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Planned Obsolescence and its Effects on the Environment



Planned obsolescence is a method of designing a product with a limited lifetime or weak design in order to make the product obsolete within a predetermined period. This forces customers to buy newer products by shortening the natural life of the product they own at the time. Some marketing experts believe that it is a result of competitive and technological forces in a free market rather than something producers intentionally do to increase profit. However, others think that it is used by firms to maximize profits rather than benefit customers. [1]

The world cartelization of lightbulbs is considered the first instance of planned obsolescence in modern technology. In 1925, a group of representatives from major lightbulb manufacturers founded the Phoebus cartel—a supervisory body that attempted to divide the worldwide lightbulb market, and assign manufacturers and production quotas to different regions. While the cartel lasted less than 20 years, one long-lasting outcome of it has been the intentional reduction of the lifespan of lightbulbs, from more than 2500 hours to around 1000 hours. One particular lightbulb in a U.S. state California fire department, has been on for more than a million hours—it has been burning almost continuously since 1901. No more can you find products that can live through two world wars—incandescent lightbulbs made today have less than half the lifespan than that of those made in the 1920s. This method of artificially limiting the lifespan is called *limited func-*

tional life design.

Planned obsolescence has become a central feature of modern manufacturing, especially with the advent of smartphones and tablets. As companies churn out newer and flashier models each year, the piles of electronic waste grow. More than 50 million tonnes of such waste were generated in 2019, half of it from larger household appliances, and the remaining half from smartphones, tablets, computers, and televisions [3]. Apple Inc., once renowned for making long-lasting quality products, now no longer even attempt to deny their efforts towards planned obsolescence [4]. Their repair services are priced high enough to make buying an entirely new product less expensive, and have actively attempted to prevent third-party repair shops from offering their services. Louis Rossmann, the owner of a computer repair shop specializing in MacBook logic board repairs, has become renowned as a right to repair activist after being an open critic of newer MacBook designs on his YouTube channel, which initially became popular for his repair tutorials. This type of planned obsolescence, also known as *design for limited repair* [1], is also common with some types of large industrial equipment.

According to the UN, around 90% of the world's electronic waste is dumped or traded illegally. Significant amounts of resources, including rare metals such as copper and gold, are required to manufacture these

products. Smartphones and wireless earphones in particular are criticized for their use of non-replaceable batteries, which are typically lithium-ion, and have to be thrown away. Resources such as gold, copper, and lithium, among others, are expensive and their extraction processes already cause a considerable amount of damage to the planet. However, more and more units of electronic products are sold each year, with older models being trashed along with their pricey components. Moore's law predicts that microchips will double in capacity roughly every two years—the finite resources of the planet, however, constrain infinite growth.

The growth of fast fashion over the 2010s has been astronomical. 'High street' retailers such as H&M and Zara replicate pieces from designer brands for lower prices, using low-quality fabrics such as polyester and rayon, the production of which is also detrimental to the environment. The manufacture of these clothes typically takes place in sweatshops in developing countries, and the workers' meager pay and long work hours make up for the cheapness of the clothes. This type of clothing is known as *fast* fashion, as it is made not to last very long, and quickly be replaced as new trends replace old ones, which is also known as *design for aesthetics*.

In recent years, however, slow fashion and sustainable goods have become more desirable to consumers. The Reddit thread [r/BuyItForLife](#) consists of members sharing information about quality goods that have lasted them decades, and warning against expensive products that promise ethical manufacture and durability but ultimately are not different from their generic coun-

terparts, i.e., greenwashed brands. 'Greenwashing', as J. Vishwathiga expands on in her article, is promising an environmental benefit to one company's product in comparison with the competition, often to justify higher prices. It has become a lucrative marketing strategy in the past decade, as consumers do not usually have the time or ability to individually fact-check a company's claims.

The onus of reducing electronic and clothing wastes is placed entirely on the consumer, who is urged to make greener, more sustainable choices but is not provided with such options. While a push towards sustainability has happened in more affluent circles and developed countries, the majority of people can only afford cheap products that do not last very long, and are produced using unviable methods. Thus the demand for low-priced products ultimately will not decrease much, especially in developing countries.

Consumers may employ some practices to decrease their waste—very carefully buying products only when necessary, becoming part of the repair economy, stock-piling old things until recycling catches up, or returning them to the retailers if policies exist to facilitate it. But real change and considerable reductions of waste as a result of planned obsolescence can only happen through legislation and sanctioning the recycling or re-using of parts and valuable materials by manufacturers.

-Rithika Ganesan, B'19
Other sources: [\[2\]](#)

An Introduction to Greenwashing

Greenwashing is a form of marketing technique in which the manufacturer advertises their product and organization to be more eco-friendly than they are. They cleverly capitalize on the consumers' concerns for the environment. Conscious consumers end up with seemingly guilt-free purchases that do not benefit the environment.

Usage of misleading terms and imagery is a common way to confuse people. [\[1\]](#) Words like oxo-biodegradable, recyclable, do not have a standard meaning across the globe. Customers buy the products with noble intentions only to realize that their local recycling facility/ biogas plant is not ready to accept the waste. Many brands deceptively incorporate nature imagery to give a false image of environment-friendliness.

One of the most commonly greenwashed products are biodegradable menstrual products. [\[2\]](#) They are marketed to be completely biodegradable and environment-friendly. The layers of problems in this are cleverly masked by the marketing companies. First of all, any biodegradable menstrual product would take more than six months to decompose, which will pose practical difficulties in waste management as the number of menstruators living in an area increases. Secondly, most of them are bleached, and they already have a layer of plastic to hold the adhesive, which defeats the point of being green. The primary raw material is organic cotton which ends up using more land and water for production. Considering all these facts, we can quickly conclude that they are not as sustainable as claimed. Yes, they are way better than plastic dispos-

able menstrual products, but this does not give them the quality to be advertised as the epitome of sustainability because conscious consumers would easily fall into this trap without putting an effort to look for better alternatives.

Another typical example is bioplastic. These biodegradable plastics generally require special industrial conditions to decompose. Additionally, they can still choke animals if not disposed off properly. The ultimate question is how we can consider them as the best alternative if we don't have the proper waste infrastructure to deal with them. Similarly, we assume most of the food packaging that comes in cardboard is compostable. Still, most of the time, a layer of plastic is always present, rendering it useless even to be recycled. The last example that I would like to mention is of *kulhads*. *Kulhads* are made from soil, and they ultimately find their way back to them. But, they have an insanely high carbon footprint and lead to the depletion of the most fertile soil layers. The environmental cost of manufacturing a *kulhad* is still way too high. [3]

From these examples, it is evident that biodegradability is always given more importance to gauge the environment-friendliness of any product. This approach is insufficient and could trap us in a vicious cycle of choices that might seem guilt-free, but are not.

As consumers, the best we can do is educate ourselves. Before buying any compostable packaging material, performing a rip test [4] to see if there's a layer of plastic present would be helpful. Verifying the certifications of the brand, trying to gather information about the environmental claims, having a plan on how to manage the waste before purchasing are a few ways in which we can be better consumers. Transparency and increased stringency from the certification committees will go a long way in reducing the instances of greenwashing.

-J. Vishwathiga, B'19

An Interview with Dr. Sathya and Dr. Subramani

Akshita Mittal (B'19) and Shreya Venkatesan (B'19) from our team had the opportunity of interviewing Dr. Sathya and Dr. Subramani from CMC Vellore, where they talked about their research and their involvement in environmentalism. Balaram Vishnu (B'17) helped with the transcription. Here is the interview transcript:

Q. Could you start by giving us a brief summary of your research and medical interests? Are they related to your social activism?

Social activism might not be the right term to describe our activities. Perhaps we are environmentalists. We both work for the Christian Medical College, Vellore, one of the leading institutes for medical sciences in India.

Dr. Sathya: My current research is focussed on validating a novel blood pressure apparatus (CMC NIBP) that my team has developed and is more accurate than any device available for home and clinical use in the market. We have applied for patents in India, USA, Europe and China. Apart from that, we have been working on the mechanism of action of a plant poison used for suicidal purposes. We also screen some compounds for anti-cancer effects on certain cancers. We run a patch clamp laboratory to support our mechanistic studies.

My philosophy has been to keep a variety of labs running in our department, i.e. cell biology, isolated tissue (isolated heart, isolated blood vessels, ureter, etc.) whole animal experiments, (anaesthetized rats and rabbits in which therapeutic interventions can be tried) and clinical physiology—we have not only developed a BP apparatus, but are working on an ICU monitor which can store waveform data (for BP, ECG, etc.) for hours together, which current monitors don't. They only store numerical data. I work with my husband on this :). Having these diverse laboratories allows us the pleasure of playing with multiple ideas towards solving a problem.

One of the most fruitful collaborations we have had is with Prof. Suresh Devasahayam, who was Professor and Head of Bio Engg. here at CMC. He has just retired and moved to IIT Jammu. His team has enabled us to translate our ideas into working solutions. We developed the BP apparatus and the ICU monitor in collaboration with him. A third important device is one that can measure volume flow in blood vessels in humans non-invasively using ultrasound imaging and Doppler (The current methods will give only velocity of flow and not volume flow in ml/sec, for example). We have used the data acquisition system that Prof. Suresh developed in many other forms, making new devices, which

are too many to be listed here.

In the next 3 to 4 years, my time is going to be spent largely on generating normative data for blood pressure for the country, so that we come with better treatment guidelines than there are. Right now we only use normative data from the West and treatment guidelines generated in the West.

Dr. Subramani: I am an intensivist (ICU/critical care professional) and would call myself more of a patient-centred professional than a researcher. However, my interests are in the development of low cost equipment to provide affordable ICU care. My other area of interest is quality and safety, and to this end, I have introduced procedures and protocols in our ICU



Dr. Sathya and Dr. Subramani at their farm

Q. Many of us have desires to utilise more sustainable technology at home, but few of us actually translate it into action the way you did. What was that moment that made you want to turn your ideas into reality, and what would you say to people who are considering the same, but haven't taken the dive yet?

We can talk about two aspects we have concentrated on. The first one is water and second is electricity. Our farm was the first area where we used drip irrigation to conserve water in 2004. Now, we have more innovative ways of doing this with subsurface irrigation, etc. to reduce evaporation. Till about 8 years ago, we were just like anybody else w.r.t. how we used water for domestic consumption. We lived in a campus community maintained by our institution where everything was taken care of. We then moved out and built our own home and water was not an issue for about six years. The turning point was the worst water scarcity that we faced in the year 2012. Borewells dried out and new wells which were sunk were unsuccessful. My first initiative as the secretary of the residents' association was to meter the water consumption and ration. This

reduced the consumption by an astonishing 50%. The next step was to improve the water levels within the campus by recharging the groundwater with storm water. This proved to be a huge success and the problem was solved.

Then in 2014, we decided to harvest water from our house's terrace and built a 60,000 litre tank under our car park. Now, we use rainwater almost nine months a year. There was no turning back after that. We have added more areas and I have about 150 square meters for water harvesting now. The advantage of our system is the ease of maintenance.

When it comes to electricity, the idea of generating electricity for one's own use was very addictive. The environmental-friendly aspect was another attraction. I am a half-cooked engineer and wanted to explore the technology. These were the turning points for us to look up to the sun. Those days (2013) were early days for solar power in India. Exporting to the grid was not in vogue. It was handy to have a family friend who was interested in solar power plant installation and ours was his first project. Though we had the necessary space in our home, finance is the foremost necessity. We were always asked when we would break even. Though we wanted to realise the investment, it was not the primary aim. Sustainability was the *mantra*. I would request everyone to take measures to use water and other natural resources responsibly by starting something small in your house. For example, collect rainwater in buckets or barrels, take measures for ground water recharge by building small recharge structures in your compound, moving onto the community and involve like-minded people. Once you start, the feel-good-factor which comes with this will make you do more and more. The second aspect is time and one should make time for these activities. Small is beautiful, therefore, start something small and progress to bigger ventures. At this juncture, it won't be fair if I do not mention two of our friends Mr. Piyush Manush, an environmental activist who inspired us with his activities and my other friend Mr. Arul Sekhar, who worked with and for us in these ventures.

Q. As people in the fields of medicine and research, how did you take up farming? Do you think farming has given you an advantage in the current scenario?

Our grandparents were farmers and therefore farming is in our genes! We wanted to create a small forest, which we have achieved with fruit trees. We wanted to grow our own food organically and we mostly con-

sume what we grow—right from grains, vegetables and fruits. Farming is not just owning a farm! One should do physical work, which we do. Besides all this, this activity keeps my mind off the grueling critical care environment and rejuvenates me for the next week's work. The best part is the exercise we get for our mind and body in the most serene atmosphere. We have also taken up a greening initiative in our native village, where we've taken a small step of creating a forest (agroforest) in a nearby field. We have employed techniques to prevent rain water runoff and use them to irrigate the saplings.

Our life is on a fast track and has become more and more mechanical and stressful. With all the chemical fertilizers and pesticides used in farming, the food we eat is potentially toxic. Farming, I believe has improved our physical and mental health, and we eat organic, healthy food.

Q. Youth, predominantly, have a vicious habit of educating themselves through social media platforms, and they incline towards an ideology based solely on that content, without seeing both sides of the coin. Although this births supporters of sustainable living and the like, do you think that they are at a disadvantage because they haven't seen the big picture?

Social media has become too powerful an instrument for sharing information quickly and effectively and nobody can blame the youth for positioning themselves based on the information they get from social media. For example, there is so much hype about battery-powered vehicles in the media. People should also

understand that driving a battery-powered car will be eco-friendly only if the power generated to charge the battery was produced employing sustainable technology, like solar power. The government should incentivise such measures for the society at large to benefit, rather than only some who can afford. The power of information technology and social media has taken the awareness about the environment to a totally different level and people are more aware about the environment now than ever before.

Q. What role does science play in transitioning to sustainable living and in the society that comes with it?

The advancement of science has led human beings to exploit the natural resources and harm the environment. We should use the same science to change our practices to sustainable living. For example, without science, solar power would not have been possible. Now we should think as to how this can be made affordable to the common man so that everyone can benefit from it.

Q. Lastly, what advice do you wish you had gotten when you were college students?

Our college life was full of academic activities. Awareness of the impact of our activities on the environment was negligible. In the 80s, environmental matters were not so bad. Therefore, I guess we did not care. Now there is a lot of awareness among the public. I wish that the information we have currently was available to me then and that there were role models.



The solar energy set-up at their house

How Climate Change Affects Breeding Patterns

Global warming has led to climate change and changes in temperature, which have led to drastic changes in the breeding patterns of several flora and fauna, especially birds and fish.

Birds

False springs: The birds' migration season is shifting because of false springs, when birds fall under the wrong impression that the spring season has already arrived due to increased temperature. However, flowers would not have bloomed at the time. This, in turn, may lead to an increase in the mortality rate of offsprings due to competition and lack of food. In some bird species, climate change has also resulted in a short bird-breeding window, threatening the species' survival [1]. This change can also be seen in some seabirds in Arctic regions. Signs that would usually suggest the onset of spring in the Arctic (rise in the ocean's temperature, melting of ice, etc.) cause surface-feeding birds in the north of the Pacific Ocean to shift their breeding season to an earlier time than other species. Arctic seabirds reproduce under optimum light, temperature and food. However, this temporary window obtained due to false spring does not last long, and they fail to reproduce because they cannot adapt to the changing environment.

Unseasonal rains: In tropical countries like India, monsoon conditions play an important role in nesting and breeding of several bird species. The nesting of the tallest of the world's flying birds—the Sarus crane (*Antigone antigone*) has been affected by shifting seasons and unseasonal monsoon conditions. The sarus crane relies on the timing of rains to start nesting. Sudden and delayed rains reduce their reproductive success due to exposure to adverse climatic conditions that reduce nesting success.

Mismatch: These sudden changes in breeding patterns and false seasons cause an ecological 'mismatch' between the hatching of eggs and peaks in their prey, (e.g. flowering plants and caterpillars that serve as their food). Climate change diminishes insect populations and changes flowering seasons at critical moments in the birds' nesting season, creating food shortages for the hatchlings. Thus birds are adversely affected when they become unsynchronised with the phenology of their food supplies.

Disturbance to habitat: Populations of migratory birds

are affected by changes in climate as changes in land cover and loss of habitat cause them to stop breeding in those areas, and the reproduction rate has reduced.

Marine Animals

Global warming has caused a shift in the breeding season and location of many marine animals. Fishes are especially sensitive to temperature changes, and have a low tolerance for heat during mating. The rise in water temperature in their spawning areas negatively affects the reproduction of up to 60% of all fish species. These marine species should either adapt through biological evolution or migrate to some other place. But due to this drastic change, their reproduction rates will decline, and new habitat can lead to new interactions between species, and the ecosystems may experience a drop in productivity.



Insects

Contrarily, climate change and rising temperatures suit many insects' reproduction conditions and can cause trouble to humans. One such example is the locust nuisance. Rainfall is the most favourable breeding condition for desert locusts. Climate change and the formation of several cyclones have increased the reproduction rate of locusts, and the increase in their population has led to competition for food. Due to a lack of food, they migrate to other places, creating more havoc in agricultural farms than usual.

Flora

The false springs also trick flowering plants. In false spring, warmer temperatures in late winter or early spring trigger vegetation and plants' flowering. However, the false springs do not last long, and when extreme cold conditions follow them, it leads to the

freezing of young buds and a complete disruption of their reproduction pattern, and the mortality rate is increased.

Several species are not only affected by climate change, but also other human-caused disturbances such as pollution, habitat degradation, deforestation and land use change. More research is being done to develop species

that can withstand the changing climate. Several local bodies of particular areas are taking the initiative to provide a suitable environment for their breeding to prevent extinction of migrating species.

-Ananya Aravind, B'19

Other sources: [\[2\]](#), [\[3\]](#), [\[4\]](#), [\[5\]](#), [\[6\]](#), [\[7\]](#), [\[8\]](#)



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We hope you enjoyed this month's edition of Exhibit A!

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