

Disruptive Innovation

Executive Summary

Disruptive innovation represents invention and distribution in the normal flow of business. Clayton Christiansen supposedly coined the term in 1995. Christiansen looked at how certain inventions disrupted the normal lives of humans and how humans were changed by these innovations. This paper will present different disruptive innovations that occurred within various engineering disciplines. Learning about these disruptive innovations will provide insight on how society has been able to constantly evolve and will also help predict future innovations that may appear in the near future. The four engineering disciplines discussed are as follows.

Electrical and Software

A common theme for disruptive innovations in the electrical and computer industry is integrating the technology with daily life for convenience. PCs, the Internet, social media, and smartphones are all disruptive innovations which led users to everyday lifestyle changes because of the convenience and communication power these innovations gave. The vision for the future is to integrate more common items with technology that currently do not have it. Since computer hardware advancements have historically made computing smaller and faster, it's only natural to add it them to products that currently do not have them yet and for users to be able to communicate and control those products.

Chemical and Material Industry

In the history of chemical and material industry, there were numbers of disruptive innovations changed human's life. This paper mainly focus on the examples of past textile production innovation, current nanotechnology related textile innovation in material industry, as well as past chemical production innovation, current nuclear power plants. By studying those past and current examples, we conclude that disruptive innovations have both advantages and disadvantages toward the development of human's living standard. Although advantages weigh much heavier than disadvantages, the later can't be ignored, like environmental issues, failure caused disasters in these industries.

Mechanical and Manufacturing

Mechanical disruptive innovations are primarily technologies and solutions that emerge from the industrial application of mechanics and the production of tools, machinery and their products. One of the most important disruptive innovations is the wheel. Even though the wheel can be considered a simple and primitive solution, it wasn't invented at an early stage of the human race. It can be considered as a latecomer considering there existed boats, sewing needle, woven cloths and more. Then came the introduction of the steam engine which played an integral role in the industrial revolution. The first successful design by James Watt made its way into a wave of products such as the steamboat, steam locomotive and the steam engine automobile. The introduction of the internal combustion engine also paved the path for the modern day automotive industry that we know today. These motors revolutionized transportation and have found themselves in secondary products and technologies that people use in their everyday lives, such as generators, snowmobiles, lawnmowers and much more.

Civil Industry

The three main subsections are structures, water, and transportation.

In history the unique features of religious structures, such as the ziggurats flat roof and the different church designs, had people change the way they used to worship. In the current times, the use of efficient and economic materials, such as reinforced concrete, has become the core objective. As for water, the largest disruptive innovations were in regards to water extraction, using the archimedes screw, and water distribution through aqueducts. Aqueducts introduced a system of water transportation using gravity.

Furthermore, the introduction of roads and highways throughout the land, and canals across the sea's have dramatically replaced the earlier ways of transportation adopted by people. Disruptive innovation is key for society evolution. For a brighter future, one must learn to identify or develop possible disruptive innovations. Some of the predicted future disruptive innovations within civil engineering include, composite building materials, energy generating roadways, and sea water purification facilities.