figure 5.3.** Eco-friendly Apparel

The next wave of sustainable fashion certification

SANE is a comprehensive accreditation for eco-friendly apparel. A product must be healthy for the environment and people in order to be considered sane. SANE ensures that certified products are produced with the same regard for the environment, workers' rights, and consumers' health. With SANE, consumers just need to focus on one label because it addresses consumer, societal, and environmental safety issues.

People are becoming more and more concerned about the effects of the clothing they purchase all over the world. Fashion companies are becoming aware of this fact. Some of them are working very hard to resolve those problems. Others speak loudly while doing very little action. Responsible brands can no longer be heard, and informed customers can no longer distinguish between genuine sustainable efforts and greenwashing.

From the fiber to the stitching of the final button, SANE certification ensures the greatest degree of sustainability throughout the production of an article. Because SANE is a third-party certification, independent auditors verify the factories and the materials to ensure their veracity and integrity.



**Figure 5.3.** Consumer's safety checks tagged on Eco-friendly Apparel

The scope of SANE is international and includes textiles for the house, footwear, and fashion accessories. SANE is a new initiative that seeks assistance from people and businesses that think fashion has a bright future.

## **8. CONCLUSION**

A lot of issues with sustainability and social responsibility confront the global fashion business. Fast fashion, in particular, has a large carbon impact and poses a number of problems for society and the environment. Corporate social responsibility and environmentally conscious initiatives may help to combat disparities in the fashion industry while boosting standards and procedures, given that the law at the moment only offers minimal protection of rights in the sector and frequently fails to change corporate behavior. To shift the fashion business and consumers away from the model of rapid fashion and towards more sustainable procurement, manufacturing, distribution, marketing, and being consumed practices, legislative changes and more support for businesses that seek more sustainable practices are therefore required. Businesses that follow these slow fashion principles ought to serve as models for the future of the international fashion sector.

## **REFERENCES**

- [1] Edge Fashion Intelligence. (2020). Fashion Industry Waste Statistics. Retrieved from <https://edgexpo.com/fashion-industry-wastestatistics>.

- [2] Ellen MacArthur Foundation. (2017). A new textiles economy: Redesigning fashion's future, Retrieved from <http://www.ellenmacarthurfoundation.org/publications>).
- [3] Haque, M., Rizvi, S.H., Rahman, M., Chowdhury, T.A., Baset, M.A., & Norman, Z. A. (2020). Study of fabric waste generated in the woven garments industries in Bangladesh. *International Journal of Scientific & Engineering Research*, V11 (11), pp. 198-209.
- [4] Lindsey, R. (2020). Climate Change: Atmospheric Carbon Dioxide. Retrieved from <https://www.climate.gov/newsfeatures/understanding-climate/climate-change-atmospheric-carbon-dioxide>.
- [5] Sandin, G., & Peters, G.M. (2018). Environmental impact of textile reuse and recycling: A review. *Journal of Cleaner Production*. V184, pp. 353-365.
- [6] Song, HK, & Lewis, V.D. (2013). Development of a system for sustainable fashion from recycled clothes based on US fashion brands. *The Research Journal of the Costume Culture*, V21 (1), pp. 139-150.
- [7] Williams, L. (2020). How Can We Reduce Our Fashion Environmental Impact? Sustain Your Style. Retrieved from <https://www.sustainyourstyle.org/en/reducingour-impact>.
- [8] The Pretty Planeteer. (2020). How Much Waste Does the Fashion Industry Produce? Retrieved from <https://theprettyplaneteer.com/fashion-industry-waste/>
- [9] Global Organic Textile Standard. 2018. Ecology & Social Responsibility. General Description. Available online: <https://www.global-standard.org/the-standard/general-description.html> (accessed on 8 October 2019).
- [10] Jensen, Michael C., and William H. Meckling. 1976. Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics* 3: 305–60. [Google Scholar] [CrossRef]

## Chapter 6

### AIR POLLUTION IMPACT ON ECONOMY AND HEALTH IN INDIA

Amit Gupta<sup>1\*</sup> and Kartick Chauhaan<sup>2</sup>

<sup>1</sup>Assistant Professor and <sup>2</sup>Student, Delhi Technical Campus, Greater Noida

#### ABSTRACT

*Over the past few decades, air pollution problems have become a major global concern. The current study has been conducted for India which is significantly related to air pollution, human health, and the economy. The study found that air pollution in India highly affected the health and the economy. There are different types of diseases in human health due to air pollution which also suffer the economy of the country. It was also studied that urbanization and industrialization are also important contributors to air pollution in India. It is studied that life expectancy is reducing because of the increasing air pollution in the country. In India, the death rate is also increasing due to air pollution which results in significant economic expense. Indian government addressed the issue of air pollution through numerous financial support and actions between policymakers and environmentalists. The present study review that reducing health effects due to air pollution associated with an economic change in India, the government should be funding more to tackle air pollution in the country and conduct more awareness programs of the environment for making pollution less in India. In addition, there should be thought about urbanization and industrialization to keep pollution reduced in India.*

*Keywords: Air pollution, Pollutants, Air Quality Index, Particulate matter (PM2.5, PM10), Health, and Economy.*

#### 1. INTRODUCTION

Air pollution is acquired from solids and liquid particles including specific suspended gases in our atmosphere. These solids and liquid particles are known as aerosols. Air pollution on a global scale is a silent killer. Pollution means undesirable waste of human origin released into the land, air, and water that poses a risk to both human and

environmental health. The three primary forms of pollution are ozone pollution, home pollution, and ambient air pollution. This originates from different sources and has a variety of effects on human health and the functioning of a country. In the world, the fourth most important issue for human health for air pollution and is estimated to cause about 6.5 million premature deaths from air pollution (OECD & IEA, 2016). India's air pollution problem is fundamentally cross-sectoral and cross-jurisdictional (World Bank, 2021). One of the most challenging problems in India is air pollution, which not just affects human health or the community but also disrupts the economy and climate change of the fast-growing country Air pollution exposes India's major cities to unsanitary and hazardous conditions [1-3]. India ranks second in terms of global pollution. Air pollution shortens the average life span of Indians by 5 years. In India, urbanization along with growing population and industrialization is one of the main key reasons for increasing air pollution in the country [1-3]. Air pollution causes unhealthy conditions in India's major cities [3]. In India, 18% of all deaths are caused by air pollution (CAF, 2021). The most hazardous pollutant that comes from a range of sources, ambient PM2.5, is exposed to unsafe levels through the 1.4 billion individuals (100% of the population) in India (World Bank, 2021). The motivation for this study is how air pollution affects India's economy and health. The remaining of this research is structured as follows: Section 2 describes types of air pollutants; Section 3 air pollution exposure ad sources; Section 4; air pollution sources and quality in India; Section 5 describes air pollution effects on economy; Section 6 air pollution effects on health; Section 7 government policy and monitoring initiatives and Section 8 represents conclusion.

## **2. TYPES OF AIR POLLUTANTS**

Air pollution is caused by liquid, and solid particles, including specific gases, suspended in our atmosphere. These solid and liquid particles are known as aerosols. Several natural and man-made sources emit air pollution. Mobile, stationary, regional, and natural sources all contribute to air pollution. Oil refineries, power plants, businesses, and other factories are examples of stationary sources. Cities with agricultural economies and wood burning are among the local sources [4 -7] A complicated mixture made up of thousands of contaminants causes air pollution (Seinfeld and Pandis, 2016).

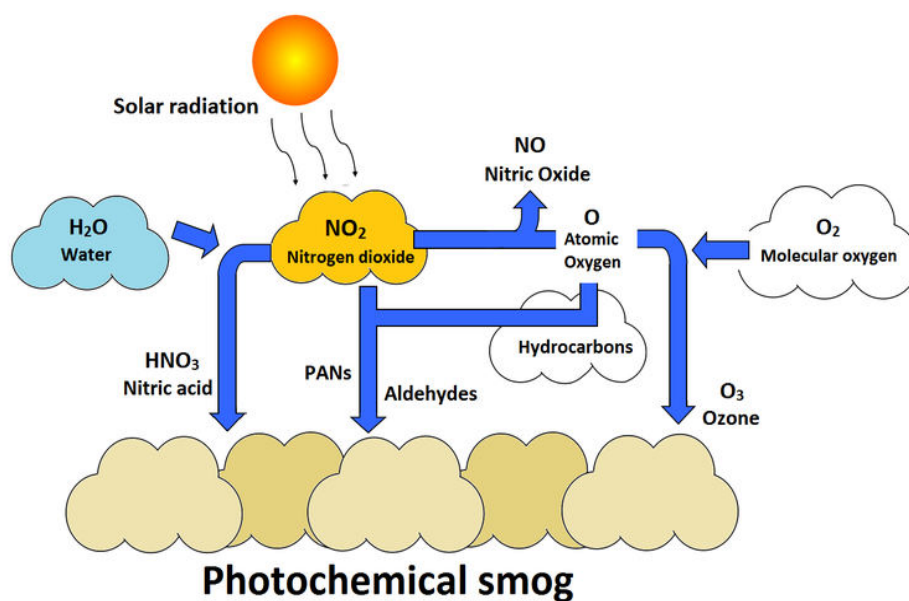
The majority of the air pollutants have particulate matter (PM<sub>2.5</sub>, PM<sub>10</sub>), which is made up of suspended liquid and solid particles, as well as various gases such as volatile organic compounds (VOCs), carbon monoxide (CO), ozone (O<sub>3</sub>) and nitrogen oxides (NO<sub>2</sub>)[7]. There are two different categories of air pollutants: primary and secondary.

### **2.1. Primary Air Pollutants**

These pollutants occur from human action or natural processes and are released into the atmosphere directly. These are liberated by the burning of fossil fuels. The main air pollutants were Lead, hydrocarbon (Benzopyrene) liberated from cigarette smoke, sulphur oxides (SO<sub>2</sub>), ammonia (NH<sub>3</sub>), carbon monoxide (CO), methane (CH<sub>4</sub>), particulate matter (PM), black carbon (BC), non-methane volatile organic compounds (NMVOCs), including benzene, and several metals (Lal, 2016). Another significant contributor to air pollution in India was liming of open coal, followed by mining for fluoride, mining of limestone, thermal energy sources, domestic and natural coal burning, the cement sector, and the dust on road (MPCB, 2010; Maji et al., 2016).

### **2.2. Secondary Air Pollutants**

Secondary pollutants are poisonous substances created from primary pollutants, sunlight, and components in the atmosphere reacting with one another (Usmani et al. 2020; Lal, 2016). Secondary pollutants are difficult to control because their ways of synthesizing are different and are not well understood, and neither is the formation. For example, ozone (O<sub>3</sub>), sulfuric acid and nitric acid (an acid rain component), nitrogen dioxide (NO<sub>2</sub>), peroxyacetyl nitrates (PANs), aldehydes, peroxides, organic aerosol (haze), etc. These all together make up photochemical smog as shown in figure 1 (Lal, 2016).



**Figure 6.1.** Formation of Photochemical Smog

*Source:* (Miller and Hackett, 2011)

### 3. AIR POLLUTION EXPOSURE AD SOURCES

This section gives a background summary on ambient air pollution (AAP) and household air pollution (HAP) exposures. The ambient and interior air quality in India varies according to the sources, contaminants, climate, topography, and cultural considerations.

#### 3.1. Ambient (Outdoor) Air Pollution (AAP)

Air pollution in outdoor settings is referred to more broadly as "ambient air pollution." The origins of ambient air pollution are industry, solid fuel combustion, and emissions from motor vehicle combustion processes. Particulate matter, NO<sub>2</sub>, CO, and sulphur dioxide etc. are the most common pollutants of air in outdoor air pollution. Ambient Air Pollution (AAP) levels in India have rapidly increased as a result of the nation's fast growth in the industrial, electricity, and transportation sectors as well as both planned and unplanned urbanization growth. In India, the next ten years are predicted to see a severe decline in air quality due to both the significant increase in vehicle numbers and the production of coal-based electricity. Among the major risk factors for disease in India, ambient air pollution (AAP) ranks seventh in terms of the overall burden of health and fifth in terms of death. In 2016, ambient air pollution was a factor in the



untimely deaths of 4.2 million people worldwide (PAHO, 2018). Around 88% of these fatalities have been placed in low- and middle-income nations. The World Health Organization (WHO) lists 10 of the top 20 highly world polluted cities as being in India, including Delhi, Patna, Gwalior, Raipur, etc. More than three-quarters of Indian cities have regular particle matter (PM) values that are higher than the National Ambient Air Quality Standards (NAAQS) (PHFI, 2017). Different governmental organizations have been keeping track of ambient air quality, with a heavy emphasis on urban areas and scant attention paid to rural areas. For example, The Central Pollution Control Board (CPCB) of India launched the National Air Quality Monitoring Programme (NAMP) as a national initiative to track the concentrations of main pollutants in urban and semi-urban areas.

### **3.2. Household (Indoor) Air Pollution (HAP)**

Air pollution in indoor settings is referred to more broadly as Indoor (Households) air pollution. Utilizing environmentally dangerous fuels both inside and outside the house contributes to household air pollution. These pollutants include microscopic particles that can get deep into the lungs and into the bloodstream, in addition to a number of hazardous chemicals. The significant sources of indoor air pollution emissions include heating, cooling, cleaning, burning incense, smoking, refrigeration, and air conditioning. The four major indoor pollutions are CO, formaldehyde, Pb, and NO<sub>2</sub>. Ambient air entering interior rooms through ventilation, windows, and doors also contributes to household air pollution. It is typical to discover ultrafine and fine particles, biological aerosols, and oxides of nitrogen and sulphur indoors in homes where biomass is used for cooking. The major cause of household (indoor) air pollution in Indian households is the combustion of biomass used in cooking and heating. Only 30% of Indian households use LPG, while about 60% use biomass as their main source of cooking energy (PHFI, 2017).

## **4. AIR POLLUTION SOURCES AND QUALITY IN INDIA**

The issues with air pollution in India, particularly in metropolitan areas, come from a variety of causes. There are a variety of mobile, stationary, and location-specific pollutants that can cause pollution of air in rural and urban environments. In India, the

greatest cited sources of region-specific emissions include vehicles, manufacturing, production of electricity, construction, road dust, burning of agricultural waste, and residential combustion of oil, coal, and biomass. In India, population growth, rapid urbanization, industrialization, and increased economic activity have all been responsible for an increase in air pollution. In cities and metropolitan areas, vehicular emissions are the source of air pollution that is expanding the fastest. The ambient air pollution in India is primarily caused by a variety of other unusual sources in addition to automobiles. The amount of particulate matter (PM) is substantially influenced by the dust of building construction and road dust in India and also up to 30% of the particulate matter (PM) pollution in Indian cities is caused by the usage of biomass during the winter.

A regulatory authority's acceptance of a certain air quality level as enforceable is represented by an air quality standard. The fundamental framework that establishes a legal basis for air pollution control is provided by air quality standards. Aiming to eliminate or drastically decrease exposure to toxic air pollutants, standards have been developed to safeguard human health from their harmful effects. Indoor and outdoor air pollution is seriously harmed to human health. In India, there are two types of air quality monitoring networks: online and manual. The following description categories have been selected for the air quality index of India in order to present the level of air quality and its implications on human health.

In India, AQI is split into six categories: Good, Satisfactory, Moderately Polluted, Poor, Very Poor, and Severe as shown in table 1.

**Table 6.1.** Air Quality Index (AQI) Categories. Source: (AQI, MoEFCC, 2014)

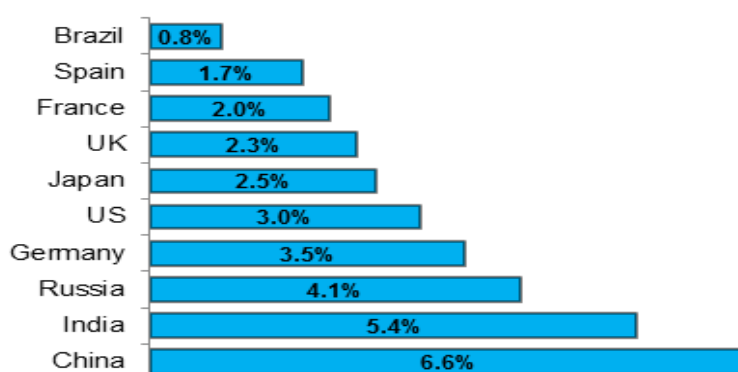
| <b>AQI<br/>(Category)</b> | <b>AQI<br/>(Range)</b> | <b>Associated Health Effects</b>   |
|---------------------------|------------------------|--|
| Good                      | 0-50                   | Little Impact  |
| Satisfactory              | 51-100                 | People who are sensitive could feel slight respiratory discomfort.   |
| Moderate                  | 101-200                | Breathing pain can occur in people with lung situations like asthma, heart patients, young children, and elderly |

|           |         | adults.  |
|-----------|---------|--|
| Poor      | 201-300 | In healthy individuals, prolonged exposure can result in respiratory issues, while in those who already have cardiac issues, it can exacerbate problems.   |
| Very Poor | 301-400 | Long-term exposure can cause respiratory problems in certain people. People who already have lung and heart problems may feel the impact is stronger.  |
| Severe    | 401-500 | Severe health consequences for patients with lung/heart conditions, as well as respiratory impacts on healthy individuals. Consequences on one's health could be felt even with only moderate physical activity. |

Therefore, to maintain air quality effectively, monitoring pollutants is crucial. The yearly average PM10 has been reduced by India Central Pollution Control Board (CPCB, 2009), which is less than the WHO target guideline value.

## 5. AIR POLLUTION EFFECTS ON ECONOMY

Air pollution shortens the life and productivity of numerous commercial assets. India's economy and development are on an exponential growth trajectory. Being a rising economy with rapid growth has a price, though, and that price is unstable air quality. The economic costs associated with pollution's harmful effects on human health are high. The global economic expenses of air pollution caused by fossil fuels were 5.4% of India's GDP in 2018 as shown in figure 2.



**Figure 6.2.** Economic Cost of Air Pollution (% Share of GDP in 2018).

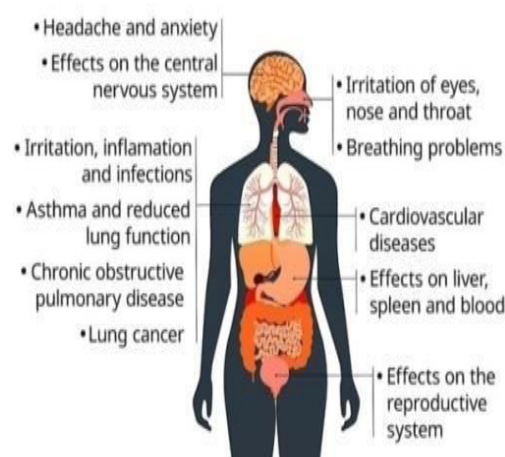
**Source:** Centre for Research on Energy and Clean Air (CREA, 2020)

In 2019, a loss of 3.8 million workdays is a result of air pollution, which is to blame for 18% of all deaths in India and responsible for paying 25% of premature mortality's financial cost. A major factor fostering the expansion of India service industry is the country's IT sector, which contributes 9% of its GDP. The cost of air pollution from the IT sector is \$1.3 billion or 0.7% of its GDP, and it also caused attendance to drop by 10% on days with poor air quality, productivity to fall by 3%, and hiring difficulties to rise by 28%. These outcomes affect the growth of a country.

An IT company in India's competitive edge over a company in the Philippines would grow by 33% if pollution levels were lower in just the capital of India (WEF, 2021). GDP in the tourism sector fell by 1%, costing \$2 billion. International visitors are beginning to reconsider their intentions to visit India due in large part to pollution. 820,000 jobs in travel and related industries were lost as a result of this. Air pollution costs Indian employers 1.3 billion or \$6 billion in lost working days annually. India could have added 1.4 billion working days in 2019 by reducing sick days caused by air pollution. In addition, the cost of air pollution to Indian businesses each year amounts to US\$ 95 billion (7 lakh crore) or 3 % of India's GDP. Air pollution has a total economic impact equal to 150% of India's healthcare expenditure, 150% of India defence budget, and 50% of yearly tax revenue (CAFE, 2021). In 2010, the negative effects of air pollution on human health cost India's economy more than US\$ 80 billion, or nearly 5.7% of GDP (Maji et al., 2016). India suffered a US\$ 36.8 billion US\$ economic harm brought caused by air pollution in 2019, which was approximately 1.4% of the gross domestic product (GDP). A loss of 28.8 billion US dollars was brought on by early deaths brought on by air pollution and 8 billion USD in losses were attributable to morbidities (AQI, 2021). Delhi and Kolkata are two Indian cities that have a big economic impact on the country and its ability to compete internationally. The political and economic powerhouse of India, New Delhi, has a long history yet, in 2019, the city well-known air pollution issue cost it \$ 5.6 billion (6% of its GDP). Kolkata which is the entry point to East and Northeast India has an air pollution cost of \$ 2.1 billion (about 2.5% of the city's GDP), which is more than Mumbai and Bangalore (CAFE, 2021).

## 6. AIR POLLUTION EFFECTS ON HEALTH

Air pollution has become a serious global hazard to human health and welfare (Kampa and Castanas, 2008) [8]. As illustrated in figure 3, it poses a serious risk to human health and can lead to issues including lowered lung capacity, skin cancer (UV Rays), eye irritation, respiratory symptoms, an increase in the prevalence of cardio-respiratory illness, and asthma (WHO, 2013; Shaw and Gorai, 2020; Lal, 2016).

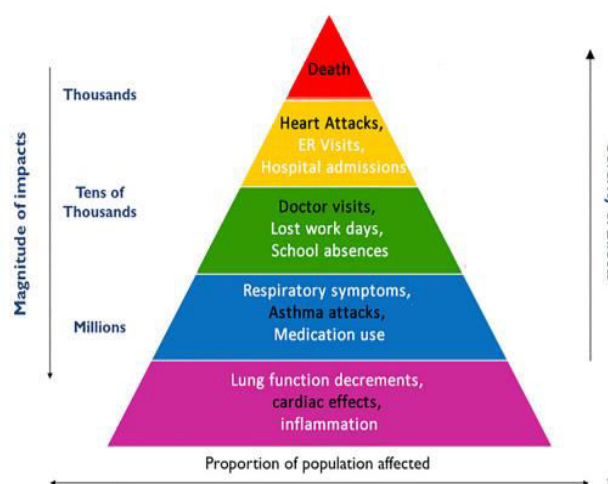


**Figure 6.3.** Health Effects of Air Pollution

**Source:** European Environmental Agency (EEA)

Air pollution may have short, medium, and long-term consequences on human health. (Gumashta and Bijlwan, 2020). The effects of air pollution vary from person to person since some persons are more vulnerable to air contaminants than others. Health concerns associated with air pollutants are more likely to affect children, the elderly and pregnant women. According to research, children who are exposed to air pollution are more severely impacted than adults since their lungs are less fully developed at birth and do not begin to function normally until they are 6 to 8 years old [9-13]. Additionally, there is a bigger chance of suffering more for those who already have health problems like heart disease, lung disease, asthma, etc (Kaur and Pandey, 2021) [14]. Air pollution-related cardiovascular and respiratory disease conditions are major causes of death. In addition, cardiovascular diseases (CVD) are the main factor in fatalities in the entire world (Usmani et al. 2020). The health impacts of air pollution, notably those caused by ground-level ozone and fine particles, are depicted in figure 4

as a pyramid, emphasizing their scope and severity. This pyramid was created by the Benefits Mapping and Analysis Program (BenMAP) of the US Environmental Protection Agency. The air pollution pyramid is a typical structure for outlining the range of negative effects on health caused by exposure to air pollution, which has been shown in figure 4 (EPA, 2020b).



**Figure 6.4.** Health Effects of Air Pollution.

**Source:** Environmental Protection Agency (EPA, 2020b)

The population is far more affected by health outcomes at the bottom of the pyramid, such as asthma episodes and cardiac consequences, which are less severe. A smaller percentage of people are affected by more severe impacts near the tip of the pyramid, such as hospital admissions and heart attacks (EPA, 2020b). Globally 92% of people breathe contaminated air, which has resulted in 6.5 million deaths globally (11.6% of all fatalities worldwide) (WHO, 2016a). An estimated 5.39 million persons worldwide passed away before their time in 2017 as a result of exposure to PM<sub>2.5</sub> pollution (World Bank, 2021). According to Global Burden of Diseases (GBD) 2019 data, the effects of air pollution on disease and disability vary by sex. Men are more likely than women to pass away from exposure to ambient air pollution. Children and women are more likely than men to die from exposure to water contamination (Fuller et. al., 2022). The World Health Organization (WHO) reports diseases associated with particulate matter (PM<sub>2.5</sub>) pollution claim the lives of more than seven million people worldwide each year (WHO, 2015). Nine of the world's top 10 highly polluted cities are located in India, which is a

fast-developing country with a growing population (WHO, 2016). Accordance to the World Health Organization (WHO), drinking tainted water and breathing polluted air cause 900,000 deaths in India each year (WHO and UNICEF, 2002). In addition, the Indian Ministry of Health reported that every year, 1.5 million children aged 0 to 5 die due to air pollution. Approximately 0.6–0.7 million Indian children under the age of five pass away due to diarrhea each year (Kaur and Pandey, 2021) [14-20]. India ranks in fifth place out of 98 nations in 2019 according to the World Air Quality Report based on weighted average PM2.5 concentrations in a pollution pandemic. India is ranked 21 of the 30 cities with the poorest air quality in the world (CAFE, 2021). About 1.67 million deaths in India in 2019 were attributed to air pollution, making up 17.8% of all fatalities there. The majority of these deaths were brought on by household air pollution (0.61 million) and ambient particulate matter pollution (0.98 million) (Kaur and Pandey, 2021)[20-28].

## **7. GOVERNMENT POLICY AND MONITORING INITIATIVES**

In India, numerous policies and programs for the control of air pollution have been implemented and addressed this issue by undertaking numerous key actions. The effectiveness and success of these programs have depended, similar to any other policy measure on coordination among different stakeholders. Furthermore, policy initiatives for pollution abatement have not yet received sufficient financial support, despite environmental and health specialists long drawing attention to the country's deteriorating air quality. Recognizing this imbalance, the Indian government raised funding for pollution control in Budget 2019–20 by roughly 10 times, from US\$ 678,000 (4.95 crores) to US\$ 62.2 million (445 crores), and this amount grew to US\$ 63.01 million (460 crores) in the 2020–21 budget (Roy et. al., 2020) [29-32].

- (i) Indian government has recently tightened regulations on industrial and vehicular emissions and plans to revise its criteria for ambient air quality. Examples of measures the government has taken to minimize air pollution include increasing the use of renewable energy sources, promoting the use of electric vehicles, and giving cooking fuel LPG to millions of families (World Bank, 2021).
- (ii) The Government of India's National Clean Air Programme (NCAP) is the most important step toward identifying and resolving the problem of declining ambient

air quality in 132 "non-attainment" cities (from 23 states of India) where the required air quality levels are not met (World Bank, 2021; Roy et. al., 2020). The principal air pollutants PM10 and PM2.5 are to be decreased by 20 to 30% using 2017 as the baseline year by 2024, according to the aim stated by the NCAP action plan (Roy et. al., 2020).

- (iii) As per the recommendations of the 15th Finance Commission, the Indian government budgeted around \$1.7 billion in 2020 to combat air pollution for the 42 Indian cities with a million or more residents during the ensuing five years, providing they cut their levels by 15% annually (World Bank, 2021).
- (iv) To assist the National Knowledge Network (NKN) in creating a training program to increase people's ability and talents for new positions in air pollution control, the World Bank is assisting India in its battle against air pollution as part of its Country Partnership Framework. The guidelines follow the National Skills Qualification Framework for India (NSQF) (World Bank, 2021).
- (v) The National Air Quality Monitoring Programme (NAMP) is a government initiative that monitors ambient air quality in 29 states and 6 Union Territories around the country (NCAP & MoEFCC, 2019).
- (vi) The National Ambient Air Quality Standards (NAAQS) are the is a government initiative and the purpose is to indicate necessary air quality levels as well as ensure the protection of vegetation, health, and property (NCAP & MoEFCC, 2019).
- (vii) The Prime Minister of India introduced the National Air Quality Index (AQI) in April 2015, beginning with 14 cities. It has since expanded to 71 cities in 17 states. The AQI is a mechanism for effectively communicating the status of the air quality to the public in simple words (NCAP & MoEFCC, 2019).
- (viii) For the Delhi NCR region, the Indian government has announced the Graded Response Action Plan (GRAP), which includes graded measures for each source organized in accordance with the AQI categories (NCAP & MoEFCC, 2019) [33-36].



## **8. CONCLUSION**

The focus of the current study is on India's excessive air pollution levels and how they affect the nation's economy and health. India, a developing nation, has seen negative effects from air pollution on both its people health and its economy. In addition to pursuing development strategies that limit future environmental harm, developing nations must also take action to address the negative effects on human health caused by deteriorating air quality and lost economic output. It is crucial to draw attention to the high illness burden and mortality caused by pollution of air in Indian cities to successfully regulate the concentration of air pollutants across the nation. In India, air pollution reduction will have a direct positive effect on consumer purchasing as well as company operations on a corporate level. It is crucial to consider India's large population, going on urbanization, and industrialization in order to prevent negative health effects from air pollution brought on by an economic transformation. To ensure the health and welfare of human development, the following actions can reduce air pollution: Utilizing low-sulphur coal in industry, sulphur removal from coal, moving toward fuels that are spreading less pollution, plantation of trees, and industrial locations were chosen following environmental impact assessments. We focused on the actions made by the government of India to minimize air pollution and raise public awareness. The studies indicate people generally have a favorable opinion of the quality of the air. The general public does not frequently use public transportation but likes acts that do not demand individual effort and are prepared to pay for environmental protection. It is observed that the air pollution crisis will have an important challenge due to urbanization and industrialization in India. India would profit from increasing its investments in specific air pollution by state management measures since doing so will help it achieve its goal of having a \$5 trillion economy by 2024. In India, rapid urbanization has led to an increase in urban migration. As a result, India's population will be primarily urban by 2050, increasing from its current share of 31.5% to 50%. Urbanization encourages increasing energy and fuel consumption, particularly in the transportation and industrial sectors, which raises the levels of air pollution.

## REFERENCES

- [1] Manisalidis, I., Stavropoulou, E., Stavropoulos, A., & Bezirtzoglou, E. (2020). Environmental and health impacts of air pollution: a review. *Frontiers in public health*, 14.
- [2] OECD, I. (2016). *Energy and air pollution: world energy outlook special report 2016*.
- [3] Dutta, S., Ghosh, S., & Dinda, S. (2021). Urban air-quality assessment and inferring the association between different factors: A comparative study among Delhi, Kolkata and Chennai megacity of India. *Aerosol Science and Engineering*, 5(1), 93-111.
- [4] AQI (2021); Available online at: <https://www.aqi.in/blog/health-and-economic-analysis-of-deaths-due-to-airpollution-in-india/>.
- [5] EEA (2023); Available online at: <https://www.eea.europa.eu/>.
- [6] Krishna Moorthy, K., Suresh Babu, S., Manoj, M. R., & Satheesh, S. K. (2013). Buildup of aerosols over the Indian Region. *Geophysical Research Letters*, 40(5), 1011-1014.
- [7] Usmani, R. S. A., Saeed, A., Abdullahi, A. M., Pillai, T. R., Jhanjhi, N. Z., & Hashem, I. A. T. (2020). Air pollution and its health impacts in Malaysia: a review. *Air Quality, Atmosphere & Health*, 13(9), 1093-1118.
- [8] Kampa, M., & Castanas, E. (2008). Human health effects of air pollution. *Environmental pollution*, 151(2), 362-367.
- [9] WHO, O. N., & Chriscaden, K. WHO (2016) WHO releases country estimates on air pollution exposure and health impact. <https://www.who.int/en/news-room/detail/27-09-2016-who-releases-country-estimates-on-air-pollutionexposure-and-health-impact>.
- [10] EPA (2020) Benefits Mapping and Analysis Program (BENMAP); Available online at: <https://www.epa.gov/benmap/how-benmap-ce-estimates-healthand-economic-effects-air-pollution>. Accessed 2023 January 15

- [11] Burri, P. H. (1984). Lung development and histogenesis. *Handbook of Physiology*, 4, 1-46.
- [12] Lee, B. K. (2010). Sources, distribution and toxicity of polyaromatic hydrocarbons (PAHs) in particulate matter. In *Air pollution*. IntechOpen.
- [13] Smith, K. R. (2013). Biofuels, air pollution, and health: a global review.
- [14] Kaur, R., & Pandey, P. (2021). Air pollution, climate change, and human health in Indian cities: a brief review. *Frontiers in Sustainable Cities*, 3, 705131.
- [15] WHO (2013). Review of Evidence on Health Aspects of Air Pollution – REVIHAAP Project. Copenhagen: World Health Organization Regional Office for Europe.
- [16] Shaw, N., & Gorai, A. K. (2020). Study of aerosol optical depth using satellite data (MODIS Aqua) over Indian Territory and its relation to particulate matter concentration. *Environment, Development and Sustainability*, 22(1), 265-279.
- [17] Maji, K. J., Dikshit, A. K., & Deshpande, A. (2016). Human health risk assessment due to air pollution in 10 urban cities in Maharashtra, India. *Cogent Environmental Science*, 2(1), 1193110.
- [18] Fuller, R., Landrigan, P. J., Balakrishnan, K., Bathan, G., Bose-O'Reilly, S., Brauer, M., & Yan, C. (2022). Pollution and health: a progress update. *The Lancet Planetary Health*.
- [19] Seinfeld, J. H., & Pandis, S. N. (2016). *Atmospheric chemistry and physics: from air pollution to climate change*. John Wiley & Sons.
- [20] Dutta, S., Ghosh, S., & Dinda, S. (2021). Urban air-quality assessment and inferring the association between different factors: A comparative study among Delhi, Kolkata and Chennai megacity of India. *Aerosol Science and Engineering*, 5, 93-111.
- [21] LAL, B. S. (2016) AIR POLLUTION IMPACT ON HEALTH AND ECONOMY.

- [22] G. Tyler Miller, Jr. and D. Hackett, "Photochemical and Industrial Smog," in *Living in the Environment*, 2nd ed. USA: Nelson , 2011, ch.20, sec.3, pp.465-471.
- [23] WHO (2015). Countries: China: Country Health Profile. World Health Organization. Available online at: <http://www.who.int/countries/chn/en/>.
- [24] WHO Global Urban Ambient Air Pollution Database (Update 2016) (2016). Available online at: [https://www.who.int/phe/health\\_topics/outdoorair/databases/cities/en/](https://www.who.int/phe/health_topics/outdoorair/databases/cities/en/) (accessed April 10, 2021).
- [25] World Health Organization and United Nations Children's Fund (WHO and UNICEF) (2000). *Water Sanitation and Health (WSH). Global Water Supply and Sanitation Assessment 2000 Report*. Geneva: WHO.
- [26] Gumashta, R., & Bijlwan, A. (2020). Public health threat assessment of vehicular load index-induced urban air pollution indices near traffic intersections in Central India. *Cureus*, 12(10).
- [27] MPCB (2010). *Action Plane for Industrial Cluster: Chandrapur. Maharashtra Pollution Control Board*. Available online at: <http://cpcb.nic.in/divisionsofheadoffice/ess/Action%20plan%20CEPI-Chandrapur>.
- [28] Clean Air Fund (2021); Available online at: [https://www.cleanairfund.org/wp-content/uploads/01042021\\_Business-Cost-of-Air-Pollution\\_Long-Form-Report.pdf](https://www.cleanairfund.org/wp-content/uploads/01042021_Business-Cost-of-Air-Pollution_Long-Form-Report.pdf).
- [29] Centre for Research on Energy and Clean Air (CERA 2020); Available online at: <https://energyandcleanair.org/publication/quantifying-the-economic-costs-of-air-pollution-from-fossil-fuels/>
- [30] World Economic Forum (WEF, 2021); Available online at: <https://www.weforum.org/agenda/2021/06/air-pollution-india-economy-business/>.
- [31] The World Bank (2021); Available online at: <https://www.worldbank.org/en/country/india/publication/catalyzing-clean-air-in-india>.

- [32] Roy, A., Chandra, T., & Ratho, A. (2020). Finding Solutions to Air Pollution in India: The Role of Policy, Finance, and Communities.
- [33] Ministry of Environment Forest and Climate Change (NCAP under MoEFCC, 2019); Available online at: [https://moef.gov.in/wp-content/uploads/2019/05/NCAP\\_Report.pdf](https://moef.gov.in/wp-content/uploads/2019/05/NCAP_Report.pdf).
- [34] PAHO (2018); Available online at: <https://www.paho.org/en/topics/air-quality-and-health/ambient-and-household-air-pollution-and-health-frequently-asked>.
- [35] Pollution, A. (2017). Health in India: A review of the current evidence and opportunities for the future July 2017. Public Health Foundation of India/Centre for environmental Health, India, 1-64.
- [36] AQI & MoEFCC (2014); Available online at: <https://pib.gov.in/newsite/printrelease.aspx?relid=110654>.

## Chapter 7

### ANALYSIS OF INDIANS INVESTING CHOICES AND THE COUNTRY'S POTENTIAL CRYPTOCURRENCY ENVIRONMENT

**Sarita Pundhir<sup>1\*</sup>, Poonam Gupta<sup>2</sup> and Mohd Akif<sup>3</sup>**

<sup>1</sup>Associate Professor, Delhi Technical Campus, Greater Noida, India

<sup>2</sup>Associate Professor, IMS Ghaziabad, India

<sup>3</sup>Student, Delhi Technical Campus, Geater Noida

#### ABSTRACT

*A currency that solely exists digitally and without a central issuing or governing body is known as a crypto currency. The block chain technology is used to record and monitor transactions in a decentralized system in order to avoid fraudulent activities. Block chain technology is a system that is used to log transactions and is difficult to hack. Every transaction that is replaced on the block chain is recorded in each participant's ledger, and each block in the chain comprises a range of transactions. A hash, a type of immutable cryptographic signature, serves as the permanent record of block chain transactions. A hacker would need to alter each block of a chain that is continuously growing to disrupt the block chain, increasing system security.*

#### 1. INTRODUCTION

Online currencies with ledgers protected by encryption, such as B-Money and Bit Gold, were experimented with and formulated between 1998 and 2009, however they were never fully developed. A document titled Bit coin - A Peer to Peer Electronic Cash System was published in 2008 by an author named Satoshi Nakamoto, whose real identity is still unknown. This led to the emergence of cryptocurrencies, often known as digital or virtual currencies created to function as a medium of exchange. According to CoinMarketCap.com, there are over 2,200 different crypto currencies that are presently traded publicly. On June 6, 2019, the value of all crypto currencies was approximately \$246 billion, and the value of all bit coins was approximately \$136 billion.

## **2. REVIEW OF LITERATURE**

Based on cryptography, which has numerous benefits over conventional payment methods (like Visa and MasterCard) like high liquidity, low transaction fees, and greater anonymity, cryptocurrency offers (Abraham.M,2019) [1]. Apart from that, there are a number of advantages to using cryptocurrencies that should be mentioned. The two main benefits of cryptography are that it prevents users from fraudulently tampering with their cryptocurrency balances and ensures that only the proper "address holder" can "spend" the funds associated with an address.

The focus of Bitcoin and the Future of Cryptocurrency by Rahman and Dawood (2019) was on cryptocurrency as a creative and technologically cutting-edge alternative to globalization [2]. It looked at the possibility of a different method for processing payments across borders, and it suggested that, if properly regulated, cryptocurrencies would be able to solve many of the current financial problems.

In his 2017 article Bit coin As Developing Virtual Currency and Its Corresponding Effect on India, C.A. (Dr.) Pramod Kumar Pandey concentrated on the high profits and great risk that go along with it. He thought that because bit coins are unbacked by anything, investing in them would be like diving into a dark well without knowing its depth. Establishing it as a kind of money or a commodity would be one of the difficulties to be overcome. If this is recognised as a currency, the RBI will likely take the lead in its regulation; if this is recognised as a commodity, SEBI will start the regulatory process [3].

Despite the astonishing rise in cryptocurrency popularity, Komal Dhande (2017) does not believe that paper money will be replaced by cryptocurrencies any time soon in his Bit coin and Its Prospects in India study. The challenge is to arrange it such that consumers and law enforcement agencies can ensure the security of transactions. Another challenge is figuring out how to tax cryptocurrency. Bit coin growth has generated a lot of curiosity, but investors are reluctant to invest due to the high level of risk. Notwithstanding the study's findings that there is belief in virtual currencies, a solid legal and regulatory environment is necessary for investors to have confidence in this type of currency in India.

In her 2017 article CRYPTOCURRENCY-SCOPE IN INDIA, Dr. Vijeta Banwari explores the evolution of finance and the financial industry. Although there is a significant risk involved, cryptocurrency is becoming more and more popular, making it challenging for the government to regulate the transaction. More than 30 new exchanges reportedly filed for membership in the last two months, according to the Block chain Foundation of India, a lobby group made up of about 45 cryptocurrency dealers [4].

2018 (The Print). The storage of data could be greatly improved with the use of block chains. Notwithstanding the prohibition on cryptocurrencies, many government entities have utilised the block chain (Andhra Pradesh, Maharashtra, and so on). Future transactions might not go via banks but instead be handled over the counter.

The Development of Cryptocurrency in India by Shailak Jaini (2018) focuses on issues like the influence of cryptocurrencies in India and the opportunities that come with them [5]. Also, it discusses the many facets of other nations' laws and regulations surrounding the introduction of cryptocurrencies.

### **3. CRYPTOCURRENCY IN INDIA**

The present decline in cryptocurrency prices is evidence of how harmful cryptocurrencies are to the Indian economy. The legalisation of cryptocurrencies in India has received strong opposition from the Indian government. The main reason why the government decided to pursue this line of action is the difficulties in tracing decentralised crypto currency transactions, which might be advantageous for hackers, criminals, and terrorist operations [6]. The second reason is that the banking services industry may be seriously threatened by the cryptocurrency market. Demonetization has led to an increase in the amount of Indian rupees being exchanged for cryptocurrencies, which has led to the growth of cryptocurrencies like Bit coin both in India and other nations.

**Security and Dependability:** Because it is a digital form of payment, crypto currency has become a popular platform for money laundering, terrorism financing, drug trafficking, and hacking. Because it leads to a decreased sense of security and a lack of dependability, this has increased population fatigue to a greater degree.



### **3.1. Speculative and Risky**

There are many different sorts of cryptocurrencies on the market, and they all operate on the speculative market they help to establish. Not all cryptocurrencies will yield profitable investments for crypto currency investors [7]. The crypto currency's supply and demand factors alone determine its price. When it comes to valuing cryptocurrencies, speculation takes centre stage, adding to the danger.

### **3.2. Taxing Trouble**

The taxability of bit coin gains is not explicitly stated in the income tax regulations. The income tax authorities haven't completely ruled out the prospect of taxing crypto currency gains, either. Depending on how long they held the crypto currency, if an investor makes a capital gain from their investments, they may be subject to taxation as either long-term capital gain or short-term capital gain.

### **3.3. Lack of Regulatory Body**

While other countries around the world have already reacted to the usage of cryptocurrencies, the Indian government is taking a wait-and-see approach. There is no regulatory authority to oversee crypto currency transactions. This has raised the likelihood of fraud, posed a threat to investor protection, and made it more difficult to track the flow of money through the economy. The Reserve Bank of India and other global central banks were unable to monitor crypto currency activity.

### **3.4. Price Volatility and KYC Norms**

An investor who signs up for a crypto currency transaction must comply with KYC laws, which may take some time for the approval by the respective wallets. This is because the pricing strategy for cryptocurrencies depends on supply and demand as well as speculative activity. This clearing procedure varies from wallet to wallet and could take many days. Because the currency's value would fluctuate more fast under these conditions, the investor would be more likely to lose out on the opportunity to earn.

## **4. PRESENT AND FUTURE OF CRYPTOCURRENCY IN INDIA**

Currently, there is no regulation of cryptocurrencies in India. Because there is no regulation, certain bitcoin exchanges, including Unocoin, Zebpay, etc., have started trading cryptocurrencies with Know Your Customer policies (KYC) norms. The

Reserve Bank of India initially opposed cryptocurrency trade in India, but in 2014 the RBI indicated interest in the block chain technology that cryptocurrencies employ to restrict the circulation of actual paper money. The RBI produced a financial stability paper in 2015 to highlight the significance of private blockchain. Block chain technology was used by ICICI Bank and Emirates NBD in 2016 to perform transactions and remittances. Emirates NBD is one of the largest banking groups in the Middle East in terms of assets, the year 2017 saw a white.

## **5. HOW SECURE IS CRYPTOCURRENCY?**

If something is off, it costs money and takes a long time to be discovered.

There are no geographical restrictions or conversion fees when transferring cryptocurrency; anyone with internet connection can do so. The world has recently seen the value of digital currency during the current conflict between Russia and Ukraine. By donating cryptocurrency, people from all around the world showed their support for Ukraine. Alex Bornyakov, the deputy minister of digital transformation for Ukraine, said that the nation has raised about \$100 million to fend off the Russian invasion.

The currency's supply is constrained since fresh money only enters the economy once blockchain miners approve any transaction. Because more people are becoming aware of the potential of this asset, demand for cryptocurrencies is growing daily. The cryptocurrency market is extremely dangerous and volatile due to the coin's limited supply and growing demand. invasion.

In the Union Budget 2022–2023, Finance Minister Nirmala Sitharaman made two pronouncements that will have a big impact on the Indian crypto asset market. The Digital Rupee will be adopted in the fiscal year 2022–2023, and the Indian government would impose a 30% tax on the earnings generated by cryptoassets. The Indian government has finally made the decision to accept cryptocurrencies after much hesitation and trepidation. Although there is still some uncertainty over the future of cryptocurrencies, these announcements have sent a strong message to enthusiasts that cryptocurrencies are getting closer to becoming legal in the

Although cryptocurrencies have been in use since 2009, they have experienced unheard-of growth during the past several years. Younger investors, who have a greater appetite

for risk and are passionate about obtaining necessary financial education to benefit from the ever-evolving environment of digital finance, are particularly fond of crypto assets. The Economic Times reported that almost 20 million Indians are involved in bitcoin trading.country [8].

According to Chainalysis, a business that specialises in blockchain analysis, the global use of cryptocurrencies increased by 880% in 2021. India placed second in the ranking after Vietnam with an index score of 0.37. The Indian cryptocurrency market increased by 641% in a single year. It is obvious that the global cryptocurrency business has a lot of promise and is developing quickly. That appears to be a potential sector for India as well.

## **6. CONCLUSION**

Cryptocurrency is one such technology that has become widely used. Because cryptocurrencies are associated with money laundering and terrorism financing, the RBI has repeatedly cautioned Indians against using them. Cryptocurrency, on the other hand, is a cutting-edge technology and a tool that needs to be prepared for. Despite the absence of any regulatory action from the Indian government, the number of cryptocurrency investors has been growing very swiftly in recent years. The use of such a currency in India should be appropriately regulated right immediately because it is becoming more and more popular. There is reason for hope given that the future of cryptocurrencies in India seems promising.

## **REFERENCES**

- [1] Scott, Brett (2016): How can cryptocurrency and blockchain technology play a role in building social and solidarity finance? UNRISD Working Paper, No. 2016-1, United Nations Research Institute for Social Development (UNRISD), Geneva.
- [2] Omri Marian, Are Cryptocurrencies 'Super' Tax Havens?, 112 Mich. L. Rev. First Impressions 38 (2013), available at <http://scholarship.law.ufl.edu/facultypub/358>.
- [3] Fry, J. & Cheah, E.-T., Negative bubbles, and shocks in cryptocurrency markets, International Review of Financial Analysis (2016), DOI: 10.1016/j.irfa.2016.02.00.

- 
- [4] Gabor, Daniela and Brooks, Sally Heather [orcid.org/0000-0002-1005-1245](https://orcid.org/0000-0002-1005-1245) (2017) The Digital Revolution in Financial Inclusion: International development in the fintech era. *New Political Economy*. pp. 423-436. ISSN 1469-9923.
- [5] Chelliah, Paramasivan & Ganeshkumar, V. (2013). Overview of Financial Inclusion in India.
- [6] Mittal A. an analytical study of present position of bitcoins
- [7] Vyshnavi R. Bitcoins as a Payment System: Problems and Challenges Developments with Particular Reference to India. *International Business Management*.
- [8] Fatima F. Bitcoins: The First Cryptographic Currency An Overview.

## Chapter 8

### THE HUMAN THOUGHT POLLUTION IN THE ENVIRONMENT

Ajay Pal Indolia<sup>1</sup> and Supriya Tiwari<sup>2</sup>

<sup>1</sup>Associate Professor, Delhi Technical Campus (GGSIPU Delhi), Greater Noida, India

<sup>2</sup>Student, Delhi Technical Campus, Geater Noida

#### ABSTRACT

*Deep thought would reveal that the majority of current global issues are a result of thought pollution, as it undermines one's sense of objectivity, consideration, and cooperation and turns him callous, hostile, violently prone, and vicious. It has an impact on commerce, politics, business, friendship, and all other relationships. It also destroys genuine love, kindness, and human values, all of which are necessary for peace and a happy life. Realizing oneself and our relationships with other people is the key to finding the ultimate solution to this issue. No problem can truly have a long lasting solution without the moral and spiritual values that can only be brought into play and sustained by a spiritual orientation of the relationship between man and man. If this is not done, science devoid of spirituality might dangerously propel humanity towards a nuclear disaster, population explosion, or environmental upheaval. Let's use spiritual understanding as a strong tool to purify our soul from negative thought patterns and live in perfect harmony with the elements of nature.*

*Keywords: Thought pollution, Spirituality, Negative thoughts, Yoga meditation, Heartfulness cleaning*

#### 1. INTRODUCTION

We are mindful of air, water, and noise pollution. On this planet, there is also mental pollution. Negative ideas can contaminate your inner calm, which is known as thought pollution. Humans need the ability to think in order to function. We think to address our issues. Thoughts become difficulties when we start inventing them in our minds.

There are frequencies associated with our thoughts that draw in other ideas. For instance, if we have an inspired idea, we will likely follow it up with another one, unless another thought, like a remark from your boss, interrupts this frequency.

Once a negative thought enters our consciousness, it will attract other negative thoughts. We don't think as we slumber. Even though our brains are active, we do not think. We feel more rested if we get seven to eight hours of sleep. Since we get to begin a new series of thoughts, now is the greatest moment to think positively.

Your day should begin with gratitude for life. Throughout the day, you will have related thoughts. Start appreciating again once a negative thought from the outer world interrupts this string. The easiest approach to prevent negative thoughts from entering your mind is through appreciation. This procedure is ongoing. Every day, we must clean our thoughts just as we do our bodies. Jewelry is jewellery even if it is covered in dust. Money that has fallen apart retains its value; we just straighten it out. The mind functions similarly. We are able to appreciate its beauty when our minds are free and clear. We realize how magnificent it is.

We can change our cognitive processes by focusing on a strong thought. It can come from within, such as a pleasant internal dialogue, or a compliment from a friend. Being reliant on an outside power is undesirable. Practice looking inward to change your thought [1]. You are utilizing an endless force rather than placing limitations on yourself. You approach the entire Universe by turning inward.

This chapter is meant to start a positive mental chain in the morning. How toxic are negative thoughts to the environment and what can be done to reduce their bad consequences.

## **2. EFFECT OF THINKING**

The same is true of thinking. As a self-made individual, for instance, have you ever set your mood so low that when someone came on your door, you did not feel they should enter? Because this is a stinker. You do not even want to be in your own space, much less that of someone you love, because of how empathetic you are. This is how moods work, and it is thoughts that bring about moods.

They have the effect of making you feel terrible for anyone who enters the room where the major commotion occurred before the fan can blow it all out. In such a stench-filled environment, you do not want them to enter. You were actually considering separating yourself! That was just how horrible it went. When was the last time you could not be in your own space? How could it get that terrible in there from you?

So, Jesus asserts that thinking generally stinks a lot of the time. Everyone must breathe that air. Everything becomes tainted in the astral. It becomes difficult to navigate through it. You might believe that when you passed away, you travelled to an elderly person's residence or an embalming facility. You're making an effort to go through it, but you are unsure if you can continue to breathe. What will occur is unknown.

Jesus therefore says, "Meet the mother." The daughter is one you have seen. Here is the mother, now. You must observe the source from which this garbage emerged. What is going on in this neighbourhood? Someone seems to be unhappy. You must track down and turn off the cause of the annoyance. Yeah. Otherwise, as you can see, you are not aware of what you are consuming everywhere. Thus, as you can see, some of those people were over thinking things [4].

According to Jesus, clearing your mind is a good idea because it helps you to understand how profoundly every thought we have has an impact on everyone around us. If someone knocks on the door when the person is sitting there thinking in an unpleasant manner, they will inhale that. Also, the material is actually translucent to the walls, much like an AC unit. It is moving around, though perhaps more densely so close to the source.

And so, in fact, if you are a caring person, you would not just tell everyone to leave the house and go outside if you wanted to live in a reasonable environment or create a decent area for others.

Sending them away is simply not acceptable. You cannot constantly send everyone outside. You need to be in a circumstance where the source is pure. Where you are not consuming that unsavoury food. Where your brain is not being poisoned by the stuff you are thinking about. That is impossible because if you did, everyone would have to split or breathe it.

### **3. IT'S VERY IMPORTANT WHAT PEOPLE THINK**

It is crucial to consider what others think. Do not raise a fuss over anything because if you do, people will either perish, deviate off course, or become ill. You have seen it before; it occurs frequently. You have probably seen someone enter someone's workplace looking fantastic and leave looking like trash. What the hell just occurred inside? They inhaled and exhaled.

Therefore, the mental discipline of the people living there is the key to a decent atmosphere. God help us with the rest. God help us if we actually believe that it is crucial that we think whatever we want to think. Please pray for us. And worst of all, may God protect our friends. God help anyone who knows us. They are unwittingly suffering as a result of garbage they did not even emit. Do you understand? Therefore, in that circumstance, God be with everyone [2]. And you are pretty much the only God who can do anything about it. Mind control is a must. It must be acceptable to maintain the object in the proper direction and out of the shadows. If not, everyone must perish along with it. Everyone must breathe it in. It will have an impact on everyone.

Because we constantly educate ourselves on how to think, for example, we are self-made individuals. See what I mean? That can then turn into a circle. You have formed your own set of beliefs, as well as your own methods of reacting to events, and so forth. Through justification and rationalisation, you teach yourself what everything is. Then, those harmful thoughts start to emerge automatically as a result of a set of knowings and actions.

### **4. BENEFIT OF THE DOUBT**

The solution is the mind control and giving people the benefit of the doubt. We have a lot of reservations, as you can see. We have a lot of self-doubt. We have a lot of reservations about other people. And our best defence is uncertainty. "I doubt this, and I doubt that, and that shields me." In America, there is a phrase that goes, "Give them the benefit of the doubt." That basically says they are innocent until proven guilty.

Doubt, when accumulated, presents an opportunity for growth and understanding. To derive value from doubt, it is essential to share it and extend the benefit of the doubt to others. This means withholding judgment and considering alternative perspectives even



when uncertain. Rather than assuming someone is a serial killer, for instance, you choose to give them the benefit of the doubt, acknowledging that they may not be.

Within us resides an abundance of accumulated doubt, carrying with it an immense potential for granting others great benefits. Imagine bestowing upon them the interest or profit of our doubt, making them exceedingly prosperous! Let us generously provide everyone with the full extent of the benefit of our doubt. In moments of uncertainty, grant others the benefit of the doubt, and witness a wealth of positivity unfolds. Likewise, when plagued by self-doubt, extend to yourself the same gift of the benefit of the doubt. Envision the immense reservoir of benefits that would emerge, enriching the lives of all involved.

In a memorable Bill Hicks skit, there was a man who had an epiphany while walking with his wife. He exclaimed, "Eureka! Dirt! We have an abundance of dirt. We can sell it!" This seemingly simple idea turned out to be brilliant because he realized that he was not dirt poor but rather dirt rich. Similarly, we can draw a parallel to our collective wealth of doubt. We are doubt rich, and by being willing to share the benefit of the doubt, we can bring riches to everyone, not just ourselves. This concept follows a logical line of thinking, as the more we give; the more we receive, creating a cycle of abundance and prosperity for all involved.

## **5. SOURCE OF THOUGHT POLLUTION**

A crucial step towards purifying our thoughts is to address the root cause of pollution rather than merely focusing on the visible manifestations [5]. Often, individuals only recognize the material pollution present in the branches of a polluted tree, neglecting the seed or root from which the pollution originated. Consequently, without eliminating the foundational source of thought pollution, true purification of the source cannot be achieved. It is imperative to acknowledge the significance of eradicating the root basis of pollution to effectively restore clarity and purity to our thoughts.

The presence of material pollution has inflicted direct harm upon human life, animal life, and even plant life. How did this situation come to pass? The root cause of pollution can be traced back to the human mind. According to certain non-Buddhist religions like Christianity and Judaism, the pollution of thought has existed since the

earliest days of humanity, since the story of Adam and Eve. In these religious narratives, God Jehovah is depicted as prideful in his divinity, prone to anger when confronted with evil, and even engaging in acts of war to protect his followers. These actions, attributed to impure thought, stem from the impurity of the mind.

Prior to the occurrence of material pollution, there exists thought pollution as the underlying seed of potential impurities. This notion aligns with the writings of Ralph Waldo Emerson, who proclaimed that every thought originating from genius and compassion has the capacity to transform the world. He further argued that truly great individuals are those who recognize the supremacy of spiritual forces over material ones, acknowledging that thought governs the world.

In summary, the presence of thought is intrinsic to life itself, and prior to the manifestation of material pollution, thought pollution exists as its origin. Ancient texts and philosophers, such as Proverbs and Marcus Aurelius, emphasize the profound influence of thought on our existence. Emerson's writings underscore the transformative power of thought, asserting that those who grasp the supremacy of spiritual forces over material ones comprehend that thought holds the reins of the world.

## **6. EFFECT OF TRANSFORMATION OF CONSCIOUSNESS**

Attaining complete purification that leads to the transformation of the eight consciousnesses into the five wisdoms has always been a challenging endeavor, even in ancient times. However, practicing the two-fold path of non-egoism is not an impossible task. It is feasible to purify the self held by the seventh consciousness, which can result in the cessation of conflicts between individuals and nations. Although eliminating the pollution of the sixth consciousness, the mind itself, may be difficult, we can strive to diminish some of the five desires, thereby instigating change. By engaging in this pursuit, temporary peace can be achieved.

Through my prayers and ongoing dedication to the ten perplexities, I seek to facilitate this transformation. In this process, believers have the potential to convert demerit into merit, impacting the collective karma of the entire world. Even if only one person is inspired, I will not be disheartened.

## **7. PRESERVING THE SUBTLE BODY'S PURITY**

Similar to how we clean our physical bodies every day, for self-transformation to be an ongoing process, the subtle body needs to be regularly cleansed. If not, it takes on the characteristics of a unclean lake where the presence of turbulent water obscures the lake's bottom. In a tumultuous mind, uncertainty and a lack of vision result when there is no clarity. As a result, in order for us to become the best versions of ourselves, the Heartfulness Cleaning, becomes essential [1]. How are impressions created?

For a moment, try to imagine what it would be like to have a consciousness as pure and calm as a pool of crystal. Similar to how a disturbance causes turbulence in water, when a thought, an emotion, or an event enters that tranquil state, it causes a ripple. Impression-like energy knots, known as ripples, develop if the ripples are not removed. Samskaras are formed as the impressions get more intense and durable.

Our subconscious programmes are primarily caused by samskaras. They develop our behaviours based on our aspirations and worries. When they are repeated again, they are similar to raindrops turning into streams, which eventually turn into rivers. No matter how much we may wish to change, unless we get rid of these samskaras, we remain entangled in our habits and find it difficult to break free. You can practise Heartfulness Cleaning and learn how to remove impressions from your mind for yourself. Read the book Simple Heartfulness Practises for additional information on these techniques [6].

## **8. EFFECT OF MEDITATION ON THE EVOLUTION OF THOUGHT**

The function of contemplation, thought, and feeling is manas, the fourth and final part of the subtle body. Meditation is the most effective way to refine this aspect of the mind [1]. Consider what we do each day as we get ready to meditate: We unwind and focus inside, away from the sensory input of the outside world, once we have found our meditation place and our chosen sitting position. The mind is then brought to the heart, where it is gradually allowed to dwell on just one thought rather than its usual activity of many, different thoughts. But that merely serves as a preparation for meditation, as it is known in yoga. That thought is like a doorway opening inside, and it will typically disappear at some point, allowing the focus of meditation to be sensed directly through inner experience.

You would get a headache and be unable to let your awareness soar if you kept thinking just that one thought the entire meditation. In order to be able to melt into the experience of the presence of Divinity, you must go deeper than that first concentrate on one thought [1]. When you experience the divine presence, you gradually vanish into the depths of your own being, where feeling itself eventually vanishes. The ego has reached its purest form in this moment, and you are submerged in universal consciousness [3].

So, the level of sensation first flourishes when manas develops through meditation. When we are no longer required to feel anything, we arrive at a condition of contentment. But then something drives us past that as well, and we reach a condition where we desire to become something more—a state of evolving into ever-more-perfect versions of ourselves. Finally, we transcend the desire to change and arrive at a state of absolute being, unification with the unmanifested universal consciousness [3].

## **9. CONCLUSION**

Human thought pollution refers to the negative impact of various factors on the quality and clarity of our thoughts and cognitive processes. After considering the topic, I can conclude that human thought pollution is a significant problem that has an impact on both people and society as a whole. It arises from a variety of sources and has wide-ranging consequences on our mental well-being, decision-making abilities, and social interactions.

To combat thought pollution, it is essential to develop awareness of our thought patterns and cultivate yoga practices that promote mental clarity and emotional balance. Heartfulness meditation with cleaning and engaging in activities that bring joy and relaxation can be helpful in reducing thought pollution.

## **REFERENCES**

- [1] Patel, K. D. (2019a). *Designing Destiny: Heartfulness Practices to Find Your Purpose and Fulfil Your Potential*. Hay House.
- [2] Bhawuk, D. P. S. (2011). *Spirituality and Indian psychology: lessons from the Bhagavad-Gita*. *Spirituality and Indian Psychology* <https://doi.org/10.1007/978-1-4419-8110-3>

- [3] Patel, K. D. (2017). The evolution of consciousness. Heartfulness (Vol. 2, 12). Sahaj Marg Spirituality Foundation. <https://www.heartfulnessmagazine.com/editions/december-2017/>
- [4] Hanson, R. (2013). Hardwiring Happiness: The new brain science of contentment, calm and confidence. Harmony Books
- [5] Brewer, J. (2017). A simple way to break a bad habit. Mindful (Vol. 11). [www.mindful.org](http://www.mindful.org)
- [6] <https://heartfulness.org/en/simple-heartfulness-practices/>

## Chapter 9

### INDIAN ECONOMY ON WORLD MAP

Anupama Sharma<sup>1\*</sup> and Daksh Pratap<sup>2</sup>

<sup>1</sup>Professor, Delhi Technical Campus, Greater Noida, India

<sup>2</sup>Student, Delhi Technical Campus, Geater Noida

#### ABSTRACT

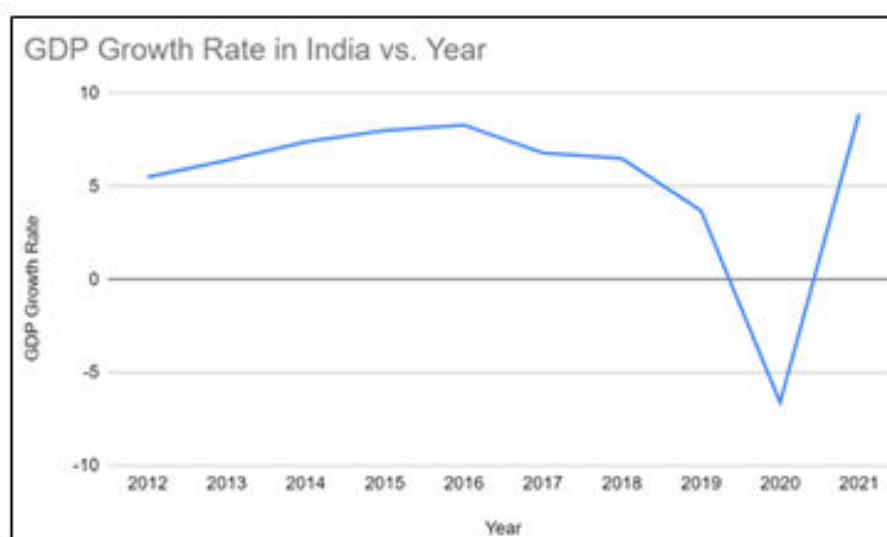
*The Indian economy has witnessed a transformational journey over a century from the status of being golden bird to the most impoverished nation to the fastest emerging economy in the world. India which was known for its cultural heritage, its richness status and significant institutions was exploited by invaders who used its resources to their advantage. Post independence India was left as the most poorest and backward economy. The journey of India from its downtrodden state to the current progressive state is being highlighted in the current chapter. The focus is to understand the factors that have contributed to achieve its present status of fastest emerging nation economically and where Indian economy is positioned on the world map.*

*Keywords: Economy, Post-Independence, State*

#### 1. INTRODUCTION

Indian economy has gone through epic journey and has transformed over century. Long term growth or downfall of economy of a country influences all businesses regardless of country, sector and geography. India being one of the most populated country in the world after China, has transformed itself from the one of the poorest economies post independence to the current third largest economy in the world. Over the centuries the pace of the structural reforms in economic sector was very slow in India. As the Indian economy has always been dominated by the agricultural sector, it has remained the major contributor in India's GDP and hence the determinant of economic progress. Past decade has witnessed India as the fastest growing economy amongst all major democracies in the world having maintained a growth of around 7% [1].

The Indian GDP has substantially increased above average over the past few decades. The more and more goods and services are being produced over the years which are enabling India to uplift its people above poverty level. The major contributor to the growth in recent past is the service sector of India which has been the fastest expanding and most significant sector of the economy. As per the report of World Bank, 2022, India's growth in terms of its Gross Domestic Product in the first quarter of 2022-23 was around 9.7% as compared to the previous quarter. When the GDP of any country grows it is an indicator of the sound health of economy which eventually leads to industrialization and increased employment and purchasing power of its countrymen.



**Figure 9.1.** GDP growth Rate in India vs. Year

*Source:* World Bank

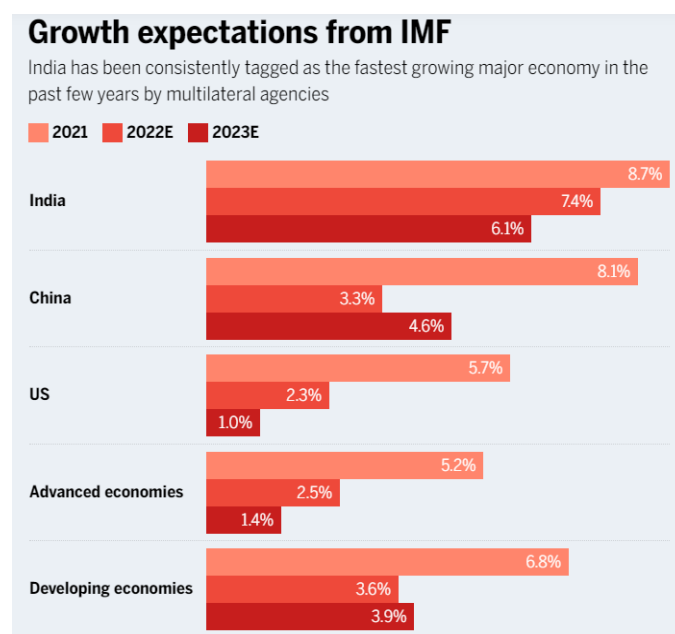
Post independence Indian government's only focus was to elevate the economic condition of country and its countrymen as it was left by Britishers in the state of extreme poverty and economic and social inequality. The government strategically began framing policies which aimed at the social and economic welfare of the people especially the most deprived ones [2]. The developmental strategy aimed at self reliance, economic and social development and alleviation from poverty. In order to achieve this target the government built democratic framework with inclusion of both public and private sector and made revolutionary changes through regulatory reforms for the economy.

### **1.1. Resilience of Indian Economy**

As per the report of Morgan Stanley (2022) it has been projected that India will surpass Germany and Japan by 2027 to become the world's third largest economy and will have the world's third largest securities markets by 2030. This remarkable achievement is the result of the liberal path India has adopted for economic development which has pushed India seven places upward. The Indian GDP growth being the strongest in 2022-23 amongst the largest economy is a contributor to the tune of 28 and 22 percent to Asian and global growth respectively. The main driving forces for economic boom highlighted by the report are digitization, global off shoring, credit, consumer and energy access and transition. The report focuses on medium to long term position of the economy, wherein certain challenges are being faced in terms of exports which have fallen by twenty percent in 2022 as compared to the previous year 2021 but this is foreseen as short-term position. The most affected segments are Jewellery, Gems and engineering exports. The other segment which is likely to get hit is software exports on account of the lay-offs in technology sector,. As the exports of India have fallen in current fiscal year 2022-23, the bank credits to exporters have also shrunk by twenty five percent. This has led to strengthening of US dollar which hit the high mark of Rs 82.5 per US\$. Despite these challenges India is very well positioned to deliver domestic demand [3].

To mitigate and control the fiscal deficit, government is eyeing on private sector investment which is increasing on account of favourable trade policies. The government is also taking various measures for price stability of goods like reduction in import duty on various critical raw materials and cutting down excise duty on petrol and diesel. Given the volatility of crude oil prices globally and the measures taken by RBI in the past, it can be successfully projected that Indian Government and Central Bank are likely to take suitable measures in terms of additional rate hikes to curb inflation.





**Figure 9.2.** Growth expectations from IMF,

*Source:* HDFC Mutual Fund

It has been observed in a study by HDFC Mutual Fund (2022), the debts to non financial sectors since the beginning of recession in the world in 2008, India is amongst few economies which has lowest debts.

## 1.2 Critical Infrastructure Accessibility

There has been a phenomenal improvement in basic infrastructure accessibility. The BofA Global Research, Government of India (2022) reports that in housing sector, the population in rural areas now have access to affordable housing which has gone up to 25 million houses in financial year 2022 from one million houses in the year 2015 [4]. Tap water accessibility has gone up to 52% in financial year 2022 from that of 13% in financial year 2015. Electricity, Indoor sanitation and LPG access by households have almost doubled over past decade. Piped gas connections have gone up by four times in just seven years beginning from 2015. India ranks sixth in the total GDP and share of world GDP as shown in figure 1.3.

| Rank | Country        | Total GDP (USD, Trillion) | GDP per capita (USD) | Share of World GDP |
|------|----------------|---------------------------|----------------------|--------------------|
| 1    | United States  | 19.5                      | 59,939               | 24.08%             |
| 2    | China          | 12.2                      | 8,612                | 15.12%             |
| 3    | Japan          | 4.9                       | 38,214               | 6.02%              |
| 4    | Germany        | 3.7                       | 44,680               | 4.56%              |
| 5    | India          | 2.7                       | 1,980                | 3.28%              |
| 6    | United Kingdom | 2.6                       | 39,532               | 3.26%              |
| 7    | France         | 2.6                       | 39,827               | 3.19%              |
| 8    | Brazil         | 2.1                       | 9,881                | 2.54%              |
| 9    | Italy          | 1.9                       | 32,038               | 2.40%              |
| 10   | Canada         | 1.6                       | 44,841               | 2.04%              |
| 11   | Russia         | 1.6                       | 10,846               | 1.95%              |
| 12   | South Korea    | 1.5                       | 29,958               | 1.89%              |
| 13   | Australia      | 1.3                       | 53,831               | 1.64%              |
| 14   | Spain          | 1.3                       | 28,175               | 1.62%              |
| 15   | Mexico         | 1.2                       | 9,224                | 1.42%              |

**Figure 9.3.** Ranking as per total GDP and Share of World GDP

*Source:* Refinitiv, MOSPI and World Bank

## 2. CONTRIBUTION TO THE GLOBAL ENVIRONMENT

United Nations Framework Convention on Climate Change is set up to initiate positive measures wherein India has set a target of generating half of the electricity requirement from non fossil fuels resources by 2030 which is a nationally determined contribution towards reduction of global warming and climate change.

The widespread use of internet on account of increased accessibility has enabled India to achieve leading position globally in terms of digital payments. Almost sixty percent of payments in India are now digital or UPI based. The easy and affordable accessibility to internet has contributed to the explosive growth of Indian economy. As per the projections made by PwC for the next half decade commencing from 2020, India will make cashless transactions to the tune of US\$ 1.9 billion which potentially will be tripled by 2030.

The Bloomberg data (2022) highlighted that highest international investment were made in Indian equities in second half of 2022 by Foreign Portfolio Investors after withdrawals from stock markets that began in May 2020. The Foreign Portfolio Investors (FPI) started pulling out their investments in 2020 due to the increased cost of investments since global economies started increasing interest rates that made investments in emerging economies even more costly for global investors and FPIs. The

international investment inflows in Indian stock market amounted to around INR sixty thousand crore in August 2022.

As per the report of Ministry of Statistics and Program Implementation, 2022, India has with its social welfare and education schemes has reached the literacy rate of 79% as of 2022 and its average life expectancy has increased to around 70 years due to medical advancements and has been able to pull 280 million people out of poverty. The government in the current phase is focusing on the inclusive development and is framing various policies with this objective.

### **2.1 Factors Affecting Economic Growth of India**

The GDP of India in the first quarter of current year 2022-23 has increased by double digits. The major sectors that have contributed to the growth of the economy are highlighted here.

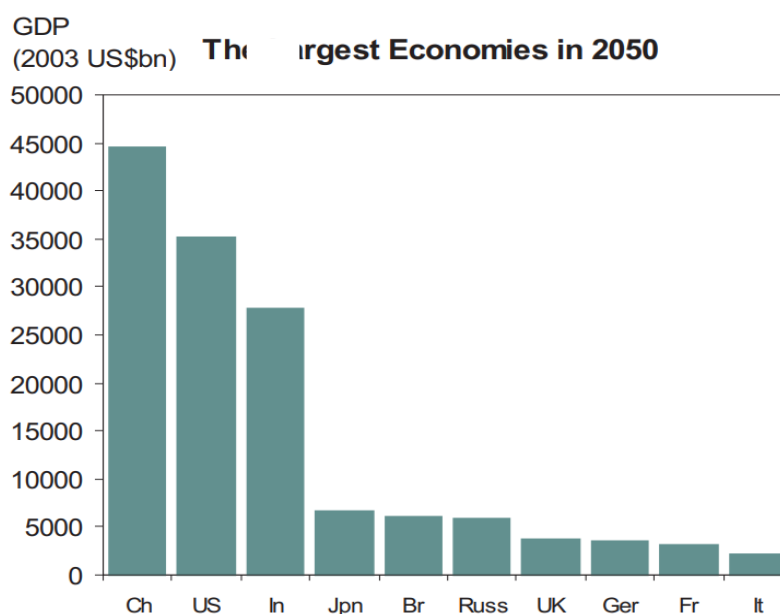
- **Healthcare Sector:** The pandemic has emerged as an opportunity for India to lead in vaccine production globally. The wide scale production of vaccine in various regions of India has resulted in the export of vaccine to various countries which eventually have contributed to the increase in India's GDP.
- **Rapid Growth in Investment Sector:** Investment sector in India has seen a rapid surge in recent years, wherein investments by both corporate and individuals have grown phenomenally. The favourable policies by government have elevated Indian position in terms of ease of doing business worldwide. As a result there is a tremendous growth in domestic and international investments in India which eventually lead to increase in import and export of India. This has highly influenced positive growth rate in GDP.
- **Increase in Foreign Reserve:** The investment oriented and simplified foreign trade policies of the government has made it possible for India to create fifth largest foreign exchange reserve in the world which is around UD\$ 506.36 billion as of January 2023 as per statistical reports of Reserve Bank of India and it is only behind China, Japan and Switzerland and Russia. Rise in the Indian position to the fifth in the world in context of foreign exchange reserve has created a positive and favourable sentiment amongst prospective investors worldwide. India has now

become a favourable destination for global investments. The increase in foreign exchange reserve is attributed to the increase in foreign currency assets and the investments made by international investors in India. This has increased the liquidity in the economy which has enabled India to undertake various industrial development projects and move towards the path of development and progress of the nation. The results are clearly visible as India is emerging as the fastest growing economy in the world. The phenomenal and unusual growth of Indian economy is majorly on account of proliferation of its service sector which has left the manufacturing sector behind in terms of rapid growth. The Economic survey of India 2020-21 reported 30% contribution by manufacturing sector whereas 50% contribution was made by the service sector. The growth pattern is unusual as compared to the other developing nations. The recent reforms are being implemented from time to time by government in order to achieve the target of growth and development of the nation.

The positive growth journey of Indian economy began post liberalization that commenced in 1991. It gave an impetus to the industrialization and worked as a catalyst to the growth of commerce in India which generated employment, aided in elimination of monopolies and uplifted the status of the people. This also worked in favour of the development as it increased the workforce of India in the service as well as manufacturing sector which eventually is leading to the contribution towards the growth of the GDP. India is a lucrative destination for the international outsourcing and trade which is benefitting India in terms of the increased money supply in the financial system. India is also the biggest source of agricultural produce like wheat and tea in comparison to any other country in the world and is acting as powerhouse across the entire globe. The economic reforms and liberal policies of Indian government are all aimed at self sufficiency, high growth rate, promotion of small scale industries, indigenous capacity building, reduction of economic inequality, prevention of concentration of wealth, balanced regional growth, discouraging foreign dominance. The implementation of liberal trade policies has integrated Indian economy with the economies of the rest of the world. Post liberalization greater reliance was on the private sector for the industrial development and a larger role was played by Foreign Direct Investment and Foreign Portfolio Investment. It resulted in the fast growth rate of India

as investments in India proliferated which made India a fastest growing economy in the world.

However inflation is one of the factors which pull back the growth in India's GDP. The government and the Reserve Bank of India continue to take suitable steps time to time to curb inflation so that India is able to achieve maximum growth in its economy.



**Figure 9.4.** The world's largest economies by 2050 are projected by GS BRICS.

*Source:* GS BRICs Model Projections

### 2.3 Projection of Growth of Indian GDP and its Impact

There is a positive projection of the growth rate in GDP in India by the end of the fiscal year 2022 despite surge in inflation. As per the analytical reports of Statista, there could be a downfall in the GDP growth rate in the year 2023-24 by one percent and again there will be a rise in the GDP growth rate that may reach 7.08%. The Reserve Bank of India has also warned of the risks of negative impact of geopolitical tensions and high volatility of financial markets which may have an influence on the GDP growth rate in the future. To curb the inflation Reserve Bank of India raises policy repo rate from time to time. Recently in the first and second quarter of 2022-23, Reserve Bank of India consecutively raised policy repo rate by 0.90% with the objective of controlling inflation. As a result the current consumer price based inflation in the third quarter of 2022-23 has fallen to 5.88 percent from 6.77 percent which has come as a respite for the

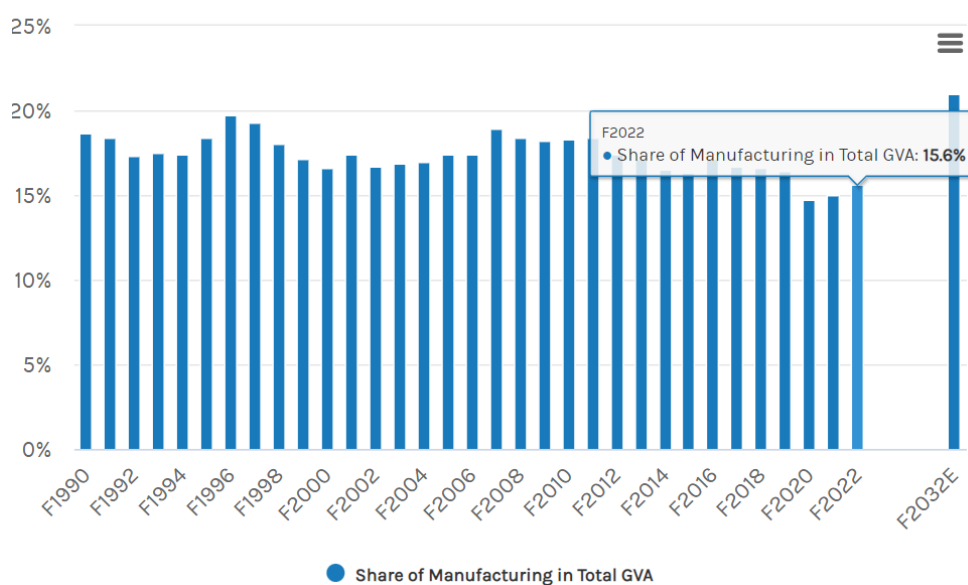
consumers. India is achieving the consistent GDP growth rate and is expected to perform in the future as well.

India is expected to have a demographic bulge by 2030 which will enable India to have higher workforce and move towards more inclusive economic growth. India's capabilities are now being recognised world over. It has made its mark in knowledge capital and is servicing globe by providing high quality services in software sector wherein around 55% firms are Indian which have achieved level V in the capability maturity model. India has also upgraded itself in the pharmaceutical sector and is recognised world over for providing high quality and low cost generic medicines which has not only elevated India's position but has also contributed to GDP. India on account of comparative cost advantage, offers exceptional value at significant cost advantages and this has made India a favourite and lucrative destination for global investors [5].

India is already providing knowledge based services in various sectors and is emerging as "service capital to the world". The industries wherein India is providing its services are information technology, pharmaceutical and healthcare, education, auto engineering, chemicals and financial services. It is delivering services remotely as well as importing customers to India. The value added or leisure tourism is also one of the sector which is gaining popularity on account of improved road connectivity and wider civil aviation network along with its advancement, all this is adding to the GDP of India. It is projected that India would contribute UD\$ 200 billion to its GDP on being positioned as the service centre of the world by 2022, as per the report of Goldman Sachs 2022. In a new Morgan Stanley Blue Research paper 2022, India will have a major share in global manufacturing, creation of new businesses, enhanced credit availability, improvement in the status of countrymen and boom in consumer spending. As per the analysis of Morgan Stanley's Chief Asia economist, Chetan Ahya, India is all set to attract global investors and will be one of the only three economies in the world by 2023 that have the capability to generate US\$ four hundred billion economic output growth annually and the same is expected to rise above US\$ five hundred billion post 2028. India being hub to global outsourcing and especially post covid has made it the back office to the world. The remote working has strengthened the Indian position on account of low labour cost

and has created numerous employments outside country for Indians. As the number of offshore jobs has almost doubled in India and is projected to reach eleven million since global expenditure on outsourcing has increased from US\$ 180 million to US\$ 500 million by 2030. India is also looked up as manufacturing hub in the coming years as favourable investment incentives like corporate tax cuts, infrastructure spending help business units world over to drive capital investments in manufacturing facilities in India. International corporations are at an all time high in their sentiments as they are buoyant about the bright prospects of investing in India. All this is certainly going to generate liquidity and growth of the economy. Morgan Stanley reports that by 2031, the share of manufacturing in Indian GDP could increase from the present 15.6% to 21% which has never crossed above 19.7% ever in the past thirty years.

India's Share of Manufacturing is expected to increase to 21% of GDP by 2031



**Figure 9.5.** depicts the share of manufacturing in Gross Value Added (GVA)

**Source:** CEIC, Morgan Stanley Research estimates

For India with a huge population and limited resources, it remains a challenge to cope up its limitations and weaknesses and overcome them by channelizing them in the right direction and convert them into opportunities for the growth, progress and development so that it is able to achieve its target of becoming five trillion economy which not only is completely self sufficient but is capable of nurturing and supporting needy nations.

The three major global megatrends that India is following, viz. digitalization, global offshoring and energy transition have already set the momentum for India to attain remarkable growth in future. India with its economic and social growth oriented policies, is satisfactorily moving towards the path of becoming a very strong economy and is set to become a powerful nation in the years to come.

## **REFERENCES**

- [1] Wilson Dominic, Purushothanam Roopa. Goldman Sachs, “Dreaming with BRICS:The Path to 2050”, 2003, Volume: Global economics Paper no.99, page 2-23
- [2] Morgan Stanley, “India’s Impending Economic Boom, 2022 Volume:November 2022.
- [3] Morgan Stanley , "Why This is India's Decade" (Oct. 31, 2022).
- [4] Shrotryia, Vijay, Singh, Shashank, “A Short History of India's Economy: Pre and Post Independence Period”,Volume: Economic and Regional Studies 2020
- [5] World Bank Report “India Better Positioned to Navigate Global Headwinds Than Other Major Emerging Economies: New World Bank Report”, 2022, Volume:December 2022.

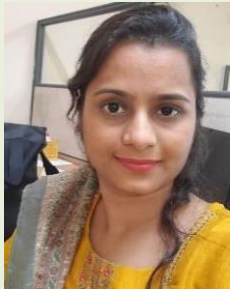


## ABOUT THE EDITORS



### **Prof. Pranay Tanwar**

Is currently working as Professor and donning the mantle of Dean Academics at Delhi Technical Campus, Greater Noida, a premier institute affiliated to GGSIP University, New Delhi. She has almost twenty four years of academic experience in teaching and research. Prof Tanwar is forward thinking and experienced academician, possessing drive, ambition and ability to make consequential contribution in the field of educational administration. Prof Tanwar research interest includes optimization, operation research, quantitative research, green design etc. She has published and presented various articles in Journals and Conferences. Dr Pranay has been successfully conceptualizing and operationalising various academic and cultural events.



### **Dr. Harpreet Kaur**

Is presently working as Assistant professor in Department of Engineering, Delhi Technical Campus, Greater Noida. She has received her doctoral degree from Delhi Technological University (Erstwhile Delhi College of Engineering) in the year 2021. She has published 14 SCI/SCIE research papers in scientifically reputed international journals. She has been awarded with Commendable Research Excellence award for four consecutive years. Her major research interests comprises of nano/micro particle synthesis, optimization and characterizations for its applications in photonic device. She has almost 6.5 years of total experience including research and teaching. She has been speakers in many International and national conferences and received best oral as well as poster presentation awards in International conferences. She was second topper while her masters in Jamia Millia Islamia in 2016. Overall, she holds an excellent academic record and received several award while her career.



### **Dr. Mohd Atif Wahid**

Is currently working as an Associate Professor in the Department of Mechanical and Automation Engineering at Delhi Technical Campus (GGSIPU), Greater Noida, India. He is also the in charge of the Research Cell at the institute level. He received his PhD and Masters in Mechanical Engineering in the year 2018 and 2013, respectively from Jamia Millia Islamia (A Central University), New Delhi, India. His major research interest includes, material processing and characterisation, optimisation of design using evolutionary approaches, sustainable engineering, green manufacturing etc. He has approx 10 years of experience including industry, teaching and research. He is a reviewer of reputed Journals such as International Journal of Advanced Manufacturing Technology (Springer), Multidiscipline Modeling in Materials and Structures (Emerald), Kovove Materialy/Metallic Materials, Indian Journal of Engineering & Materials Sciences (NISCAIR), Journal of Engineering Manufacture (SAGE), etc. He has published and presented above 50 articles in SCI/ Scopus indexed/UGC Journals, International and National Conferences. Dr Wahid has been an active member in organizing various international/national conferences, workshops, seminars, webinars etc. He is also the Editor of various Journals and Conferences.



### **Dr. Kimmi Verma**

Is an Academician from last 18 years in the field of Engineering. She has obtained her Ph. D degree in Biomedical Image processing from department of Electronics Engineering and has done her M. Tech in Microelectronics & B. Tech in Electronics and Instrumentation Engineering. She is a Class A certified Professional in Robotics under MHRD project 'E-yantra' from IIT Mumbai. She has teaching experience of more than 18 years in engineering academics. She has authored and co-authored several research papers which are published in high quality international journals and reputed conference proceedings. She has successfully completed several editorial responsibilities for reputed journals. She has 5 patents in the field of Electronics and advance computing technologies. She is an author of book titled "Analog and Digital Electronics" with University Science press and an editor of Taylor and Francis Book series " Energy Harvesting-Enabling IOT" and currently she is working as an Associate Professor in Department of Computer Science, Delhi Technical campus, GGSIPU .



India | UAE | Nigeria | Uzbekistan | Montenegro | Iraq | Egypt | Thailand | Uganda | Philippines | Indonesia

[www.empyrealpublishinghouse.com](http://www.empyrealpublishinghouse.com)