

Theories of innovation | netflix case study



The following discussion will provide insights on what is innovation by taking into account its characteristics through the example of Netflix and phone manufacturing companies. Theories will also be applied to illustrate why innovations are needed. It then leads to the four roles that science can either play by analysing Paul L. Gardner (1994)'s ideas. Finally, this essay will suggest the transforming roles of science in technological innovation. The discussion to that will mainly focus on how 'creative destruction' (Schumpeter, 1942) has become a recurring problem since the rising of R&D.

What do we mean by innovation?

The meaning of innovation is not merely what is stated in a dictionary, but often instead characterised with the values it adds to an entity. Some traits of innovation can be demonstrated in the example of Netflix.

Netflix is one of the biggest streaming providers within the entertainment industry, co-founded by Marc Randolph and Reed Hastings in 1997 (Netflix), who later forewent the DVD delivering service. This business firstly establishes the concept that innovations are not restricted in the format of a product, but also a service. Secondly, the subscribing fee introduces the commercialisation of Netflix's new approach in delivering entertainment.

Netflix's burgeoning business also embodies the idea of 'creative destruction' (Schumpeter, 1942)- formalising the new way of distributing entertainment by knocking down alike businesses and the labour force involved. The streaming network Netflix provides effectively separated the DVD rental industry from the mainstream home entertainment source. Ever since its start-up, US's consumer spending on home entertainment through brick-and-mortar rental has been declining; it plummeted a substantial 21%

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in 2016 to \$0.49 billion (Statista, 2016). Subsequently, the number of employees within the video tape and disc rental industry decreases over the last decade (BLS, 2015). The success of Netflix has also influenced the English language. For example, people often refer any business pushed out by Netflix as 'Netflixed' (Perry, 2015). This reiterates there is no precondition for an innovation to be a high-tech product, but also suggests the collateral novelties in a different field which could be led to by the innovation.

Also, consider the case of Samsung being accused for imitating iPhone's appearance, display, touch-screen interface and packaging (IBT, 2016). Assume Samsung pragmatically copied Apple's notions, but that a Samsung Galaxy's phone realistically looks different to an iPhone. It is reasonable to suggest that the room for innovations is restricted by what is already existing. For instance, the layout of virtual keyboards on phones is confined by the fundamentality of the QWERTY keyboard which historically served the purpose to resort jamming occurred in typewriters. Even if alternative keyboards such as Dvorak (1936) ergonomically speeds up typing (How-to Geek, 2014), but the multitude will still prefer the QWERTY keyboard because they are locked into the QWERTY paradigm (Margolis and Liebowitz, 2000).

The Panda's Thumb Theory (Gould, 1980) plays a role in explaining the evolution of the QWERTY keyboard. It illustrates pandas' outwardly grown wrist bones as a result of the lack of functionality of their real thumbs, so that they can hold onto bamboos when they eat. This essentially means if bamboo was extinct in history, then pandas' anatomical adaptation would

not have served a purpose. Analogically to the QWERTY keyboard, if typewriter was never invented then the QWERTY layout would have been composed for no values.

Therefore, innovation is supposedly a purpose-derived and commercialised spinoff of creative destruction following path dependencies e. g. Netflix; which is also served as a process to overcome flawed innovations e. g. original typewriter.

What is the role of science in technological innovations?

Science might have acted as a free-rider to absorb experience from innovating technologies. Prior to the industrial revolution and the introduction of thermo-kinetic theory of gas, the first steam engine was invented by Thomas Newcomen in 1712 (BBC History) despite the lack of efficiency and the extravagant cost to build one. This example preliminarily provides the materialist view of technology preceding science (Gardner, 1994a).

As scientific understanding towards thermodynamics grew, James Watt improved the primitive steam engine in 1769 (BBC History) which was then widely applied in powering transportations. A complementary nature between science and technology is implied (Gardner, 1994b)- Newcomen had set the basis of a viable steam engine which allowed theories to be developed over time which could explain the principle of a steam engine, and finally the piece of technology was refined by adapting the new knowledge acquired. The latter also brings about how science informs technology (Gardner, 1994c).

Nevertheless, there are also hints of independency between the thermodynamic theory and the steam engine, because the two elements are only interacting with each other if they truly share the same goal and implement the same process arriving to a coherent result (Gardner, 1994d). Note that this merely implies a particular scientific theory is not intentionally developed for a particular technology, vice versa. It doesn't deny either of which lead to the other. Thermodynamics was proposed on the ground to explain how hot gas transfer energy, whereas James Watt refined the steam engine to improve its efficacy. The goals are varied. Similarly, physicists might have carried out a series of experiment to conclude a more comprehensive model for thermodynamics. Meantime, James Watt could have just redesigned the steam engine by applying the thermodynamic theory. Both processes and the corresponding outcomes are unidentical.

How has this role changed since the first industrial revolution?

During the industrial revolution, science offered assurance to technological innovation in order to improve labour working conditions. Both unskilled and skilled labours worked long hours and received below reasonable salaries, who also operated machines with a paucity of safety precautions often led to deaths and injuries. Child workers are often the victims of these accidents due to their unawareness of dangers. For instance, Cora Flipse was killed at the age of fourteen, from an accident where her head was trapped between the edge of the lift and floor (Our Great American Heritage, 2016). Followed by the accident, Elisha Graves Otis worked on the safety of elevators by introducing the safety brake (1853) to minimise casualties in case of the cables break; not adding doors to stop body parts from getting caught by

moving components. The principle of the safety brake provided assurance to the use of elevators, but the need to apply the knowledge for the safety brake was informed by the inherent flaws of the technology.

Nowadays, science continues to establish an assiduous safety standard in work environment. Potentially dangerous tasks can be carried out by robots such as Handle (Boston Dynamics, 2017), which can perform a 6.5 feet vertical jump - an excessive 1.2 feet on top of the highest human jump recorded (TechCrunch, 2017) and overcome rough contours. Essentially, the safer the work environment, the less relevant the human input to an entity.

As the size of a company grows, the emergence of R&D departments allows division of labour but it also routinises the process of technological innovation (Schumpeter, 1942). This effectively reverses Karl Popper's proposition about falsification that science is all about disproving (1963), because a profit-maximising firm is more likely to try to prove the feasibility of technology instead of disproving it.

Of course, robotic technology is imperfect and it is yet to be integrated by research and development (R&D) departments. Thus, science can be constituted as an excuse to help secure human jobs in the way of developing technological innovations. When machines gradually replace human labours, the emergence of R&D might seem like an attempt to paper up the plethora of workers. Assume a company wants to found a R&D department and all employees in the manufacturing department have equal proficiency in bringing new innovations to light. Then unneeded workers in the manufacturing department can simply be outplaced to the R&D department.

The recurring problem to be considered is that the R&D department might be working towards a technology that might even further devalue the employees. Eventually, human labours will suffer from their own creative destructions.

Additional to those, science might have conjointly acted as a driver to prompt creation of government policies. Innovations such as vaccination undoubtedly increased the life expectancy. While the British government might have complicated the health and safety regulations due to the uncertainty brought along by science and its corresponding technology in work environment. Meanwhile, the Chinese government might have been burdened by the rising Chinese population and so the enactment of the one-child policy was needed.

In conclusion, science's role has changed since the first industrial revolution in three ways. Firstly, it has changed from giving assurance to technological innovations to giving the ascendant right for technology to replace human labours. Secondly, from falsifying the possibility of technology to ascertaining it in R&D. Thirdly, and passively, from aiming to protract people's lives to controlling the number of population as a result of that.

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