The Impact of Newly Innovative Technologies in American Society

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction: The Potential of Artificial Intelligence

Imagine a future world where all parts of life are intertwined with Artificial Intelligence. Fully autonomous cars driving down the highway, machines diagnosing and treating critical illnesses, even a personal assistant within your phone with capabilities indistinguishable from any human being. There are all concepts fantasized in movies; however, this futuristic technology may be closer than you think. Artificial Intelligence is becoming rapidly integrated into our everyday lives. From our daily use of smartphones and smart devices to the improvement of workflows in various sectors, AI is allowing us to cut costs, increase efficiency, and improve our quality of life. An analysis by PricewaterhouseCoopers reports that AI technologies could contribute up to $15.7 trillion to the global economy in 2023. Of this, $6.6 trillion is expected to come from increased productivity while the remaining $9.1 trillion is to come from consumption side-effects (PriceWaterhouseCooper, 2017). Although the benefits of developing AI technologies are clear, many view this development negatively. A study conducted to gather the public's opinion on AI garnered negative viewpoints on the effects of AI, many reflecting concerns on AI's impact on the job market (Brauner et. al., 2023). Due to the nature of new technologies, many hold misconceptions of a technologies capabilities. Whether due to its portrayal in entertainment or biased media sources, people view AI in a cynical view, fearing a change in their own life.

The polarizing opinions and unknown capabilities of AI begs the question, how will AI impact our lives? What potential changes, for better or for worse, will be introduced as AI improves and becomes more integrated into our daily life? Using the theory of Technological Determinism, the impact of Assembly Line and Personal Computer will be analyzed.

Afterwards, the potential changes that may come with the advancement of AI will be discussed based upon the analysis of the highlighted technological advancements.

Case Study Approach:

What changes will come as a result of the development and integration of AI technologies in daily life? This research question is addressed by a case study approach in which technological advancements that brought major impacts are analyzed. Although the implementation of AI in the workforce is currently in development, the conclusions drawn are supported by existing literature which highlights the social effects resulting from the creation of the Assembly Line and Personal Computer. The literature includes a variety of books, journals, and studies that highlight the impact of the previously mentioned technologies, providing statistical information and the conclusions drawn from them. The resulting conclusions from evaluating these technological advancements demonstrates the impact that technological advancements have on society. Technological Determinism is utilized to support the notion that the creation of the Assembly Line and Personal Computer have resulted in the transformation of society. The social effects of technological advancements were highlighted to infer the possible results that will come from the advancement of AI.

Technological Advancements of the Past:

The Assembly Line

The first technological advancement analyzed in this research is the Assembly Line. In the early 1900s, automobiles were owned by the wealthy elite. The process of producing an automobile was costly and time consuming, requiring the craftsmen to move from vehicle to vehicle. Then, in 1913, Henry Ford successfully introduced the first automobile assembly line containing a series of workers and machinery in a formative order that assembled parts in an

efficient manner (Swamidass, 2000). The increased efficiency and production of automobiles allowed Ford to supply his vehicles at a reduced price, increasing the availability of automobiles to the general public.

Despite its positive outcomes, the assembly line faced many criticisms by the public. Similar to the public's current view of AI, many saw the waves of unemployment in a negative light. Quoted from David Nye by Boozer, "Workers… worried about the loss of freedom on the shop floor, about endless repetition of the same movements for eight hours, and about jobs that deadened the soul" (Boozer, 2020). Yet according to Bonciu, the assembly line contributed to the new abundance of jobs with decreased physical labor (Bonciu, 2017). The creation of the assembly line improved manufacturing practices and created a large pool of jobs.

The Personal Computer

The personal computer is another technological innovation that has greatly impacted society. With its advent, people now have access to nearly endless amounts of data and are able to produce, process and store large amounts of data. Complex calculations can be completed in seconds and the computer has become so integrated into our daily lives, it is now an essential part of learning. A 1997 study stated that since 1970, there was an observed 30-50% growth in the demand for highly skilled workers that can use a computer (Autor et. al. 1997). Nowadays, we have digital based softwares with numerous applications in various fields such as business, science, engineering, healthcare, and more.

The advent of the personal computer and its advancement have also been met with negative responses and have also negatively impacted our lives. In 1987, an analysis conducted by Larry Rosen stated that of 1,256 randomly selected adults, 71% felt that computer technology would threaten jobs and over half felt that computers were a threat to privacy (Rosen et. al.

1987). Despite the negative response and risks of a lifestyle centered around a computer, it is clear that the personal computer has shaped our way of life. More jobs have been created, various fields have been improved, and our sources of entertainment have even changed.

Technological Determinism and its Applications:

As stated previously, the STS framework that will be used is the theory of Technological Determinism. The theory is that technology has important impacts on our lives and is the main driving force of major social and historical changes. Therefore, Technological Determinism will be utilized to view the potential societal developments that the integration of AI in daily life will bring. The term was coined by Thorstein Veblen, who was an American Socialist who first formulated the link between technological advancements and resulting societal changes.

Technological Determinism has varying viewpoints which are categorized into "softer" and "harder" variants (Adler, 2006). Softer variants acknowledge that technology is not the sole driving factor of societal change however they believe that it plays a critical role amongst others in its development. Harder variants view technological change to be the main or sole driver in societal change. One variant is believed to be held by Karl Marx, who thought that the "forces of production," consisting of technologies and worker capabilities, create the structure of both the relations of production as well as politics and culture. Ultimately, it is thought that relations of production and the social aspects mentioned previously are forced to adapt to the rate at which the forces of production develop. While the notion that Karl Marx's ideology followed Technological Determinism is polarizing and still not agreed upon, the variant described before does follow the logic of Technological Determinism.

With the concept of hard versus soft variants in mind, the research follows a soft variant of Technological Determinism. Factors such as class discrepancy and production efficiency are

acknowledged to play a role in driving change for American societal change. However, the impact resulting from introducing the Assembly Line and Personal Computer are considered to have played the largest role in the changes of American Society.

Results of Case Study and Further Discussion

American society has been impacted by the rapid advancements in technology throughout the past resulting in major changes in daily life. The Assembly Line and Personal Computer are two examples of technological advancements that, brought about by their creation, have impacted jobs and the quality of life of people. The changes included an increase in the need for workers and an increased availability of new technology for the general population.

The Assembly Line

The first form of soft Technological Determinism can be seen in the Assembly Line. The introduction of the assembly line by Henry Ford brought about various changes to not only the workers' lives but also the general public. Prior to its implementation, production time for the Model-T was 12 hours, however, the assembly line reduced the time to two and a half hours (Boozer, 2020). While the establishment of the assembly line decreased the amount of workers required in the shop in a shift, the manpower required combined with the implementation of an eight hour work day led to the creation of a third working shift, increasing efficiency and job availability (Ford, 2020). Job availability also increased in regards to the required skill sets for assembly line workers. Rather than requiring experience and skills in constructing automobiles, the assembly line allowed less specialized individuals to work resulting in a wider accessibility to a job for the general public. Factors such as the desire to improve efficiency and generating more profit are certainly strong elements in what caused the increased job availability and

improved car production rates; however, the implementation of the assembly line was ultimately the main action that directly resulted in the increase in both job availability and efficiency.

In addition to the increased job availability, the increased efficiency of automobile assembly allowed automobiles to be more affordable. The increased production resulting from the assembly line combined with the $5 day reduced the cost of a Model-T from $825 in 1908 to $260 in 1925 (Ford, 2020). James M. Wilson highlights that the monthly car sales from Ford more than quadrupled from roughly 20,000 in 1913 to over 80,000 in 1917 (Bowden et al., 2015). The concept of large-scale production combined with high wages has since been established as “Fordism”, allowing workers an improved quality of life and the opportunity to afford the products that they build.

The effects of the Ford’s assembly line were not unnoticed. Many competitors soon followed suit and proceeded to transform their manufacturing facilities in order to remain competitive. Other fields saw the impact that the assembly line held and proceeded to implement them when possible. Reiterating Bonciu's statement, the assembly line was one of the technological advancements brought about by the Industrial Revolution that held a major impact on society. Successful technology manufacturers created an abundance of jobs, reduced physical labor, and greatly increased productivity (Bonciu, 2017). To this day, the assembly line remains and has been refined throughout the years. It has resulted in a greater accessibility to goods and technologies for the general public to consume, resulting in a higher quality of life. While the desire for improved efficiency often provides motivation for improving technology, the actual implementation and usage of technology, such as the assembly line, is the driving force that results in societal changes similar to those highlighted previously.

Personal Computer

Another form of soft Technological Determinism can be observed through the introduction of the personal computer. The personal computer enabled individuals to not only have the capability to compute complex calculations in seconds, but also allowed them easy access to an endless sea of data and knowledge with the click of a button. The potential for efficient work was quickly implemented by various industries, creating a major shift towards computerized labor. Therefore, the shift created by the creation of the personal computer formed a lasting impact on society, placing computers at the center of most labor. This began the decline of routine workers, such as bookkeepers, telephone operators, etc but also began the growth of new positions requiring creative skills, such as engineering and computer programming jobs (Autor, 2003).

Similarly to the assembly line, the notion of improved efficiency and profit across various industries were key factors in motivating developers to create the personal computer and ultimately change American society. While these factors played a large role, the most important factor that generated the change in American society was the development and utilization of the personal computer. A study reported a 30-50% increase in demand for skilled workers that can use computers (Autor, 1998). Furthermore, data from the 1980s displays even higher growth in various fields. Engineers saw a 75% increase in job titles, analysts job titles rose 66% and supervisors roughly saw a 50% increase (Berger, 2016). These are a few examples of the many industries that observed rapid growth in job availability in response to the personal computer.

While the establishment of the assembly line formed an increase of unskilled labor, the personal computer caused a spike in the demand for skilled labor. These positions were not only widely available, but also higher paying due to the skill requirement. Microdata from 1984-1989 allowed researchers to estimate that those who use computers for their job earn 10-15 percent

higher wages (Krueger, 1993). The requirement for skill related jobs was often some form of education, thus the logical conclusion would be for individuals to pursue higher education in order to secure better paying employment. The personal computer is another example of how a technological innovation can result in drastic societal changes. While varying societal factors such as desire for improvement play a part in motivating groups to impact society, it is ultimately the implementation of technology that creates key shifts in society.

Artificial Intelligence

The information in regards to historical technological advancements heavily supports the theory of Technological Determinism in which technology creates major impacts on society. With these in mind, Artificial Intelligence has the potential to create impacts on society to the same or greater effect as the Assembly Line and Personal Computer, revolutionizing the world.

There are already large investments in AI technology across various industries. According to OpenAI, creators of the AI chatbot ChatGPT, over 80% of Fortune 500 companies have adopted ChatGPT within their businesses by August 2023 (OpenAI, 2023). Mckinsey & Company found that generative AI holds the potential to generate $2.6-$4.8 trillion across various industries (Mckinsey, 2023). Within the same report, Mckinsey also estimates that AI can automate tasks that absorb 60%-70% of workers' time today (Mckinsey, 2023).

Existing research points toward AI technology having a large impact on society. AI technologies are being heavily invested in for development and because of the great potential AI holds, it is likely that both work lives and social lives will be transformed. AI possesses the same transformative potential displayed by the personal computer. It is likely that many low skill jobs will be taken by automation or AI and as a result people will have to adapt by learning new skills within their respective fields or pursue industries that are not yet impacted by AI. Many low skill

jobs such as cashiers, data-entry positions, and factory workers may be replaced by AI technology. However, rather than losing the jobs completely, it is likely that some jobs will transform to require skills that are able to utilize, maintain, or develop AI technologies. For example, a software engineer will need to be able to utilize AI to quickly produce software that conforms to company standards and ensure that the software meets the specified requirements. It is also possible that new jobs to maintain AI systems or developed software will be created, requiring a new skill set. In the end, the societal changes resulting from the introduction of AI are already being predicted and observed. Many have already incorporated AI into their daily lives while others are preparing themselves for the changes to come.

Limitations

Because AI is still in a developmental stage and many of its effects have not been shown, there is a lack of information on the actual impact that AI has on society. In addition, the depth in which AI will be implemented into industries is unknown and thus the impact AI will have on society is unclear. Due to this, future work must look into the impacts that AI has had on various aspects of society. Research on the quantity and types of jobs both lost and created will provide insight on the impact AI has had on various industries. Additionally, research on AI's impact on the economy and general public lifestyle will demonstrate the scale of impact of AI technology.

Conclusion

To conclude, the Assembly Line and Personal Computer are technological advancements which have had major impacts on society as a whole. The Assembly Line not only impacted the job market but also generated a higher availability of goods to the general public, increasing the quality of life. The Personal Computer led towards computerized labor, increasing the need for skilled workers across various industries and increasing the wages of computer-related positions.

Drawing from these technological advancements, AI technology holds the same potential to bring about major societal changes. It is likely that low skills jobs will disappear while new, higher skill positions will be created to adapt to the endless advancements that AI will bring about. Novel forms of entertainment or transportation may be created for public use and the daily life of many may be unrecognizable compared to the present time. Regardless of what changes will or will not result, understand that all societies, including America, will undergo drastic changes and that everyone needs to be prepared to adapt to the future that has yet to come.

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