**Topic**:

Product Obsolescence and throw-away society

**Target Population**:

Adults (18+) who have the ability to comprehend product usage and the potency to purchase them.

**Sample Size**:

100 (+20 buffer)

**Purpose**:

Product obsolescence describes a strategy of deliberately ensuring that the current version of a given product will become out of date or useless within a known time period. It may occur when a company stops producing, marketing or supporting a sold or developed product. It has become an increasingly common tool for an unbearable consumer society. Not only does it deprive people of their rights to use sustainable products, this production and consumption system also relies on raw material extraction and on land and resource exploitation reaching its limits. This proactive move guarantees that consumers would seek replacements in the future, thus bolstering demand.

The motive of this survey is to profoundly examine the current consumer perception towards product obsolescence, and explore the factors that act as a basis for their decision to replace products. Such a survey would be helpful to acquire knowledge about the main types of product obsolescence that play key roles in increasing levels of consumerism, consumer perception about the same, the psychological impact it has on consumer behaviour and the overall economic and environmental impact caused by it.

**Objectives**:

**1)** To determine the psychological, economic and environmental impact of product obsolescence
**2)** To investigate the influence of different types of obsolescence on consumers' perception towards replacement of products.
**3)** To study the interconnection between the different types of product obsolescence. 4) To study the relationship between marketed product descriptions and consumer attitudes towards them.

**Confidentiality Note**:

This survey is conducted by students of St. Xavier's College. The responses obtained from this survey would be used solely for academic purposes.

## METHODOLOGY

For the purpose of this study, we selected a sample of 120 people, from our target population of individuals in the age group of 18 and above with an equal number (25%) of individuals in each age group. We ensured a 1:1 ratio of female to male respondents. We made use of non-probability sampling techniques, namely Convenience Sampling and Snowball Sampling. We made use of Google Forms to collect responses. The forms were sent to be filled via the social media platform WhatsApp to our friends, family and acquaintances that satisfied our requirements. The respondents were then asked to forward the form to other people who belong to the target population.
Our main parameters of interest for the analysis are the most prominent type of obsolescence, purchase frequency of the respondents, factors influencing purchase decision, factors influencing replacement decision, monthly income, age group and proportion of people aware about obsolescence and proportion of people willing to adopt durability over frequent upgrades considering the obstacles that may or may not entail with it.

Our survey included various qualitative as well as quantitative types of data which required different types of analysis (such as chi-squared test, ANOVA, Mantel-Haenszel Test and Karl Pearson's Correlation Coefficient) which would be best to draw the conclusions that we required. A certain amount of conceptual research as well as empirical research was required to analyse the data. A lot of the tests that were used on the sample required a certain amount of secondary data backing in order to draw certain conclusions for the population.

With reference to budget and time, there were no problems in carrying out the survey as it was carried out through online modality which helps in speeding up the work and the data becomes easier to analyse when it has been sorted into a spreadsheet database. All of the responses have been analysed through Microsoft Excel with required and relevant data tools.

## PILOT SURVEY REPORT

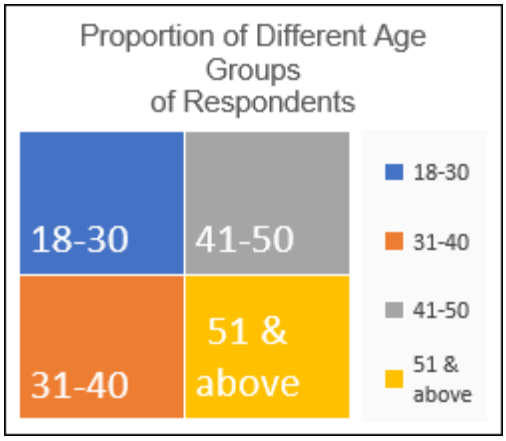
After a colossal exchange of views, the team unanimously decided to choose Product Obsolescence as the topic of the study and thereafter discussed upon a suitable title for the same, which ended up being- *'Product Obsolescence and the Throw Away Society'*. The initial draft of the questionnaire was produced after evaluating all sorts of obsolescence that exist and their impact on people's lives. The team used *Google Forms* to run a pilot survey with the questionnaire, and received *30 responses* over a period of 4 days. During this time the team began to gather and explore different methods for analysing responses. All responses were put together and checked for ambiguities and contradictions.

- In the demographic section, 'Age' was modified from a short response type question to multiple choice question with different age categories, which proved to be more useful in classifying and evaluating the survey data.
- The question which asked for a definition of product obsolescence was reframed such that the options were condensed and made easier to grasp. Along with that, an option of 'None' was added for the respondents who were unfamiliar with the term.
- The question, which demanded what the respondents did with their old appliances, was reworded and split into two questions, one asking about old working appliances and the other asking about old non-working appliances, in order to avoid confusion.
- The question, which enquired about major reasons that stopped the respondents from replacing the product, was re-formulated in a concise and self-explanatory manner so that it would be understandable to respondents. The options supplied were changed to product-specific bifurcation to gain analysis that is more precise.
- The question which asked about how likely the respondent is to buy from the same brand was redundant since it generated data that was not intended by the question, so it was reframed to 'the factors that influence the respondent's decisions when purchasing a product', which included four different factors with the same product specific bifurcation.
- The question regarding the price of a product was reworded and altered to an agree/disagree format to obtain precise answers.
- To ensure the accuracy of the generated data, parentheses were inserted wherever necessary to inform respondents of the type of response they must provide.
- The question that asked which products the responder preferred had its options changed to make it more understandable.
- In order to raise awareness about planned obsolescence, a note describing it was appended to the end of the survey after the Google form is submitted, along with a thank you note. The arrangement of questions was also edited to ensure a logical flow to the sequence of questions

In this way, a handful of questions and options were revised to eliminate discrepancies. Apart from the constructive feedback, the respondents did not face any difficulty in understanding the overall questionnaire and its objectives. The final draft of the questionnaire was created inclusive of all the changes.

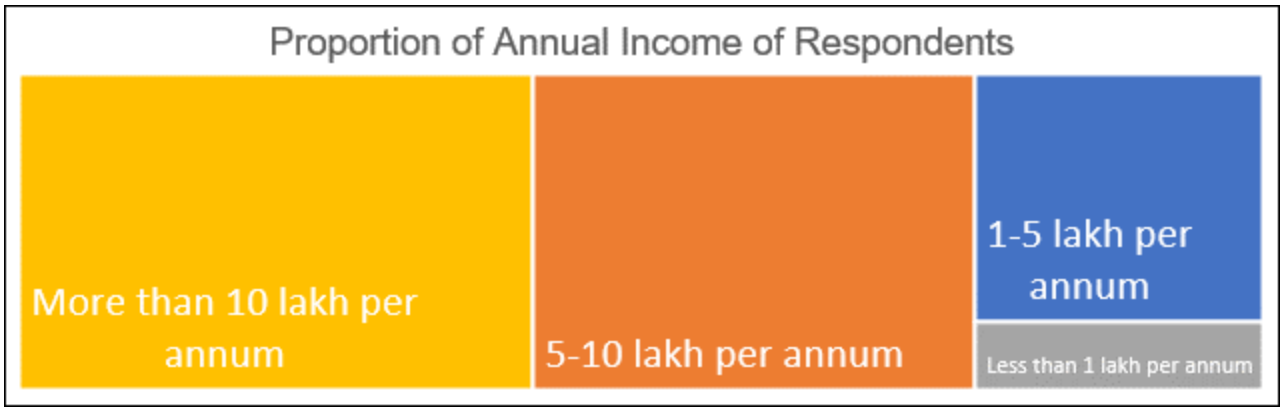
## STATISTICAL ANALYSIS

For our analysis, we considered an equal proportion of each age group, which helped us in studying the impact of obsoloscence, and it's variation among different age groups.




In order that the respondents' diversity regarding their field of study, beliefs, views, experiences and other extreme factors would increase, the number of respondents was aimed at being relatively large. We chose to include at least 120 respondents for it to be generalizable of the entire population.

The gender diversity of our population was 50:50 and income range could be depicted by the below tree map where most of them lies in the income range of more than 5 lakh per annum.

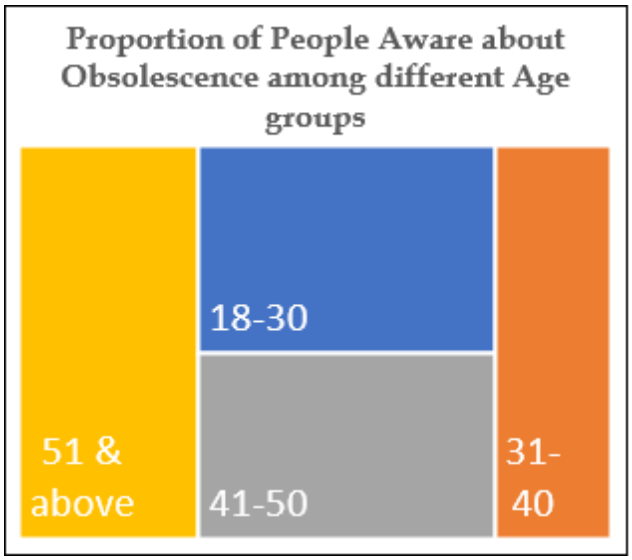


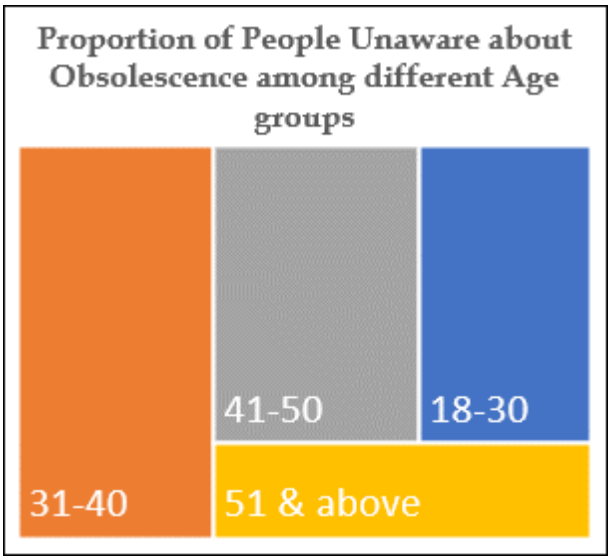

### Awareness regarding Product Obsolescence

Product Obsolescence are strategies used to make a product seem undesirable, useless, and unwanted. As more products are built to fail, we analysed the awareness of users regarding the same. As expected, 68 out of the 120 participants had no idea about what product obsolescence was.

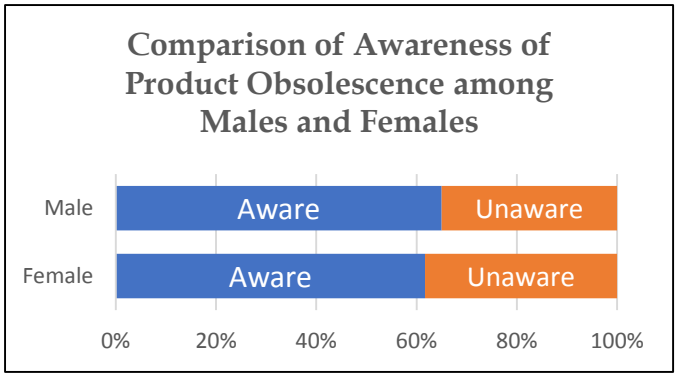

Out of the 52 respondents that declared that they were aware of Product Obsolescence, only 44 marked the correct answer while the remaining eight chose between the wrong options or NOTA. 5 had marked NOTA and only 3 marked the wrong option. The awareness regarding product obsolescence had a varying pattern among the four age groups. Those over the age of 51 were more aware about product obsolescence as compared to the other groups, the age group 18-30 were the ones tailing them

at 2nd position for being the one most aware. The individuals in the age group 31-40 were the least aware about obsolescence.



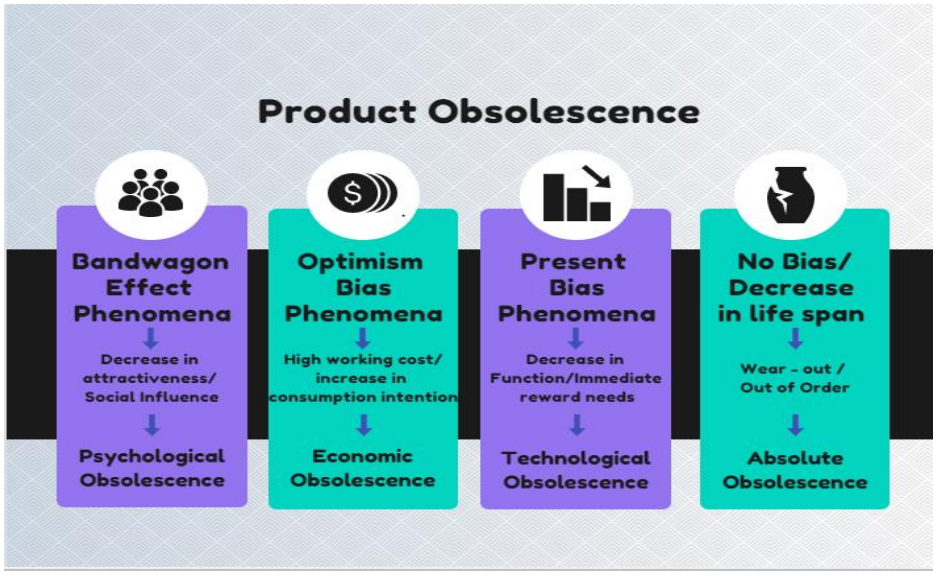




**Awareness and Gender**




There was no difference in the awareness pattern among males and females as seen in the 100% stacked chart given.

**Types of Obsolescence**



## 1. Planned Obsolescence

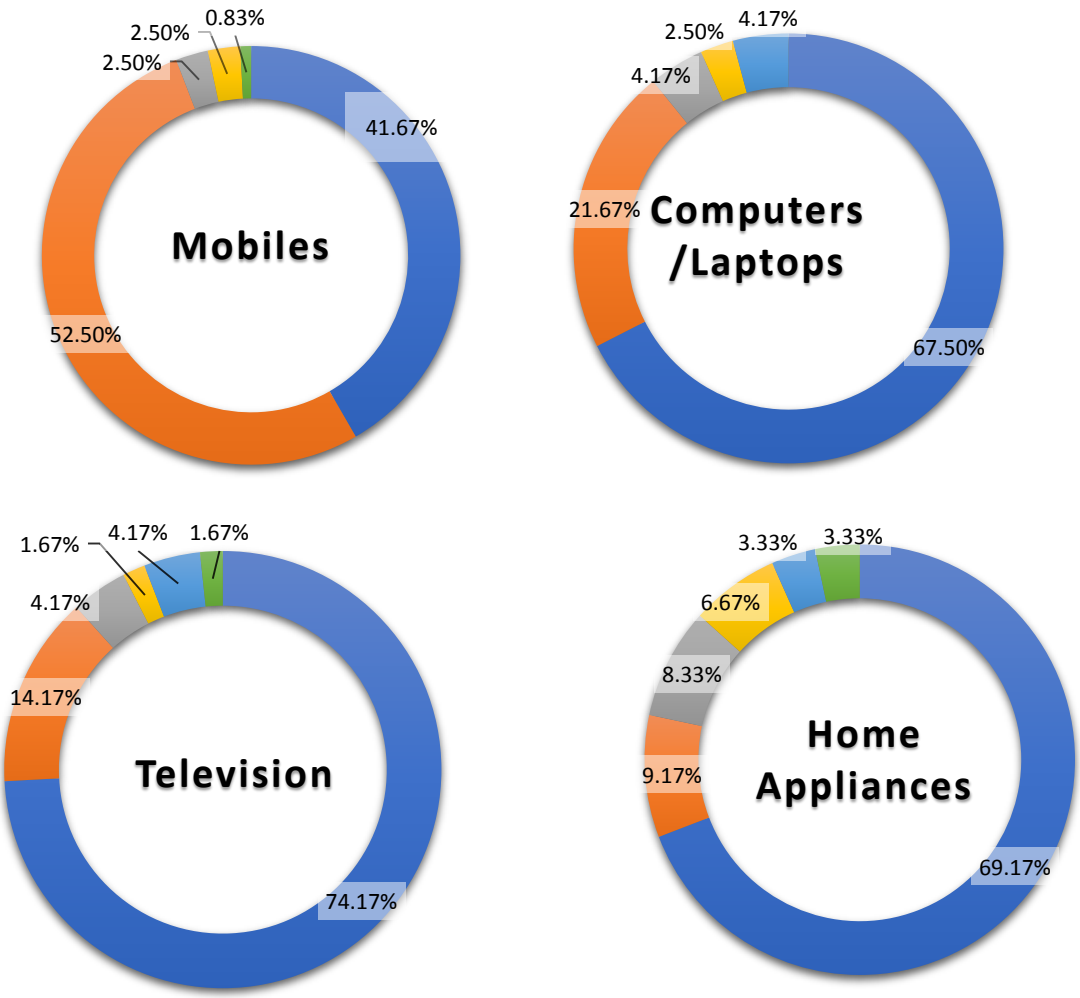
The classic definition of planned obsolescence is to produce goods with a short and uneconomical useful life, so customers will have to repeat purchases. However, rational customers will only pay for the present value of the future services of the product. Therefore, maximizing profits seems to mean producing any given flow of services as cheaply as possible, and production implies an effective shelf life.

In the most recent simple understanding, 'Planned obsolescence' refers to a plan that causes premature damage to the product due to wear and tear. This section describes what planned retirement is. We are considering the scrapping of the plan because it will affect the replacement decision. The latest academic article to determine procedural obsolescence and its different meanings is from 2009 and was written by Joseph Guiltinan. The reference system has two categories, and each category has subcategories.

The former is defined as physical obsolescence and contains various reasons for the replacement decision. Imagine that your durable product has a stylish, polished exterior design that will make you satisfied. When the product goes through daily wear and tear, you may lose your initial satisfaction. Here, we must realize that this kind of dissatisfaction may come earlier than expected, making consumers more dissatisfied with their products and the environment, and having to deal with the consequences of the product replacement cycle too fast. Guiltinan defines this problem as "design aesthetics that led to reduced satisfaction." The second form of physical obsolescence recognizes that the product can be designed for limited maintenance. The third, and last one in this category, refers to the concept of a product with a pre-designated death date, so the product has a "limited functional life design."

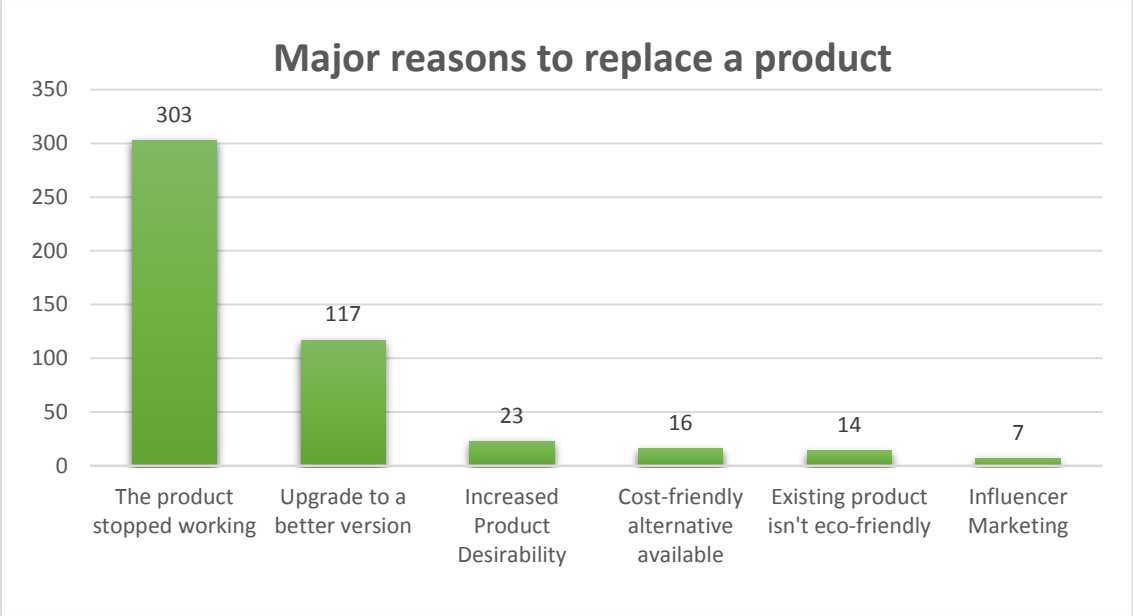
There are two types of obsolescence in the second category, both of which represent technological obsolescence. Fashion trends are increasingly used in electronic products such as mobile phones, and the first Lenovo may be the garment industry. Fashion design represents the first subcategory of technological obsolescence. The second is called "design to enhance functionality by adding or improving product features," and it deals with how companies can invest in technology development to bring improved products to market.

**Major reasons to replace a product**

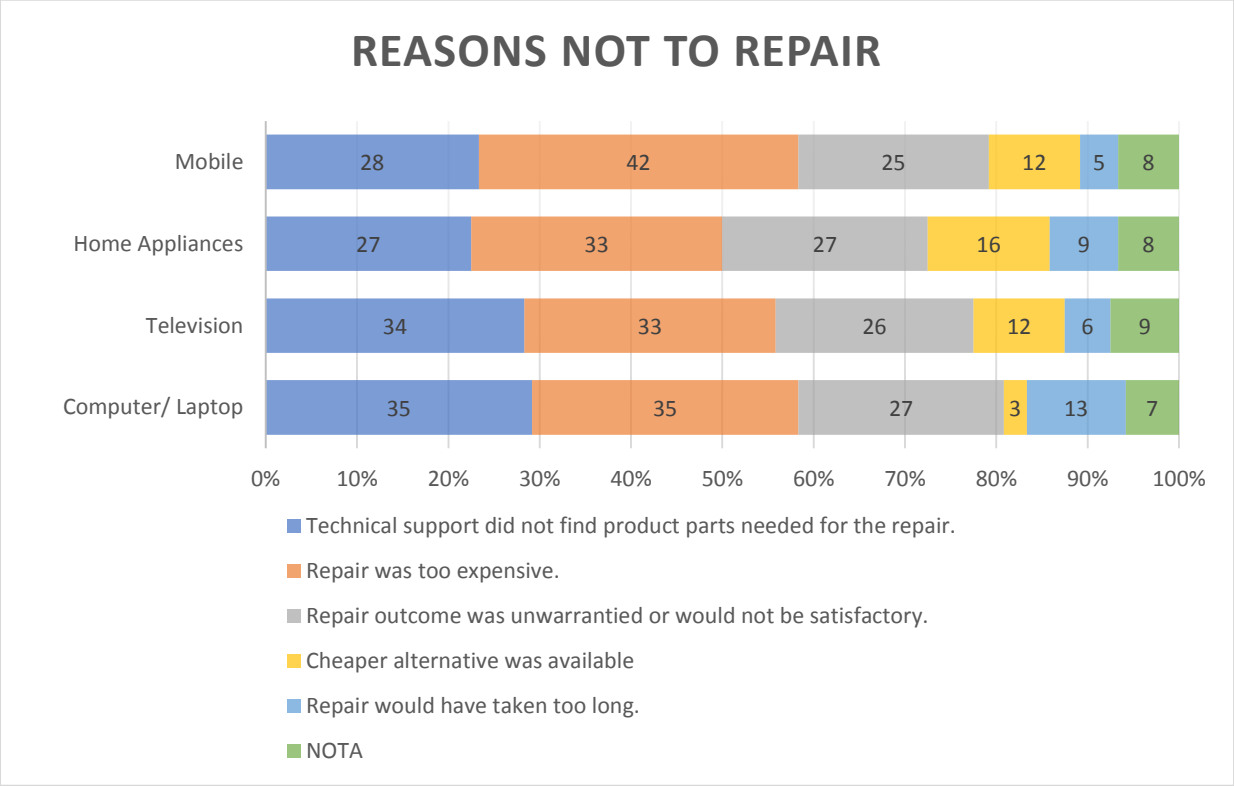



**Key Points:**

- For most of the products, people replace them when they stop working but only in the case of Mobiles we observed that people switch to a better version even if it's in working condition.
- From the graphs its clear that influencer marketing is a key factor that influences the decision of people while buying home appliances. It does not play an important role while making the decision of purchasing other appliances.
- We can also observe that people tend to choose cost-friendly alternatives while buying home appliances over other products.




**Studying the reasons why people chose to replace instead of repairing the product**



**Major reasons to not to replace a product**

**Age-wise**

**18-30**

| | Financial Reasons | Product is recently bought | Product is sustainable and eco-friendly | Discarded products contribute to E-Waste | Product is working perfectly fine |
|---|---|---|---|---|---|
| **1** | 12 | 8 | 1 | 1 | 8 |
| **2** | 6 | 11 | 3 | 4 | 6 |
| **3** | 7 | 8 | 8 | 4 | 3 |
| **4** | 1 | 1 | 13 | 12 | 3 |
| **5** | 4 | 2 | 5 | 9 | 10 |

**51 and more**

| | Financial Reasons | Product is recently bought | Product is sustainable and eco-friendly | Discarded products contribute to E-Waste | Product is working perfectly fine |
|---|---|---|---|---|---|
| 1 | 4 | 10 | 4 | 2 | 10 |
| 2 | 5 | 14 | 3 | 3 | 5 |
| 3 | 10 | 3 | 9 | 3 | 5 |
| 4 | 5 | 2 | 8 | 13 | 2 |
| 5 | 6 | 1 | 6 | 9 | 8 |

**Income wise**

**1-5 lakh per annum**

| | **Financial Reasons** | **Product is recently bought** | **Product is sustainable and eco-friendly** | **Discarded products contribute to E-Waste** | **Product is working perfectly fine** |
|---|---|---|---|---|---|
| **1** | 12 | 4 | 1 | 1 | 3 |
| **2** | 6 | 8 | 2 | 2 | 3 |
| **3** | 0 | 6 | 4 | 3 | 8 |
| **4** | 3 | 1 | 9 | 7 | 1 |
| **5** | 0 | 2 | 5 | 8 | 6 |

**More than 10 lakh per annum**

| | **Financial Reasons** | **Product is recently bought** | **Product is sustainable and eco-friendly** | **Discarded products contribute to E-Waste** | **Product is working perfectly fine** |
|---|---|---|---|---|---|
| **1** | 13 | 18 | 3 | 1 | 15 |
| **2** | 9 | 20 | 2 | 4 | 15 |
| **3** | 18 | 8 | 13 | 4 | 7 |
| **4** | 2 | 4 | 18 | 23 | 3 |
| **5** | 8 | 0 | 14 | 18 | 10 |

**2. Economic Obsolescence**

Economic obsolescence, sometimes known as social obsolescence, occurs when property values decrease because of external factors. With functional obsolescence the loss in value to a property happens because issues pop up related to age or design factors.

The optimism bias refers to our tendency to overestimate our likelihood of experiencing positive events and underestimate our likelihood of experiencing negative events.

Some factors causing Economic Obsolescence include:

**1.Location** – a neighbourhood experiencing an increase in operating cost;

**2.The economy** – reduced demand for a company's product, increased costs of raw materials etc

**3.The government** – the prohibition or restriction of the product or process the equipment is used for

Here we have analysed the economic factors

The sense of income availability, long-term ability to easily obtain employment, consumption of durable products in the long run, and increased household indebtedness are naturally presumable consequences One notes, therefore, not only a strong bias of optimism, but also a serious financial disturbance.

**Mantel-Haenszel Test**

An indicator of economic obsolescence is the unwillingness of individuals to spend. In the studied population, it was seen how different income groups react when it comes to not replacing a product.

To study the effect of annual income on replacing decision Mantel-Haenszel test was conducted. People who gave top priority to the financial reason for not replacing a product were taken into consideration. A 2x2 table of the given format was made for different income groups and Odds ratios of all the groups was calculated separately.

| | Financial Reason | |
|---|---|---|
| Income group | Yes | No |
| Female | A | B |
| Male | C | D |

$$\text{OR (Odds ratio)} = \frac{AD}{BC}$$

The OR for each income group are as follows:

| Annual Income | Odds Ratio |
|---|---|
| Less than 1 lakh per annum | 1 |
| 1-5 lakh per annum | 0.8 |
| 5 - 10 lakh per annum | 0.52 |
| More than 10 lakh per annum | 0.5 |

We observe that the odds ratio decreases as the income rises, implying that the likelihood of consumers choosing the financial reason to not replace a product diminishes as income rises. From the above test we can conclude that income plays a major role when it comes to replacing a product or not. Here the value of the property decreases as the income goes on increasing. People with lesser income are not willing to invest in replacing a product as compared to higher income groups.

**ANOVA**

According to the classical theory of planned obsolescence, the objective of planned obsolescence was to create conditions for repeated purchases, and one of them was to make the repair of the product expensive, inaccessible, and impossible. It is noted in the tables below that consumers who participated in this survey are not willing to pay for expensive repairs for their products. In the survey when it was asked why people were reluctant to repair their products, the option stating repair was too expensive was chosen by the majority of the population. To see whether income or the type of the product was the determining factor two-way ANOVA was conducted at 95% confidence interval.

$H_{01}$: there is no significant difference between the income groups, $\mu_1 = \mu_2 = \mu_3 = \mu_4$

$H_{02}$: there is no significant difference between the products, $\mu_1 = \mu_2 = \mu_3 = \mu_4$

| *Source of Variation* | *SS* | *df* | *MS* | *F* | *F tab* |
|---|---|---|---|---|---|
| Rows(Income groups) | 457.1875 | 3 | 152.3958333 | 29.7761194 | 9.276628153 |
| Columns (Products) | 13.6875 | 3 | 4.5625 | 0.891451832 | |
| Error | 46.0625 | 9 | 5.118055556 | | |
| | | | | | |
| Total | 516.9375 | 15 | | | |

From the table we can see that $f_{cal1}(29.77) > f_{tab}(9.27)$, we can reject the null hypothesis which implies that there is significant difference between the income groups.

As, $f_{cal2}(4.56) < f_{tab}(9.27)$ implies that we can accept the null hypothesis and conclude that there is no significant difference between the products.

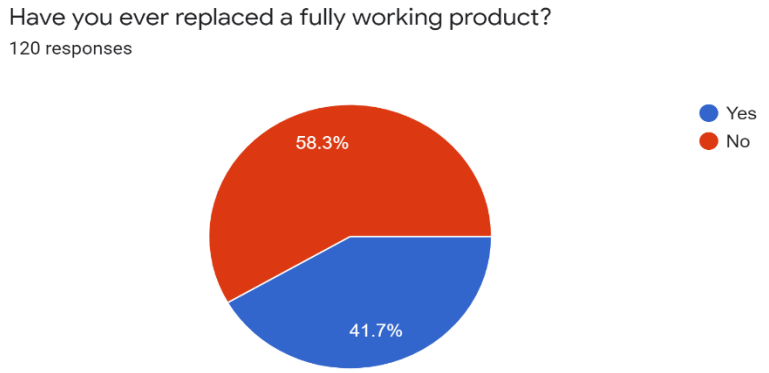
From the table we can conclude that large value for income groups signify that income groups have higher impact on variation than the type of the products.

### 3. Technological Obsolescence

Technological obsolescence is one of the most common obsolescence. Our mobiles and laptops get a large number of updates annually. Each update trying to squeeze out more performance from the device. Eventually the device succumbs to over use of its machinery and stops working. But certain updates can't be implemented in old devices, and such changes in the current trend make your device redundant or obsolete.

Sometimes, certain updates become a trend among the people. This makes you crave for a better device. These new trends or updates start inducing a feeling within you that the device you own is not good enough, instead any device with the so-called trendy feature in a device makes it a very likeable commodity. This phenomenon is called 'present bias'. And due to this phenomenon, you end up replacing a fully working device.

For example, in the present time 4G is the most widely used network band. But it is going to change in the very urgent future. We are now on the onset of making all devices compatible with 5G. this could increase the network of your device by several folds. All newly released devices are advertised in such a way that their device is '5G ready'. People are forced into believing that it would be better for them to switch to a 5G compatible device sooner rather than later. But the truth is though the infrastructure required for 5G is in their final stages. Its implementation in a developing country like India will take a few years. Hence, it isn't even necessary to switch to a 5G device for at least a few years. Though a majority of the people might know this, we will still end up buying these higher end devices. Because of this 'present bias'.




Our project aims at finding exactly how many percent of our respondents are affected by this 'present bias' because of which they end up spending more money than required. About 58.3% people have accepted that they had replaced a fully working product at least once.

**Chi-Square test**

**Hypothesis**: There is a significant difference between expected and observed lifespan of a product
$H_0$: There is no significant difference between expected and observed lifespan of the product
$H_1$: There is a significant difference between expected and observed lifespan of the product

| Observed Duration | <5 years | 5-10 years | 10-15 years | >15 years |
|---|---|---|---|---|
| Mobile | 101 | 17 | 2 | 0 |
| Laptop | 21 | 81 | 16 | 2 |
| Television | 9 | 47 | 46 | 18 |
| Home Appliance | 8 | 42 | 45 | 25 |

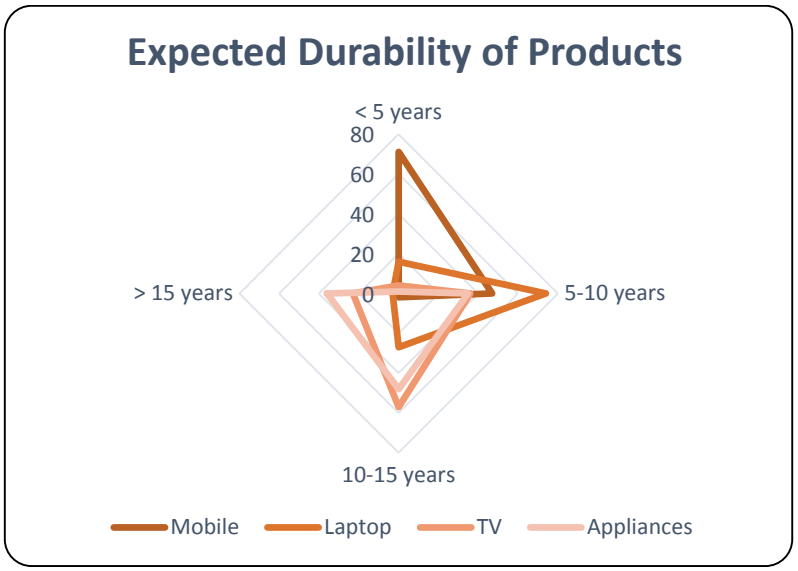
| Expected Duration | <5 years | 5-10 years | 10-15 years | >15 years |
|---|---|---|---|---|
| Mobile | 71 | 47 | 2 | 0 |
| Laptop | 16 | 74 | 27 | 3 |
| Television | 4 | 36 | 57 | 23 |
| Home Appliances | 1 | 35 | 48 | 36 |

| | Degrees of Freedom | Chi Sq (Tab) | Chi Sq (Cal) | Decision |
|---|---|---|---|---|
| Mobile | 3 | 7.815 | 31.82499 | Reject H0 |
| Laptop | 3 | 7.815 | 7.039477 | Accept H0 |
| Television | 3 | 7.815 | 12.82087 | Reject H0 |
| Home Appliance | 3 | 7.815 | 53.94861 | Reject H0 |

By the test we can conclude that mobile, Television and home appliances did not meet the respondent's expected lifespan. The observed duration is less than expected. Whereas in case of laptop/computer there is no significant difference in the observed and expected lifespan. Hence, laptop/computer has met the respondent's expected lifespan.

**4. Psychological Obsolescence**

This type of obsolescence occurs when individuals are no longer drawn to or satisfied by a product. It stems from a subjective shift in a user's opinion of a product and is linked to achieving a certain level of status. Changes in perceived need, design trends (style, fashion), desire for social status (emulation), and marketing are all factors of psychological obsolescence.
Similar situation persists in the data collected during the survey. The fact that people think that the durability of mobile phones should be less than 5 years also states how psychological obsolescence has played havoc with people's mindsets. Previously the customers have been fed those mobile batteries should be used for not longer than 5 years in order to maintain a good technological state. Soon after this the customers started to replace their phone batteries every 3-4 years, following this there came in phones which did not have removable batteries which turned the whole mobile phone game upside down thereby increasing the sale of mobile phones and reducing the sales of batteries. Similar trends can be seen with devices like laptops, televisions and other home appliances which are as shown in the following graph.



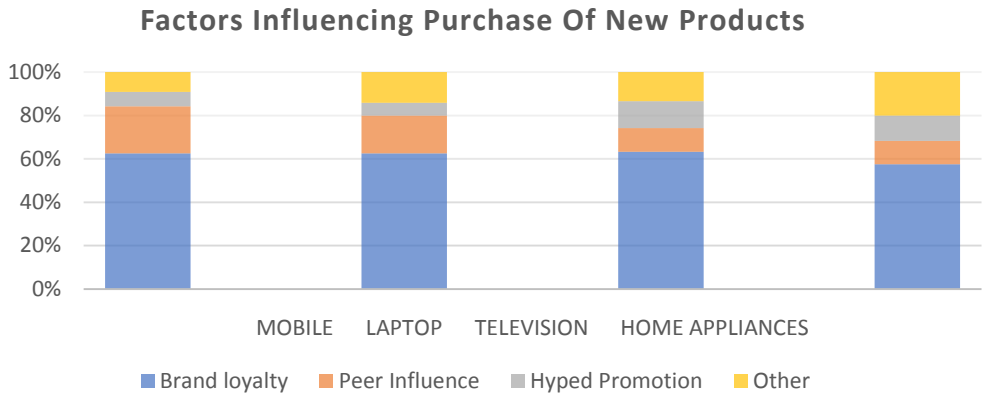

From the above radar chart, we can conclude that for mobile phones the expected durability in today's time is less than 5 years and the mode of the same value for laptops and televisions is 5-10 years and 10-15 years respectively. We can also see that there are very few responses that come close to a durability of > 15years. Taking a closer look at the curves of Televisions and Home appliances we can see there exists a greater diversity in responses as compared to the majority votes in case of Mobiles and Laptops.

In both these cases the modal value forms less than 50% of the overall data, this indicates that there is a greater difference in thought about the durability of Televisions and Home Appliances. The reasons for the same are the technological and planned obsolescence related to these products. Overall, the durability of products is presumed to be lesser than what the products are designed for. The quality of these things has clearly improved over time, but as a result of psychological and technological obsolescence, the way we think about their durability has shifted.

**Bandwagon Effect and Psychological Obsolescence**

A famous example of the Bandwagon Effect is when a consumer sees a lot of people crowded in a store and, out of curiosity, enters the store, sees the deals, and ends up buying something unplanned that the consumer did not need. The customer acts in this way to gain support from a group, believing that he has or has not lost a benefit, such as a store discount. It's a way for an individual to feel safe, and it's not the only one.
Advertising frequently uses deception to persuade consumers that the majority of people prefer a specific brand, product, or service, in order to encourage impulsive consumption without examining other options on the market.

**Factors Influencing Purchase of Products**




This study segmented the participants by gender and age, resulting in the following information:
Brand Loyalty (61.45%) turned out to be the most influential factor in determining new purchases for all products.

**A) Chi Square Test:**

The data collected shows that a greater percentage of seniors (age 40+) buy products under peer influence as compared to millennials.

We performed a $\chi 2$ test to check for the dependency in between Age and Peer Influence as an influential factor in purchases. For this purpose, we clubbed the data for age groups 18-30 and 30-40 as 18-40 and similarly data for 40-50 and 50+ was clubbed as 40+. We test this at a 95%confidence interval

$H_0$: There is no dependence between Age and Peer Influence as an influential factor in purchases.

$H_1$: There is dependence between Age and Peer Influence as an influential factor in purchases

Level Of Significance: $\alpha = 0.05$

| Observed | Peer Influence | Other | Total |
|---|---|---|---|
| 18-40 | 27 | 213 | 240 |
| 40+ | 43 | 197 | 240 |
| Total | 70 | 410 | 480 |

| Expected | Peer Influence | Other | Total |
|---|---|---|---|
| 18-40 | 35 | 205 | 240 |
| 40+ | 35 | 205 | 240 |
| Total | 70 | 410 | 480 |

| Chi Square | Peer Influence | Other | Total |
|---|---|---|---|
| 18-40 | 1.828571429 | 0.312195122 | 2.140766551 |
| 40+ | 1.828571429 | 0.312195122 | 2.140766551 |
| Total | 3.657142857 | 0.6243902439 | 4.281533101 |

$r - 1 = 1$
$c - 1 = 1$
Critical Value = 3.3.841458821= $\chi_{tab}^2$
$\chi_{cal}^2$ = 4.28153310 p-value=0.03852
Here the p value < α
Hence, we Reject $H_0$.
Thus, there exists dependency between Age and Peer influence.
Herd behaviour is the tendency for individuals to mimic the actions (rational or irrational) of a larger group. Individually, however, most people would not necessarily make the same choice. The reason for this dependency in the Chi Square Test can be accredited to the same, since most seniors believe more in the word of mouth rather than the product promotions and self-research.

**B) Chi Square Test**

Social pressure, fashion, and marketing all have a role in how people perceive psychological obsolescence. This cognitive bias is defined as a psychological phenomenon in which people make decisions based on the decisions of others, despite the fact that most people make their own judgments. When a famous person publishes a product, or a company that implies prestige and celebrity produces a new product, the consumer who wants to be a part of this "exclusive" group buys on impulse, based on the psychological urge to feel a part of this cosmos. People are also forced to listen to what their peers have to say about the things they own. All of these factors tend to generate a strong desire to upgrade their devices in order to fit into their social circle. Out of these, millennials are more likely than elders to do so.

The data collected by the group also predicts a similar trend, which is why we decided to run a Chi Square Test which measured the dependency in between the number of desired product upgrades and age at a 95% confidence interval.

$H_0$:The number of desired upgrades does not depend on the age
$H_1$: The number of desired upgrades depends on the age
Level Of Significance: $\alpha$ = 0.05

| Observed | Need Upgrades | Do Not Need Upgrades | Total |
|---|---|---|---|
| 18-40 | 69 | 175 | 244 |
| 40+ | 46 | 194 | 240 |
| Total | 115 | 369 | 484 |

| Expected | Need Upgrades | Do Not Need Upgrades | Total |
|---|---|---|---|
| Males | 57.97520661 | 186.0247934 | 244 |
| Females | 57.02479339 | 182.9752066 | 240 |
| Total | 115 | 369 | 484 |

| Need Upgrades | Do Not Need Upgrades | Do Not Need Upgrades | Total |
|---|---|---|---|
| Males | 2.096518087 | 0.6533863957 | 2.749904483 |
| Females | 2.131460055 | 0.6642761689 | 2.795736224 |
| Total | 4.227978142 | 1.317662565 | 5.54564070 |

$r - 1 = 1$
$c - 1 = 1$
Critical Value =3.3.841458821= $\chi_{tab}^2$
$\chi_{cal}^2$ =5.54564070 p-value=0.0185267731
Here the p value << α
Hence, we Reject $H_o$.
This dependency can be reasoned by the fact that millennials are more exposed to multiple social groups as compared to seniors and they are hence more likely to have knowledge of the products that are available in the market, which would in turn help them fit in their social group. Thus, more the number of people the consumers find have bought the good, the greater the demand for the good in question and further to the right demand curve for the good lies. In summary, is possible theoretically see a positive relationship between the cognitive bias.
Bandwagon effect and the perception of psychological obsolescence, which leads the consumer to make the decision to buy products.

**5. Relationship between the Obsolescence**

**Is there a correlation between different types of obsolescence?**

We wanted to test whether there was a correlation between different types of obsolescence.

So, we considered the data of following questions (based on different obsolescence)

**Absolute obsolescence** - Technical support did not find product parts needed for the repair.

**Technological obsolescence** - The product stopped working

**Psychological obsolescence**- (1) Repair outcome was unwarranted or would not be satisfactory and (2) Upgrade to a better version

**Economic obsolescence**- Repair was too expensive.

And we observed that there exists a strong positive correlation between:

a) Absolute obsolescence and Technological obsolescence (r= 0.7537)

b) Psychological obsolescence (1) and Technological obsolescence (r= 0.7609)

c) Psychological obsolescence (2) and Economical obsolescence (r= 0.9942)

In theory and in practice all forms of obsolescence are very closely interrelated and the findings of the study also predict the same. Products are designed in a way that they stop functioning (no upgrades available/system speed reduces) which forces the customers to either opt for repair or go ahead to buy a new product. Many times, due to unavailability of certain spare parts, the repair of the product becomes impossible. Even if parts become available, the repaired products are considered unwarranted, culminating in unsatisfactory results.

Expensive repair is a factor that promotes individuals to buy new products. Societal opinions and peer influence continuously act as strong influencers in the decision-making process to upgrade to better versions of products.

**Perception of Planned and Economic obsolescence**

| | **Agree** | **Disagree** |
|---|---|---|
| The more expensive the product costs, the longer it should work. | 75 % | 25% |
| The cheaper the product costs, the less time it should work | 38 % | 62% |
| The more expensive the product, the higher the cost of maintenance, but the better services. | 71% | 29% |
| The cheaper the product, the higher the cost of maintenance. | 36% | 64% |
| When a cheap product breaks down, it's better to buy another one than try to fix it. | 73% | 27% |

Price of product determines whether we should replace, maintain, and duration of it working. 75% of the respondents believe that if they pay more for a product, they deserve a better product that is more durable. Hence, the extra money that is paid for a product must be attributed to its longer usage.

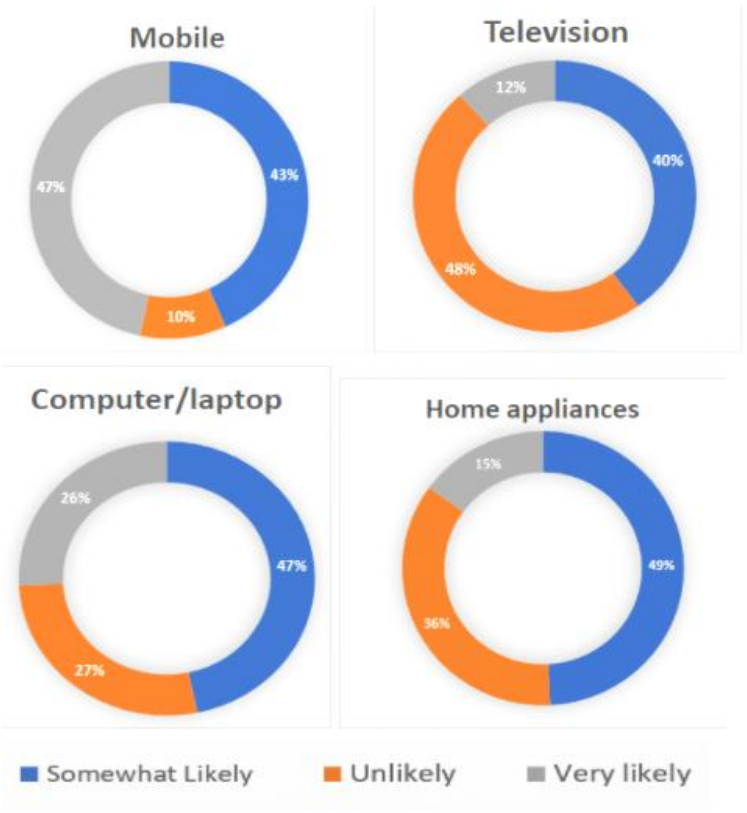
We saw that the more expensive a product is, the more is the expectation associated with its durability, but does that imply that a cheaper product shouldn't last long? By the responses we collected we can see that about 62% of the respondents are against the notion that a cheaper product shouldn't have high durability.

Now, let us look at the relationship between the cost of the product and its maintenance cost. About 71% of our respondents believe that because they buy an expensive product, they deserve to get a cheaper maintenance cost. Simply because of the fact that they are paying much more for the product compared to its value.

But it doesn't mean that a cheaper product should have higher maintenance. According to the responses collected by the group about 64% of the respondents expect cheaper servicing for cheaper products

Also, the current belief in the sample population is that if a cheaper product breaks down its better to buy a newer one, rather than fixing it. One's interest in acquiring a newer product convinces him to spend much more on buying a product rather than repairing it. About 73% of the respondents would prefer buying a new product over fixing their cheap older product.

**Likelihood of people replacing a product in next 5 years**

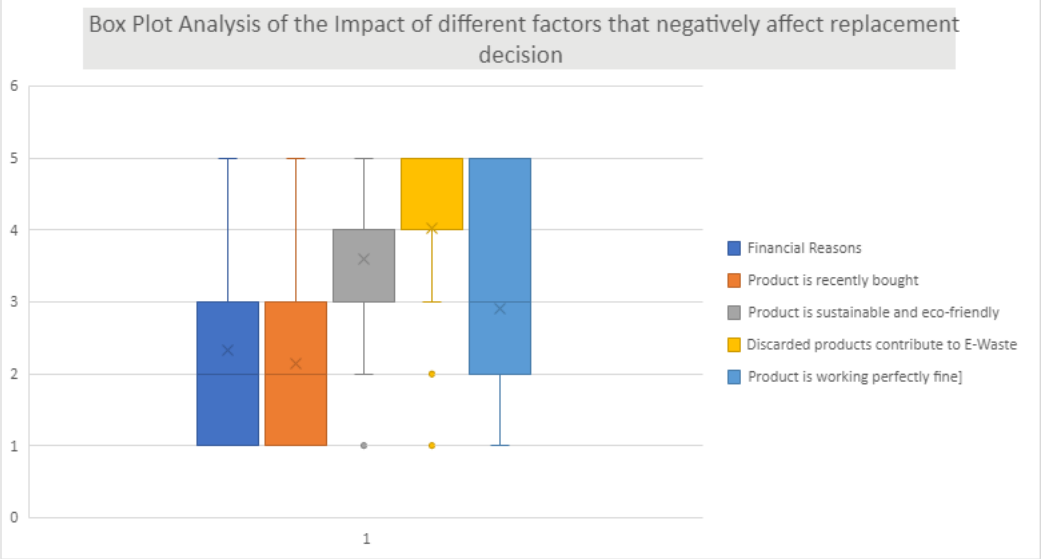


As seen from the graph above, respondents are very likely to buy a new mobile in the next 5 years as compared to the other products. Television was the least likely to be bought in the next 5 years followed by Home Appliances and Computer/Laptops. 50% of the respondents are only somewhat likely regarding buying a new Computer/Laptop and Home Appliances in the next 5 years. The current trend of replacing products is clearly displayed in the given chart.

**6. Environment and Obsolescence**

A barrier to environmental health, obsolescence plays a major role in impacting people's replacement decision, increasing E-waste and lots of dangerous chemicals being produced for the production of hardware. The environment is affected by the unrestrained consumption of electronic gadgets. According to the UN, we generate around 50 million tonnes of this waste each year from which a high percentage ends up in waste dumps in developing countries.

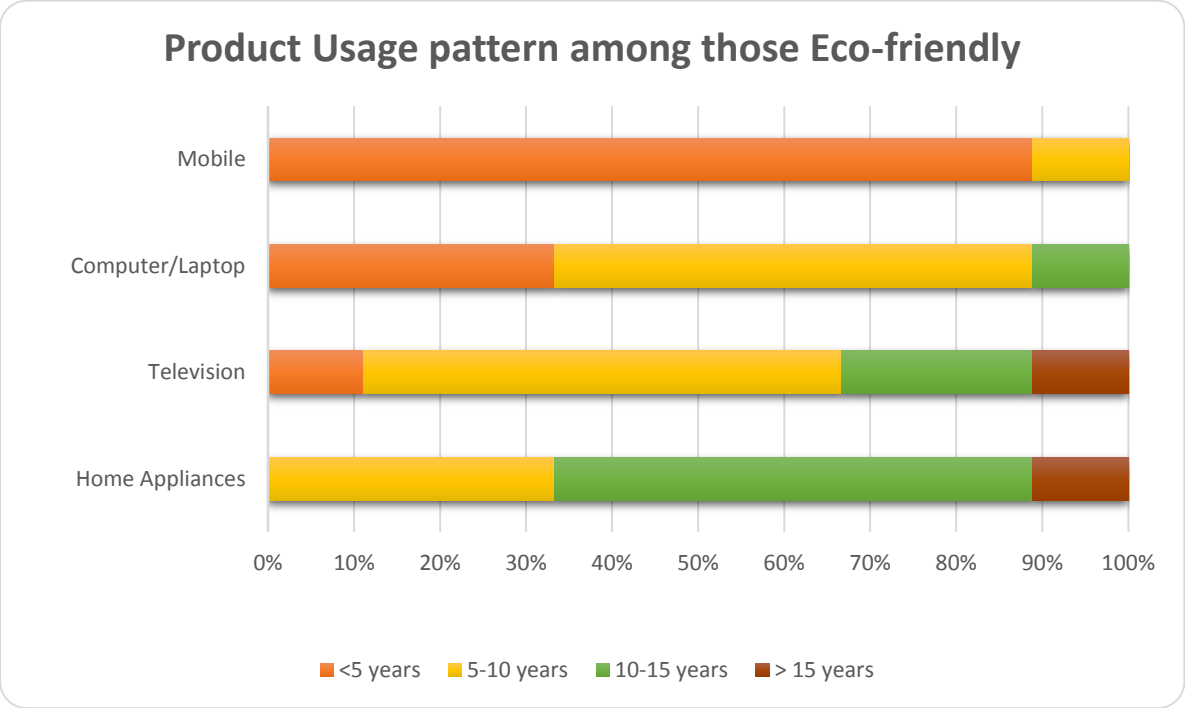
The respondents were asked to rank reasons that stop them from replacing a product.The analysis inferenced that the environment plays a comparatively negligible role in replacement decisions as compared to economic and technological reasons.




The boxplot visualises the rank given by respondents to the various factors that stopped them from replacing their product. As seen above, the environmental reasons were given the lowest rank compared to the others.

- Only 7.5% of respondents gave a higher rank to environmental factors being their reason to not replace an existing product
- Products' contributions to E-waste on disposal was given the lowest rank concluding that it was not the major reason to replace a given product as compared to the others.
- The impact of sustainable and eco-friendly products didn't stop many people from replacing them and they were given the second lowest rank.
- Around 67% of respondents that give leverage to environmental factors have never replaced a fully working product.
- 89% of the respondents that give importance to environmental factors were aware of the term product obsolescence.

The usage pattern among those eco-friendly is displayed in the chart given below




As seen above, even those who tend to care about the environment had a mobile replaced in less than 5 years of usage. More than 50% of these respondents used their Computer/Laptop and Television for 5-10 years. As compared to the other products, Home appliances had a lifespan of 10-15 for more around 50% of these respondents.

Some further analysis concluded that: After buying a new product

- 19.2% of respondents recycle their old products in working condition while 13.3% discard them.
- 27.5% of respondents recycle their old products which are not in working condition and 66.67% prefer to discard them.

Thus concluding obsolescence plays a pivotal role in influencing people's decision and thus negatively impacting the environment.

## SUMMARY

The idea of obsolescence is certainly not new – it was first written about in 1928 by the American marketing pioneer Justus George Frederick. He stated that it was necessary to induce people to buy an ever-increasing variety of things, not in order to use them but to activate commerce and discard them after a short period of time."

Nearly a century on from Frederick's description, it seems his idea is everywhere, and it sometimes feels as if we are drowning in the detritus of product obsolescence. Ever-changing software spells the demise of fully functioning devices – which is why so many of us have household drawers filled with old ones, left behind – and often bricked – by the same companies that made them.

Product obsolescence is an estimation of the end of a product's operational lifecycle. Generally, product obsolescence is measured before or during the product development phase and is estimated using past and future technological and industry growth statistics.

In computing, hardware and software become obsolete once they are superseded by newer, better versions. For hardware components, computing power, internal architecture, memory speed and other related parameters become factors used to evaluate product obsolescence criteria, whereas for a software product, enhanced functionality, security, platform compatibility and operating system (OS) support are used to evaluate the operational lifecycle.

Many people are unaware of the notion of product obsolescence and how it affects their lifestyle, which led to the selection of this topic. This study focuses on following types of obsolescence

1. Planned obsolescence
2. Technological obsolescence
3. Economical obsolescence
4. Psychological obsolescence

The initial part of the study aims at investigating the influence of different types of obsolescence on consumers' lifestyles. Planned obsolescence points out how products are deliberately designed in a way to stop working and later on how their repair is made close to impossible by using various means. Technological obsolescence refers to a mechanism of constantly making upgrades, which are not compatible with older devices, forcing people to upgrade to new devices. Psychological and economic obsolescence measure the effect of the society and economic factors like financial and employment situations on the purchase and replacement decisions of products. The study tests and proves various hypotheses under each form of obsolescence. It then throws light on the interconnection between them. This is done by finding out correlations between various variables pertaining to different types of obsolescence. Later on, it analyses the environmental impact of product obsolescence wherein we found out that many people care for the environment, but there are very few who have reduced the frequency product replacement.

Capitalists tend to argue that as technology improves, consumers should upgrade too but in our current mode of production, this is unsustainable, expensive, and harmful to our environment. At the end of the day, planned obsolescence is good for investors, not consumers. Regardless of whether it is aesthetic (psychological), technological, and technical or software, product obsolescence covers all techniques seeking to deliberately reduce product life cycle or operational life in order to increase its replacement rate. It has become an increasingly common tool for an unbearable consumer society. Not only does it deprive people of their rights to use sustainable products, but this production and consumption system also relies on raw material extraction and on land and resource exploitation reaching its limits. Bearing long and medium run climatic, environmental, geopolitical, and social and health issues in mind, we wish to think and act to conceive the world we wish to live in.

## LIMITATIONS

This study offered a number of interesting insights. Our findings, however, also have specific study constraints and for future studies, they will be examined and overcome.

•The concept of an online modality-based standardized survey surely reduced the participation of a relevant number of interviewees. Future research should focus on increasing the sample number of respondents utilizing diverse communication methods, not solely through social networking. Moreover, the study only looked at the age and gender segmentation, other segmentations such as income class may also essential to be considered.

• The sample size would be modified differently from our existing strategy. Instead, the size could have been considerably greater than 120 responses, which in turn reflect the complete population. In addition, the modification of the sampling method can also produce varied findings. However, given the various limitations in our assignment, for example the time, a lot greater sample would not allow than the one we have utilized. If a little qualitative interview with respondents was done with the quantitative approach, the study could be more reliable.

•The survey was based only upon a few products, including mobile phones, television and computers. Future research studies could include more variety of products for a better study.

•Respondents were requested to report their product experience themselves, which may not be correct. The participants, for example, answered questions about the probability of buying a given product in the next five years. Since the responses was reported on the basis of their personal memories, distinctions and prestige, some incorrect answers may be provided. For future studies a detailed interview may be recommended.

•This research has been characterized as an academic study. An experiment in the field could be more efficient and more enriching. With the application of questionnaires, the respondent can intentionally or not, misunderstand the questions, misinterpret what is being asked or even deceive the researcher.

•As the literature on product obsolescence is not much available, it was unknown how much of adult customers would comprehensively comprehend the topic, so questions on the objective knowledge of several types of product obsolescence were obviously formulated. Future studies could take this study into account and create alternative questions concerning the measurement of objective knowledge.

•The survey focused on influences and impacts of various kinds of product obsolescence. The module content can be improved or changed to give various results. Additionally, the impact of other factors could be examined, such as consumer-driven socially responsible behaviour and moral ideals on attitudes, subjective norm, and perceived conduct control. The measurement for objective knowledge could also be improved upon.

•As this study investigates the knowledge of the responder about different product at a particular time, special brands have not been taken into account. Future research

integrating marketing efforts and consumer perceptions could therefore also make a significant difference in the future as an extensive study of product obsolescence.

- The results obtained by this study, while validating the influence of cognitive biases in purchasing decision-making, couldn't give a conclusion on the intensity level at which that influence exists. Future studies may examine individual brands, participants' socio demographic factors and the environment in which the buying transaction will be carried out in order to draw the intensity level.

- For example, study topics and comparisons with other consumer groups, including parents with children, high-income workers etc. might be added as factors, which could be deemed influential. Another point is that subsequent research should clearly incorporate the views of companies and the government regarding the issue, which could deepen understanding on a broader social level.

## FINALISED QUESTIONNAIRE

**Questionnaire:**

Q1) Age:
- o 18-30
- o 31-40
- o 41-50
- o 51 & above

Q2) Gender:
- o Male
- o Female
- o Non-Binary
- o Prefer not to say

Q3) Employment status:
- o Employed
- o Unemployed
- o Student

Q4) Annual family income:
- o Less than 1 lakh per annum
- o 1-5 lakh per annum
- o 5-10 lakh per annum
- o More than 10 lakh per annum

Q1) Are you aware of the term ‘Product Obsolescence’?
- o Yes
- o No

Q2) What do you think is meant by 'Product Obsolescence’?
- o Companies selling products at a reasonable price for reduced quality. o Companies stop production and promotion of sold products, so they become outdated. o Companies using illegal means to hike product prices
- o None of the above.

Q3) In the next 5 years, how likely are you to purchase the following product? (Home appliances include Oven, Refrigerator, Washing Machine, etc.)

| | Unlikely | Somewhat likely | Very likely |
|---|---|---|---|
| Mobile | | | |
| Computer/Laptop | | | |
| Television | | | |
| Home Appliances | | | |

Q4) Have you ever replaced a fully working product?

- o Yes
- o No

Q5) When you buy a new appliance, what do you do with the old one (If it's still in working condition)?
(You can select more than one option)

- o Recycle it
- o Discard it
- o Resell / Exchange it
- o Donate it
- o Keep it in the storeroom

Q6) When you buy a new appliance, what do you do with the old one (If it's NOT in working condition)?
(You can select more than one option)

- o Recycle it
- o Discard it
- o Resell / Exchange it
- o Donate it
- o Keep it in the storeroom

Q7) What are the major reasons to replace a product you own?

| | Want to upgrade to a better version | The product stopped working | The existing product is not eco friendly | There is a cost friendly alternative | Increased Product Desirability | Influencer Marketing |
|---|---|---|---|---|---|---|
| Mobile | | | | | | |
| Computer/ Laptop | | | | | | |
| Television | | | | | | |
| Home Appliances | | | | | | |

Q8) Rank the following major reasons that STOP you from replacing a product? (1 = Highest Ranking, 5 = Lowest Ranking)

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Financial reasons | | | | | |
| Product is recently bought | | | | | |
| Product is sustainable and eco-friendly | | | | | |
| Discarded products contribute to E-waste | | | | | |
| Product is working perfectly fine | | | | | |

Q9) What do you think should be the durability of the following products?

| | Less than 5 years | 5-10 years | 10-15 years | More than 15 years |
|---|---|---|---|---|
| Mobile | | | | |
| Computer/Laptop | | | | |
| Television | | | | |
| Home Appliances | | | | |

Q10) After how many years did you get the following products replaced?

| | Less than 5 years | 5-10 years | 10-15 years | More than 15 years |
|---|---|---|---|---|
| Mobile | | | | |
| Computer/Laptop | | | | |
| Television | | | | |
| Home Appliances | | | | |

Q11) Which of the following options comes closer to why you avoided repairing the product?

| | Repair was too expensive. | Technical support did not find product parts needed for the repair. | Repair would have taken too long. | Repair outcome was unwarranted or would not be satisfactory. | Cheaper alternative was available | NOTA |
|---|---|---|---|---|---|---|
| Mobile | | | | | | |
| Computer/Laptop | | | | | | |
| Television | | | | | | |
| Home Appliances | | | | | | |

Q12) What are the factors that influence your decisions while purchasing a product?

| | Brand loyalty | Peer influence | Hyped promotion | Other |
|---|---|---|---|---|
| Mobile | | | | |
| Computer/ Laptop | | | | |
| Television | | | | |
| Home Appliances | | | | |

Q13) Which of the following statements do you agree with?

| | Agree | Disagree |
|---|---|---|
| The more expensive the product costs, the longer it should work. | | |
| The cheaper the product costs, the less time it should work | | |
| The more expensive the product, the higher the cost of maintenance, but the better services. | | |
| The cheaper the product, the higher the cost of maintenance. | | |
| When a cheap product breaks down, it's better to buy another one than try to fix it. | | |

Q14) Which product would you prefer?

- o Products that have frequent upgrades
- o Products having more durability

**Thank You note:**

For those of you still uncertain, product obsolescence is when a company stops producing, marketing, or supporting a developed product and ensures that it becomes obsolete in the near future.

We are very appreciative of the time you have taken to assist in our analysis and extremely grateful to you for contributing your honest information and thoughtful suggestions.

## REFERENCES


1.http://umu.diva-portal.org/smash/get/diva2:409924/FULLTEXT01

2.https://core.ac.uk/download/pdf/56229.pdf

3.https://core.ac.uk/download/pdf/30637923.pdf

4.https://www.ijser.org/researchpaper/Planned-Obsolescence.pdf

5. https://www.jstor.org/stable/1884176

6.https://www.researchgate.net/publication/329275849_Customer_Response_to_Planned_Obsolescence