

Negative Environmental Externalities of Digital Technology: A Meta-Analytic Perspective

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Abstract

Technology has been serving us as a catalyst for positive global development ever since the stone age when humans started making and using tools and it continues its legacy astonishingly through implementing wonderful things. Now we are in an era of a technological revolution that contributes a lot to simplifying life on the blue planet. It has established endless possibilities for the human world and significantly pushed its boundaries. Most significantly it made the whole world a smaller place, helped to assist in fighting fatal diseases, accelerates economic development and of course, magnifies the scope towards an easy and better life. But there is no denying that these everyday technologies have come at a cost to the environment. It significantly contributes to global warming and resource depletion eventually. It is doing worse than good to the human race in contrast to our perspective on technology. The paper follows the method of Meta-analytic review. It is a humble attempt to examine the at-hand literature to establish the negative environmental externalities sheering and highlighting in related documents. An abundance of research studies and grey literature is available on the topic under consideration. The researcher tried to scrutinize the literature that is accessible on online platforms to make it relevantly comprehend.

Keywords: negative environmental externalities, digital technology, meta-analysis

Introduction

Technology has been serving us as a catalyst for positive global development ever since the stone age when humans started making and using tools and it continues its legacy astonishingly through implementing wonderful things. Now we are in an era of a technological revolution that contributes a lot to simplifying life on the blue planet. It has established endless possibilities for the human world and pushed its boundaries in a remarkable way. Most significantly it made the whole world a smaller place, helped to assist in fighting fatal diseases,

accelerates economic development and of course, magnifies the scope towards an easy and better life. Moreover, assistive technologies contributed enormously and consistently to conserving the richness of biodiversity. Undoubtedly technological development is inevitable for the remarkable future of the human species but the advancement may be sustainable.

While discussing the technological arena, the primary thing that comes to mind is of course the gadgets that we carry always with us in our daily life to make our life easier, more comfortable, and more convenient. The different devices available in the digital market including smartphones, tablets, and laptops made revolutions in the life of ordinary people and changed their lifestyles with a lot of benefits. But all these conveniences have a cost to the environment (Okahor, 2020). It significantly contributes to global warming and resource depletion eventually. It is doing worse than good to the human race in contrast to our perspective on technology. Eddision, the director of ‘Green Earth Affairs’ had once said “Modern technology owes ecology an apology”, which roughly translates to “Technology has done more harm than good to the environment”. Environmental problems have seen a rise over the last few years, and technology has taken the blame. The situation is getting worse day by day, contributing significantly to the prevailing environmental issues. The usage of the digital device is increasing from every minute to minute without any restrictions. To put it simply, technology is largely responsible for the environmental problems we face today.

‘Luxembourg Times’, a quality online newspaper of Luxembourg reported on the 21st of November 2019, that Google was planning to prepare a huge data center in Luxembourg. The news raised consequential worries among the people of the state. They were very much concerned about the energy and water consumption of the center as they know the center requires the resources in pretty large amounts which will create scarcity for commons’ daily consumption. Apart from that, the center will create noise and air pollution. Because of people’s protests, the establishment is still under the concern of the authority. It is estimated that the data Centre’s operation requires 10 million liters of water per day, which is about 10% of the country’s overall water consumption. Another article describes that the data center is expected to consume 7% of the country's energy supply in phase I, and up to 12% in phase II. The example shows that digitalization can have grave effects (Liu, et al., 2019).

The investigation follows the method of Meta-analytic review. It is a humble attempt to examine the at-hand literature to establish the negative environmental externalities sheering and highlighting in related documents. An abundance of research studies and grey literature are available on the topic under consideration. The researcher tried to scrutinize the literature that accessible in the online platforms to make it relevantly comprehend. The Meta analysis of the literature under scrutiny leads to certain conclusions regarding the negative environmental externalities of digital technologies which are described hereunder with separate heads.

The Negative Environmental Externalities

Technology can be represented by a two-sided coin. One side, consistently contributing to the global growth and progress of human race but the other contradictorily doing damage to the environment and inmates of the planet. In what follows, we look at negative environmental externalities mainly in some prominent areas like energy, climate, resources and waste cleanup. It will help the people to comprehend the significant damage that caused by technology in contrast to the benefits provided by the same.

1. Energy

According to 'Forbes' Google has used almost 12.4 terawatt-hours of electricity which is equal to the total electric power used by the entire countries like Sri Lanka and Zambia (Bryce, 2020). Technological innovation leads to an increase in energy consumption (Jin& Tang, 2018). Every month, Americans stream over 8 billion hours of content to their digital screens. By 2025, the number of Internet-connected devices is slated to increase to 28 billion from today's 9.2 billion and the rollout of 5G networks could push an individual mobile user to consume 200 GB of data a month. All the images and videos generated digitally in the online platforms increasing tremendously and consumers spend an exponential amount of data. Swedish researcher Anders (2020) estimate that information and communication technology could account for more than 20 percent of global energy use by 2025 attracted wide attention. We have a tsunami of data approaching. Everything which can be is being digitalized. It is a perfect storm. 5G is coming and all cars and machines, robots and artificial intelligence are being digitalized, producing huge amounts of data which is stored in data centers (Smith, 2020)

The investigator cites an example to make the point clear. The ‘Future’ published that when the famous music video “Despacito” got released it reached the record of 5 billion views on YouTube in April 2018 it had burned as much energy as 40,000 U.S. homes use in a year (Smith, 2020). We are assuming computers and laptops as the inevitably important things in our daily routine. We are not actually aware of the disastrous trail of impacts that leaves behind on the planet. Studies show that 81% of the energy needed for a computer is used during production. The production of an average computer requires 530 pounds of fossil fuels, 48 pounds of chemicals and 1.5 tons of water. Let’s put this into a real-world perspective. 302 million computers were sold in 2014. Which can be simply interpreted as 160,060,000,000 pounds of fossil fuels, 14,496,000,000 pounds of chemicals and 480,000,000 tons of water is being consumed by this industry exclusively for making the computers. Remember, simultaneously we need the same or different resources for the manufacturing of televisions, smart phones, and all the other technological devices that surround us today. All these counts to an unimaginably big number and it may cause heavier environmental impacts beyond we can expect. The depletion of natural resources has been a persistent problem in our world today, and the main reason for this is most definitely the production and use of technology.

2. Climate

The digital technology industry is one of the least sustainable and most environmentally damaging industries currently in the world. Its leaders have long been unwilling to face up to its climate change challenges, and continue to focus primarily on the claim that they are contributing significantly to delivering the so-called Sustainable Development Goals (Unwin, 2020). Digital technologies are contributing significantly to Global Warming in these days and it has become unbearable to the planet these days. The emission has enormously elevated during the lockdown period as a result of the wide acceptance of online streaming during the last two years. Online video streaming itself contributed 3000million tons of CO₂ in last year which was equal to the total annual GHG emission of Spain in 2018. Google contributes 40% of CO₂ emission. Digital Technologies are responsible for 4% of greenhouse gas emissions to the outer world, and its energy consumption is increasing by 9% a year. The internet emits 1.6 billion annual tons of greenhouse gas emissions(ESCP, 2021).With COVID-19 restrictions in place globally, our reliance on digital technology sky-rocketed in 2020 and 2021 as video calls,

emails, instant messaging and virtual entertainment replaced face-to-face interactions in and out of the workplace.

Between February and April last year, at the peak of worldwide lockdowns, global internet traffic surged by nearly 40%, driven by video conferences, online gaming, streaming and social media, according to the International Energy Agency (IEA). An hour of streaming in Europe, for example, has a carbon footprint equivalent to boiling an electric kettle three times or driving just 250 meters, the analysis showed, while switching to a lower-quality video stream made very little difference. (Taylor, 2021). Eventually the use of technologies and their negative impacts are consistently increasing every day. It has significant impact on the environment particularly on climate of the planet. As these technologies become used much more widely their negative impacts will increase.

3. Resources

The digital technology brutally exploits a wide variety of resources especially in a way unsustainable environmentally and scarcely having the spirit of morality. Data centers consume water across two main categories: indirectly through electricity generation (traditionally thermoelectric power) and directly through cooling. The US data centres used a total of 626 billion litres of water in 2014. This is a small proportion in the context of such high national figures; however, data centers compete with other users for access to local resources. A medium-sized data centre uses as much water as three average-sized hospitals. Some progress has been made with using recycled and non-potable water, but from the limited figures available some data centre operators are drawing more than half of their water from potable sources. This has been the source of considerable controversy in areas of water stress and highlights the importance of understanding how data centers use water (Mytton, 2021).

As discussed in the first point the data centers are giant consumers of power or electricity in the whole world. They are attempting in multiple ways to make the consumption more sustainable by proving more services still declining the use of electric power. Fossil fuels still accounted for 84% of the world's primary energy consumption in 2019 (Rapier, 2020) and no exception for digital technology. It also depends on fossil fuels as a major source of energy, which clarifies the unsustainable use of fossil fuels by digital technology even today.

Moreover, most digital technologies rely on rare minerals that are becoming increasingly scarce. Many people are unaware, for example, that a mobile phone contains more than a third of the elements in the Periodic Table. Minerals such as Cobalt, the 17 rare earth elements, Gallium, Indium and Tungsten are becoming more and more in demand, and as supply is limited prices have often increased significantly. They can also fluctuate dramatically. Above all, as these minerals become depleted, new technological solutions will be needed to replace them (Unwin, 2020). The mining industry creates wide exploitation and huge damage to the nature. It's always associated with problems like tailing and waste spillages. Open cast mining destroys the life around. The wild mining methods mostly pay negative health implications. In certain countries child labour is found very common and children are widely used in this risky sector.

4. Wastes

E-Waste remains a fundamental problem for the sector ever since from the beginning of digital revolution. The increasing amount of e-waste contains concentrated amounts of potentially harmful products, and this has been shows little sign of abating. The cardinal reason for the accumulation of abundant waste products is, most of the sector is based on the fundamental concept of replacement rather than repair. Those old enough will remember fixed line telephones that lasted virtually forever. Recent days, most of the people replaces their mobile phones in every two years. New models come out; new fashions are promoted. Even poorer countries have a growing mobile phone sector and they are upgrading the software and hardware development process, promoting the people, the consumers to upgrade their devices on a regular basis rather than promoting them to re-use the devices already have. Innovation in the digital technology sector means that hardware developments often make old software unusable on newer devices, and new software requires newer hardware on which to run (Unwin, 2020). Inevitably, the consumer has to pay more to replace equipment or hardware with which they were previously perfectly happy while exchanging the devices that elevates the profit to the companies at the expense of consumers. Eventually it leads to massive redundancy with the digital wastes especially the older mobile phones which are simply being thrown away. This is scarcely sustainable.

Conclusion

We are standing at a very critical point in the history of the planet to take a decision to become more positive towards the environmental externalities of digital technology. Having dirtied the earth, air, and water for more than a century, technology is now showing promise in environmental cleanup. Technological innovations specifically aimed at reducing pollution from cleaner manufacturing processes to flue gas scrubbers to catalytic converters now figure prominently in mitigating some of the growing pains of an increasingly technological world. It is time for companies to become aware of their digital impact and deal with this issue. It is time to start reducing digital emissions and increase companies' transparency and reputation.

While sustainability has become a priority globally, the digital carbon footprint seems to have been neglected by many decision-makers. The constant increase in digitalization makes our digital world's carbon cost more and more relevant and impactful on our environment. This critical issue deserves serious attention and needs acceleration on the transition to sustainable IT to shape a greener future (ESCP, 2021)

We may take extreme efforts to reduce the carbon footprint of digital technology. Efforts are already taken by the data centers worldwide to decline the carbon emissions, by increasing their services multiple times but taking only increase in power consumption and carbon emission. But still it remains unsustainable. From 2010 to 2018, compute instances went up by 550%, while energy usage increased just 6% in the same time frame. While data center energy usage is on the rise, it has been curbed dramatically through the development of different strategies.

We can depend on the Initiatives, such as 'Restart', to decline the e-wastes that accumulating day by day. Such projects try to change the mentality of consumers, and thereby companies and governments. The Restart Project was born in 2013 out of the frustration with the throwaway, consumerist model of electronics that have been sold, and the growing mountain of e-waste that it's leaving behind. They are based in London, but the parties and messages spreads to all over the world. By bringing people together to share skills and gain the confidence to open up their stuff, the organization gives people a hands-on way of making a difference, as well as a way to talk about the wider issue of what kind of products we want. For

that the project runs regular Restart Parties where people teach each other how to repair their broken and slow devices – from tablets to toasters, from iPhones to headphones. We work with schools and organizations to help them value and use their electronics for longer. The same data were used for encouraging consumers to demand better and sustainable digital devices for all.

AWS, Google, Facebook, and Microsoft have all recently announced large-scale renewable energy purchases. Google announced in 2017 that it achieved 100% renewable energy across all of its operations, including data centers. Importantly, Google, and the rest of the major players in this space rely on renewable energy credits (RECs) to offset their fossil fuel usage and claim 100% renewable use while still being connected to grids that rely on fossil fuels for power generation (Ratka & Boshell, 2020).

Orr (1994) sensibly quoted; the plain fact is that the planet does not need more successful people. But it does desperately need more peacemakers, healers, restorers, storytellers, and lovers of every kind. It needs people who live well in their places. It needs people of moral courage willing to join the fight to make the world habitable and humane. There is no doubt, the digital revolution will continue to happen in the future too and it's the need of the hour. The planet needs a deliberately determined effort from the part of its inmates to make the developments more supportive to the environment. Let be more conscious while handling the digital resources by keeping in mind the principle of repair and reuse in order to make the world more sustainable and a better place for developments as well as livable.

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