Apple’s Involvement in Green Lean

Six Sigma

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Team 16
Introduction

Even Though Apple’s efforts in helping the environment is significant, Greenhouse gases produced by Apple Inc. rose 34 percent during Fiscal year 2013-2014 compared to that of the previous year [3]. This can be due to several factors which is why Team 16 decided to look further into this category. From the data compiled in the Project Overview, it was observed that the manufacturing sector contributed most to greenhouse gases with a whopping 61% while product use followed at 30% [7]. Transportation, Facilities, and Recycling were other smaller factors leading to greenhouse emissions [7]. With numbers such as these, the team knew if any changes were to be made to these sectors, Apple’s carbon footprint (amount of greenhouse gases emitted) would be reduced significantly. With different tools available to the team, the fishbone diagram analysis felt apt as the team could individually look at each sector and find out causes associated with each one. This rise in Greenhouse gases should not merely base the company as environmentally unsound as Apple has been doing its share to reduce energy usage. Powering Data centers with 100% renewable energy shows Apple’s commitment in reducing their carbon footprint.

Application of Six Sigma

In Team 16’s Case Description, the team discussed the application of greenhouse gas emissions to the methodology of Six Sigma. A few Six Sigma concepts were outlined, including fishbone diagrams, design for Six Sigma (DFSS), voice of the customer (VOC), and design for x (DfX) [6]. The fishbone diagram that the group produced shows the DFSS process, and ways that the processes can be improved to reduce greenhouse gas emissions. This also takes into account the voice of the customer because the customer will want a product that is environmentally friendly. Apple uses DfX by designing their manufacturing processes to focus on environmental awareness and greenhouse gas reduction [6].

The fishbone diagram, shown in sections below, outlines how each department will format their procedures to reduce emissions. The complete fishbone diagram is attached in the group’s submission in ANGEL.
Fishbone Analysis

Manufacturing

Manufacturing contributed to 61% of carbon emissions, of which polyvinyl chlorides (PVC’s) is the biggest factor. Therefore, eliminating PVCs will reduce Apple’s carbon footprint. On the other hand, Apple successfully banned harmful chemicals like benzene and N-hexane which are harmful to humans [2].

Product Use

Product Use is an external one but is very important as it ranks second after manufacturing in terms of carbon emissions. The way a device is used determines its energy usage. By identifying the causes for product use, this can be used to lower emissions in the long run.
This is the responsibility of the customer to keep their device in a safe environment so that it lasts longer, and to correctly dispose of the device or recycle it when it becomes defective [8].

**Transportation**

Apple has done a great job in terms of reducing transportation as this is seen in Apple’s new strategy to reduce emissions. The company only uses air travel to ship products which is economical and reduces effect on the environment. Team 16 realized that Apple does not account for damage while transport which can be a factor to reduce emissions as energy used to fix damages is wasted and can be avoided if the right precautions are taken.

![Figure 3: Transportation Sector of Fishbone Diagram](image)

**Facilities**

Using the fishbone diagram, the team mapped out the defects with the facilities which resulted in the causes shown in Figure 4. Using coal fired plants is definitely among the high contributors to greenhouse gases and should be powered by renewable energy sources. In Apple’s favor, the company built its data centers which are running on 100% renewable energy [5]. Also something the team overlooked had it not been for the fishbone diagram is the amount of energy consumed by retail stores and offices. This should also be renovated to use renewable energy sources like geothermal, wind, and hydroelectric energy.
Recycling

Apple uses recycling to their advantage, and have started taking more measures to improve the efficiency of their recycling processes. They are trying to make their proprietary screws recyclable. This will result in more efficient recycling of all Apple products. Apple is also looking into alternative types of glue base which would be recycled. The company is trying to make all of their products EPEAT Gold certified, which means that the product falls under the category of “green electronics” [3]

Employees

In addition to the five topics above, the employees also contribute to the carbon footprint of the company. The employee section of the fishbone diagram is shown below.
Most of the impact that an employee can have depends on how they are educated in the subject. Before they start working for Apple, they are taught the correct ways to handle machinery and the safest ways to handle harmful chemicals in the manufacturing plants. Apple also encourages employees to be environmentally responsible in their personal lives. They can do this by carpooling to work, recycling, and using more fuel efficient cars.

**Conclusion**

Apple is making strides globally to improve their environmental awareness and cut back on greenhouse gas emissions. The most emissions came from the manufacturing sector, and many things are being done to help that. Using a DFSS approach and fishbone diagram, Team 16 was able to identify possible strategies that Apple could implement to reduce emissions. In the product use section, customers should use their Apple products responsibly so that they can preserve them for longer. Apple uses exclusively airplanes for faster transport of product, and uses renewable energy in their facilities. They also recycle as many parts of their products as possible. Apple employees are asked to follow all of the company’s sustainability guidelines both at work and in their personal lives. When all of these strategies are put together, Apple would be able to reduce their carbon footprint.
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