

Transnational Assessment of Promise and Perils of Technological Advancements: Anti-Trust Perspective

Rafique Khan¹, Dr. Neha Singh², Divya Dwivedi³, Rohit Ranjan⁴

- ¹. Assistant Professor (Senior Scale), UPES, School of Law (Dehradun, Uttarakhand India) ORCID: 0000-0003-1614-3711, rafique.khan@ddn.upes.ac.in, LinkedIn: <https://www.linkedin.com/in/rafique-khan-481541149>
- ². Assistant Professor (Senior Scale), UPES, School of Law (Dehradun, Uttarakhand India) ORCID: 0009-0009-5671-9480, nehasingh@ddn.upes.ac.in email Id: www.linkedin.com/in/dr-neha-singh-83105876
- ³. Assistant Professor, UPES (Dehradun, Uttarakhand India)), Orcid ID : 0009-0006-8424-4601, divya.dwivedi@ddn.upes.ac.in, LinkedIn : https://www.linkedin.com/in/divya-dwivedia74446298?utm_source=share&utm_campaign=share_via&utm_content=profile&utm_medium=ios_app
- ⁴. Assistant Professor (Senior Scale), UPES, School of Law (Dehradun, Uttarakhand India) Orcid id- 0000-0001-9418-8734, LinkedIn- www.linkedin.com/in/rohit-rnjn

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ABSTRACT

Technological advancements have significantly transformed global economies, playing a pivotal role in driving economic growth and increasing productivity. This paper explores the promise and perils of these advancements, particularly from an anti-trust perspective. Drawing from various economic theories, such as Solow's Growth Model, Endogenous Growth Theory, and Schumpeter's "creative destruction," the paper investigates how technology fosters economic development by creating new industries, increasing efficiency, and promoting innovation. However, the disruptive nature of technological progress also poses challenges, such as job displacement, income inequality, cybersecurity risks, and threats to market competition. This paper provides a transnational assessment of the impact of technological advancements on market competitiveness, focusing on how digital platforms and automation are reshaping traditional economic models. It examines regulatory responses in different jurisdictions, including the U.S., EU, and India, highlighting both the opportunities and challenges that technology-driven economies face in maintaining competitive and equitable markets.

Keywords: Technological advancements, economic growth, anti-trust, creative destruction, digital platforms, automation, transnational analysis.

INTRODUCTION:

There is a consensus among economists that technological advancements have played a significant role in driving economic growth and increasing GDP.¹ A general comparison between global economies pre- and post-technological developments helps corroborate the statement above. In pre-industrial societies, GDP growth was relatively slow, as

¹ Nathan Rosenberg, *Innovation And Economic Growth*, OECD (July 12, 2024) <https://www.oecd.org/cfe/tourism/34267902.pdf>.

the economy was primarily agrarian and based on manual labour.² GDP per capita was moderately low and economic growth was relatively stable. With the advent of the Industrial Revolution and subsequent technological advancements, GDP growth has accelerated significantly.³ Increased productivity and efficiency, led by advancements such as automation, robotics, and artificial intelligence, have led to higher GDP per capita and more dynamic economic growth. In more recent times, GDP per capita rose by an average of 1.5% per year in the period 1850s-1870s, 2.1% per year in the period 1890s-1920s, 2.9% per year in the period 1980s-1990s, and 2.7% per year in the period 1990s-2000s.⁴ The relationship between economic growth and technology is complex and multifaceted. One way in which technology drives economic growth is through increasing productivity and efficiency. This can be seen in the relationship between technological advancements and Total Factor Productivity (TFP)⁵, which is a measure of the efficiency with which a country's economy uses its inputs. Studies have shown that TFP has been a major driver of economic growth in industrialized countries and that technological advancements have played a significant role in increasing TFP. For example, a study by the National Bureau of Economic Research in the US found that technological progress accounted for 85% of the increase in TFP in the US between 1948 and 1973⁶. Another way in which technology drives economic growth is through the creation of new industries and business opportunities. For example, the rise of the Internet and e-commerce has created new industries and business opportunities, leading to job creation and increased consumer spending. A study by the McKinsey Global Institute found that the Internet contributed to 3.4% of GDP growth in developed economies between 2005 and 2016.⁷ Additionally, technology can also help to improve the overall business environment, by making it easier for companies to access new markets, reduce costs, and increase their competitiveness. For example, the use of digital technologies can lead to significant improvements in supply chain management, logistics, and distribution, which can help to increase efficiency and reduce costs.⁸ It is worth noting that the relationship between technological advancements and economic progression is complex and multifaceted, as technology can have a wide range of implications on economic growth depending upon its application and the regulatory framework.

INTERRELATION: TECHNOLOGICAL ADVANCEMENTS AND ECONOMIC PROGRESSION

There exists a direct proportional relation between technological advancements and economic growth.⁹ An elementary example in this regard would be how automation of various industries has resulted in an exponential increase in production and subsequently leading to unprecedented economic growth. Concepts like the gig economy have started gaining prominence, both among the masses as well as policymakers, wherein digital platforms have altered the conventional understanding of employment. The gig economy refers to a labour market characterized by the

² Matleena Kniivilä, *Industrial development and economic growth: Implications for poverty reduction and income inequality*, United Nations (July 12, 2024). https://www.un.org/esa/sustdev/publications/industrial_development/3_1.pdf.

³ National Geography, *Industrial Revolution and Technology*, Resource Library (July 13, 2024) <https://education.nationalgeographic.org/resource/industrial-revolution-and-technology>.

⁴ Tony Smith, Department of Economics, Yale University (July 13, 2024) <http://www.econ.yale.edu/smith/econ116a/lecture1.pdf>.

⁵ News Release, Bureau of Labour Statistics, US Department of Labour (July 13, 2024) <https://www.bls.gov/news.release/pdf/prod3.pdf>.

⁶ Ulrich Kohli, *Explaining Total Factor Productivity*, University of Geneva (2015) (July 13, 2024) <https://www.business.unsw.edu.au/About-Site/Schools-Site/Economics-Site/Documents/Explaining-Total-Factor-Productivity.pdf>.

⁷ James Manyika and Charles Roxburgh, *The great transformer: The impact of the Internet on economic growth and prosperity*, McKinsey Global Institute 2011 (July 13, 2024) https://www.mckinsey.com/~media/mckinsey/industries/technology%20media%20and%20telecom%20communications/high%20tech/our%20insights/the%20great%20transformer/mgi_impact_of_internet_on_economic_growth.pdf.

⁸ Enis Gezgin, Xin Huang, Prakash Samal, and Ildefonso Silva, *Combining digital applications with operational changes helps yield significant performance improvements that stand the test of time* (July 17, 2024) <https://www.mckinsey.com/capabilities/operations/our-insights/digital-transformation-raising-supply-chain-performance-to-new-levels>.

⁹ Ricardo Hausmann, HRCC, Harvard University <https://rcc.harvard.edu/knowledge-technology-and-complexity-economic-growth>. (last visited on July 17, 2024)

prevalence of short-term contracts or freelance work as opposed to permanent jobs.

The proposed interrelation between technology, innovation and economic progression is not new, rather it dates back to its theoretical conceptualisation back in 1905, when the *Theory of Technological Change and Economic Growth*¹⁰ was first proposed by Robert Solow, an American economist, and a Nobel Laureate¹¹. Solow's theory is an extension of the neoclassical growth model summed by the Keynesian Harrod-Domar Model¹², which focuses on the role of technology in driving economic growth. Solow's theory suggests that technological progress is a major driver of economic growth and that it is the primary source of increased productivity and output.¹³ According to the theory, technological progress leads to the development of new and more efficient production methods, which in turn increases productivity and output. Solow's theory also argues that technological progress can be divided into two categories: "embodied" and "disembodied" technological progress. Embodied technological progress refers to the introduction of new machines, equipment, and other physical capital into the production process, while disembodied technological progress refers to the adoption of new production techniques and methods. Solow's theory of technology change and economic growth emphasizes the role of technological progress in driving economic growth and argues that it is the primary source of increased productivity and output, and that economic growth can be sustained indefinitely as long as there is continued technological progress. This theory was further modified by Robert Solow, and Trevor Winchester Swan, an Australian Economist when they proposed, the Solow-Swan Growth Model. The postulates of this refined model can be summed up in a mathematical equation:

$$Y = F(K, L, A),$$

where Y is output, K is capital, L is labour, and A is technology

which on being deduced establishes the proportionality between economic growth and technological advances.¹⁴ One of the key predictions of the Solow-Swan model is that an economy will eventually converge to a steady state, where the rate of economic growth is determined by the rate of technological progress. This steady state is known as the "golden rule" level of capital stock, where the economy is producing its maximum potential output.¹⁵ China's economy has experienced rapid growth in recent decades, and this growth can be explained by the Solow-Swan model. China's high savings rate and high investment in physical capital have led to an increase in the stock of capital, which has driven economic growth. Since then, several attempts have been made to theoretically establish the relationship between technological advancements and economic progression.¹⁶

Another theory that further simplified the discourse was the Endogenous Growth Theory.¹⁷ First proposed by Paul Romer in the late 1980s. Romer's theory was a departure from the traditional exogenous growth models that focused on factors such as resource availability and population growth as the main drivers of economic growth.¹⁸ Romer's endogenous growth theory emphasizes the role of human capital, technological progress, and innovation in driving economic growth. The theory suggests that investment in human capital, such as education and training, can lead to increased productivity and economic growth.¹⁹ Additionally, technological progress and innovation can lead to the development of new products and production methods, which can also drive economic growth. Romer's theory, economic growth is not a function of the number of resources available in an economy, but rather the rate at which new ideas are created and implemented. He argues that the key to economic growth is the ability to generate new ideas and put them into practice, which leads to an increase in productivity and output.²⁰ The theory also suggests that

¹⁰ Dr Stanislaw Gomulka, *The Theory of Technological Change and Economic Growth* 117 (1st ed. 1990).

¹¹ Noble Foundation, The Noble Prize <https://www.nobelprize.org/prizes/economic-sciences/1987/solow/facts/> (last visited on July 17, 2024).

¹² Mauro Boianovsky, beyond capital fundamentalism: Harrod, Domar and the history of development economics, *CHOPE Working Paper No.* (2015).

¹³ *Id.* at 11.

¹⁴ *Id.* at 11.

¹⁵ Prof. Van Gaasbeck, California State University, *ECON 100A* (July 20, 2024) <https://www.csus.edu/indiv/v/vangaasbeckk/courses/100a/sup/goldenrule.pdf>.

¹⁶ Zulu Hu and Mohsin S. Khan, Why is China Growing So Fast? *IMF* (July 20, 2024) <https://www.imf.org/external/pubs/ft/issues8/index.htm>.

¹⁷ Ben Fine, Endogenous growth theory: a critical assessment, *Cambridge Journal of Economics* 245, 253-258 (2000).

¹⁸ *Id.* at 19.

¹⁹ *Id.* at 19.

²⁰ Sarwat Jahan, Ahmed Saber Mahmud, and Chris Papageorgiou, What Is Keynesian Economics? *IMF*. 2 (2014).

economic growth is not constrained by the availability of resources but by the ability to create and implement new ideas. This theory implies that economic growth can be sustained indefinitely, as long as there is continued investment in human capital, technological progress, and innovation.²¹ The theory emphasizes the importance of human capital, technological progress, and innovation in driving economic growth, and argues that economic growth is not constrained by the availability of resources, but by the ability to create and implement new ideas.

Noted economist, Joseph Schumpeter's theory of "creative destruction" is a concept that describes how innovation and technological progress leads to the displacement of existing technologies and industries.²², and the creation of new ones. According to Schumpeter, creative destruction is the process by which new technologies and business models disrupt and replace existing ones, leading to economic growth and development. Schumpeter argues that the driving force behind economic growth is not incremental improvements to existing technologies, but rather the introduction of entirely new technologies and business models. He suggests that entrepreneurs and innovators are the ones who drive creative destruction, by introducing new products, production methods, and organizational forms to the economy.²³ The introduction of new technologies and business models leads to the displacement of existing ones, resulting in the destruction of existing industries and the creation of new ones.

W. Arthur Lewis' theory of "unlimited supplies of labour" is an economic theory that argues that technological progress and economic growth can lead to a rise in wages and standards of living for workers.²⁴ According to Lewis, in economies with an "unlimited supply of labour,"²⁵ technological progress can lead to increased productivity and output, which in turn leads to increased wages and living standards for workers. The theory is based on the idea that in economies where there is an abundance of labour, employers will be willing to pay higher wages in order to attract and retain workers. This increased demand for labour can push wages higher, leading to a rise in living standards for workers.²⁶ According to Lewis, this process of economic growth can be sustained indefinitely, as long as there is continued technological progress and an unlimited supply of labour. He argued that in this type of economy, technological progress will lead to increased productivity and output, which will in turn lead to increased wages and living standards for workers. The theory also highlights the importance of the agricultural sector in providing subsistence for the increasing population, and how the increase in wages in the agricultural sector can lead to labour moving from the agricultural sector to the modern sector (non-agricultural sector) leading to more employment and wages. The theory of unlimited supplies of labour is particularly relevant to developing economies, where a large proportion of the population is engaged in agriculture and there is a large surplus of labour available for employment in other sectors. It is important to note that the theory has been critiqued for its assumptions about labour markets, and for not considering the impact of technological progress on unemployment, and the fact that it does not consider the fact that technological progress may lead to the displacement of workers, which could lead to unemployment.²⁷

Charles Jones is an economist who has developed a theory of economic growth that emphasizes the importance of technological progress in driving long-term economic growth.²⁸ Jones argues that technological progress is the primary driver of economic growth, and that technological change is a cumulative process that builds on itself over time. According to Jones, technological progress is driven by a combination of factors, including research and development, education and training, and the accumulation of physical and human capital.²⁹

²¹ Id at 22.

²²Russell S. Sobel and Jason Clemens, *Frazer Institute* <https://www.essentialscholars.org/sites/default/files/essential-joseph-schumpeter.pdf>. (Last visited on July 20, 2024)

²³ Joseph A. Schumpeter, *The Theory of Economic Development An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle* 57 (Harvard Economic Studies 1934).

²⁴ UN Chronicle, W. Arthur Lewis: Pioneer of Development Economics, *United Nations* (September 14, 2024, 12:30 AM), <https://www.un.org/en/chronicle/article/w-arthur-lewis-pioneer-development-economics>.

²⁵ Id. at 26.

²⁶ Id. at 26.

²⁷ Bernhard Dachs, The impact of new technologies on the labour market and the social economy, *Scientific Foresight Unit* (August 14, 2024), [https://www.europarl.europa.eu/RegData/etudes/STUD/2018/614539/EPRS_STU\(2018\)614539_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2018/614539/EPRS_STU(2018)614539_EN.pdf).

²⁸ Charles I. Jones, *The Past and Future of Economic Growth: A Semi-Endogenous Perspective*, 14 *Annual Review of Economics* 125, 138-142 (2022).

²⁹ Id. at 30.

Nathan Rosenberg was an economist who developed a theory of economic growth that emphasized the importance of technological change and the role of institutions in driving long-term economic growth.³⁰ According to Rosenberg, technological change is a key driver of economic growth, but it is not the only factor. He argued that institutions, including laws, regulations, and social norms, also play a crucial role in shaping economic growth. Rosenberg argued that institutions can either facilitate or hinder technological change and that they can also affect the rate of economic growth by influencing the rate of investment and the distribution of income. He also emphasized the role of learning-by-doing, where firms and workers gain knowledge and skills through experience, leading to productivity gains. Additionally, Rosenberg's theory also suggested that technological change is not a linear process and that it does not have a single trajectory, but instead is influenced by various factors such as the availability of resources, the state of the economy, and the actions of individuals and firms.³¹ In summary, Rosenberg's theory of economic growth emphasizes that technological change is important but not sufficient for economic growth and that institutions and the way they foster or hinder learning-by-doing, and the rate of investment are also crucial factors in driving long-term economic growth.

ECONOMIC IMPACT

India

Article 51A (h) of the Indian Constitution reads, "*It shall be the duty of every citizen of India to develop the scientific temper, humanism and the spirit of inquiry and reform*"³²

In recent years, India has experienced rapid economic growth and technology has played a significant role in driving this growth. The Indian technology industry has been a major contributor to the country's economic growth, with the sector's contribution to GDP increasing from 3% in 1998 to 7.7% in 2018³³. The Indian IT and BPO sector alone is worth over \$150 billion and is projected to reach \$350 billion by 2025.³⁴ The Indian technology sector employs around 4 million people and is expected to create an additional 1.5 million jobs by 2025.³⁵ One of the key drivers of technology-led economic growth in India has been the government's investments in technology infrastructure. The Digital India initiative, for example, is expected to add \$1 trillion to the economy by 2025.³⁶ This initiative aims to increase the use of digital technologies across various sectors of the economy, including healthcare, education, and financial services. Another factor that has contributed to technology-led economic growth in India is the country's large and growing pool of skilled workers. India is among the top countries in the world in terms of the number of engineers produced annually and in terms of the number of patents filed. This large pool of skilled workers has enabled India to become a major player in the global technology industry. The technology industry is expected to continue to drive economic growth in the future as new technologies continue to emerge and as more people gain access to the Internet.

United States of America

Article I, Section 8, Clause 8 of the American Constitution reads, "Congress shall have the power *to promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries*"³⁷

The widespread availability of high-speed internet has enabled the growth of e-commerce and online services, which have become major drivers of economic growth. According to data from the US Department of Commerce, e-commerce sales in the US reached \$601 billion in 2018, representing 14.3% of total retail sales.³⁸ Overall,

³⁰ Nathan Rosenberg, INNOVATION AND ECONOMIC GROWTH, *OECD* (August 17, 2024, 12:30 PM), <https://www.oecd.org/cfe/tourism/34267902.pdf>.

³¹ *Id.* at 32.

³² INDIA CONST. art. 51A.

³³ *Id.* at 10

³⁴ India Brand and Equity Foundation, <https://www.ibef.org/industry/information-technology-india> (last visited September 24, 2024).

³⁵ Press Information Bureau, <https://pib.gov.in/Pressreleaseshare.aspx?PRID=1847841> (last visited August 24, 2024).

³⁶ India Brand and Equity Foundation, <https://www.ibef.org/government-schemes/digital-india#:~:text=The%20Road%20Ahead&text=As%20per%20a%20McKinsey%20report,2025%20from%20the%20digital%20economy> (last visited August 23, 2024).

³⁷ US CONST. art. 1, § 8, cl. 8.

³⁸ *Id.* at 41.

technological development in the US has played a significant role in driving economic progression, with examples such as the growth of the tech industry, the adoption of automation technologies, and the expansion of the internet all contributing to this trend. As technology continues to advance, it is likely that these positive effects on the economy will continue to be felt in the future.

European Union

Article 179 of the Treaty for Functioning of EU — (ex-Article 163 TEC) reads, “*All-Union activities under the Treaties in the area of research and technological development, including demonstration projects, shall be decided on and implemented in accordance with the provisions of this Title.*”³⁹

According to Eurostat, the EU’s digital economy is growing at a faster rate than the traditional economy, with the digital sector accounting for around 6.8% of EU GDP in 2018.⁴⁰ The digital sector is also a major source of employment, with around 7.5 million people employed in the digital economy in the EU in 2018.⁴¹ Another example is the European Union’s investment in research and innovation, through the Horizon 2020 program. The program has a budget of €80 billion for the period 2014-2020 and is supporting research and innovation in areas such as health, transport, energy, and digital technologies.⁴² This investment in research and innovation is expected to lead to new products, services, and business models, and therefore to a more efficient and sustainable economy.

The Implication: Dichotomy of Perils and Promise

“Not everything that glitter is gold”

Despite being a game changer in all possible applications and implications, the challenges posed by disruptive technological advancements cannot be ignored.⁴³ However, there is no unanimity in the literature regarding the categorisation of what would and what would not be categorised as a challenge posed by technological transcendence. This can be probably attributed to the difference in the legislative framework and economic model across different jurisdictions. Keeping this in view researcher has made an endeavour to identify the major areas where challenges posed by technological disruptions are acknowledged.

Job Displacement:

According to a report by the Reserve Bank of India, automation has led to a reduction in the number of jobs in the banking sector, with the number of bank employees decreasing by around 2% between 2011 and 2016.⁴⁴ Additionally, the increasing adoption of digital technologies in the finance sector has led to a reduction in the number of jobs in this industry. In the European Union, automation and technology have led to job displacement in industries such as manufacturing and transportation. According to a study by the European Commission, around 14% of jobs in the EU are at high risk of automation.⁴⁵ Additionally, the increasing adoption of self-driving cars and drones is expected to lead to job displacement in the transportation sector. Overall, technological advancement has led to job displacement in many countries, including the United States, India, and the European Union. This trend is expected to continue in the future, as automation and technology continue to advance and become more widespread.

Income Inequalities

Technological advancement has led to increased automation and efficiency in various industries, resulting in income inequality in many countries, including the United States, India, and the European Union. In the United States, the growing use of automation and artificial intelligence has led to increased income inequality as those with higher skill sets and education benefit more from these technologies while low-skilled workers are left behind. According to a report by the Economic Policy Institute, the gap between the top 10% and the bottom 90% of wage earners in the US

³⁹ TFEU, art. 179.

⁴⁰ Eurostat, Digital Economy, and Society (August 28, 2024, 10:15PM), <https://ec.europa.eu/eurostat/web/digital-economy-and-society>.

⁴¹ Id. at 47.

⁴² DIGITAL Europe Programme, Shaping Europe’s digital future (August 28, 2024), <https://digital-strategy.ec.europa.eu/en/activities/digital-programme>.

⁴³ Clayton M. Christensen, Michael Raynor, Rory McDonald, what is Disruptive Innovation, Harvard Business Review (August 28, 2024), <https://hbr.org/2015/12/what-is-disruptive-innovation>.

⁴⁴ Reserve Bank of India, Report on Trend and Progress of Banking in India 2020-21 (August 28, 2024), <https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/ORTP2020CF9C9E7D1DE44B1686906D7E3EF36F13.PDF>.

⁴⁵ Konstantinos Pouliakas, Automation risk in the EU labour market, European Centre for the Development of Vocational Training (August 28, 2024), https://www.cedefop.europa.eu/files/automation_risk_in_the_eu_labour_market.pdf.

has been growing since the 1970s, with the top 1% seeing the greatest gains.⁴⁶ Additionally, a study by the Pew Research Centre found that the median income for households in the US with a college degree was \$93,000 in 2016, compared to \$62,000 for households with a high school diploma.⁴⁷ In India, the growth of the technology sector has led to increased income inequality, with a small number of highly skilled workers benefiting from the high-paying jobs in the sector while the majority of the population remains in low-paying jobs. According to a report by the World Bank, the income gap between the top 10% and the bottom 40% of the population in India has been growing in recent years, with the top 10% now earning nearly 12 times more than the bottom 40%.⁴⁸ Overall, technological advancement has led to increased income inequality in many countries, including the United States, India, and the European Union. This trend is likely to continue in the future, as automation and technology continue to advance and become more widespread, exacerbating the divide between those with high skills and education and those without.

Cyber security risk

Technological advancement has led to increased reliance on technology in various industries, resulting in an increase in cyber security risks in many countries, including the United States, India, and the European Union. In the United States, the growing use of technology in various industries has led to an increase in cyber security risks. According to a report by Cybersecurity Ventures, cybercrime is projected to cost the US economy \$6 trillion annually by 2021.

Data Privacy

Technological advancement has brought many benefits to society, but it has also resulted in new risks to data privacy. The increased use of digital devices and the internet has led to the collection, storage, and dissemination of vast amounts of personal information. This information is often vulnerable to unauthorized access, misuse, and exploitation by hackers, cybercriminals, and other malicious actors. In the United States, data breaches have become a common occurrence. According to the Identity Theft Resource Centre, there were 1,579 data breaches recorded in 2019, exposing over 164 million records.⁴⁹ These breaches affected a wide range of industries, including healthcare, finance, and government. In 2020, the number of records exposed increased to over 164 million, with nearly half of the breaches being caused by hacking or skimming.⁵⁰ In India, the increasing use of digital technology has also led to a rise in data privacy concerns. According to a report by the Internet and Mobile Association of India, around 71% of Indian internet users are concerned about their personal information being shared or stolen online.⁵¹ In conclusion, technological advancement has led to a significant increase in data privacy risks, as more personal information is being collected, stored, and shared digitally. These risks are not limited to any one country and are a global concern that requires ongoing attention and action to mitigate.

Societal and Cultural Impact

Technological advancement has had a profound impact on society and culture. The widespread use of digital devices and the internet has changed the way people communicate, access information, and interact with one another. However, these changes have not been without consequences, and there have been both positive and negative impacts on society and culture. In the United States, the rise of social media and mobile technology has led to increased connectivity and communication among individuals. However, it has also led to concerns about the impact on mental health and well-being. Studies have shown that excessive use of social media can lead to feelings of loneliness, anxiety, and depression.⁵² According to a study by the Pew Research Centre, nearly 70% of American adults use social media,

⁴⁶ Lawrence Mishel, Jori Kandra, Time to remake wage pattern with economic policies that generate robust wage-growth for vast majority, Economic Policy Institute (September 01, 2024), <https://www.epi.org/wages-for-the-top-1-skyrocketed-160-since-1979-while-the-share-of-wages-for-the-bottom-90-shrunk-time-to-remake-wage-pattern-with-economic-policies-that-generate-robust-wage-growth-for-vast-majority/>.

⁴⁷ Id.

⁴⁸ Poverty Overview, The World Bank (September 01, 2024), <https://www.worldbank.org/en/topic/poverty/overview>.

⁴⁹ Michael Novinson, The 13 Biggest Data Breaches of 2019 (So Far), CRN (September 01, 2024), <https://www.crn.com/slide-shows/security/the-13-biggest-data-breaches-of-2019-so-far>.

⁵⁰ Bernard Benhamou, INTERNET OF THINGS & DIGITAL SOVEREIGNTY, Institute of Digital Sovereignty (ISN), 35-42 (2015).

⁵¹ Mithali Mukherjee, Aditi Ratho, Shruti Jain, Unsocial Media: Inclusion, Representation, and Safety for Women on Social Networking Platforms, Observer Research Foundation 8-11 (2021).

⁵² Igor Panic, Online Social Networking and Mental Health, PMC (September 01, 2024), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4183915/>.

and around 45% of them report feeling “worn out” by the constant need to check their accounts.⁵³ In India, technology has had a significant impact on the economy and society, particularly in the areas of e-commerce, digital payments, and online education. The rise of automation and artificial intelligence has led to concerns about job displacement, particularly in industries such as manufacturing and transportation.

Digital Divide

Technological advancement has led to many benefits, but it has also created a digital divide, where some individuals and communities have access to technology and its benefits while others do not. This divide can have significant consequences for education, employment, and overall quality of life. In the United States, the digital divide affects millions of people, particularly those in low-income and rural communities. According to the Pew Research Centre, around 60% of Americans with an annual household income of less than \$30,000 lack high-speed internet access, compared to just 9% of those with an annual household income of \$75,000 or more.⁵⁴ According to a report by the Internet and Mobile Association of India, around 80% of internet users in India are based in urban areas, while just 20% are based in rural areas.⁵⁵ This divide has led to disparities in access to information, education, and employment opportunities, with rural residents being at a disadvantage. In the European Union, the digital divide affects millions of people, particularly those in rural and remote areas, as well as the elderly and the disabled. According to a report by the European Commission, around 27% of EU citizens lack basic digital skills, and around 16% lack internet access.⁵⁶ This divide has led to disparities in access to information, education, and employment opportunities, with those in rural and remote areas being at a disadvantage.

Economic Disruption

Technological advancement has had a significant impact on the global economy, leading to both opportunities and challenges. The rise of automation, artificial intelligence, and the internet has led to economic disruption, as it has changed the way goods and services are produced and consumed. This disruption has had both positive and negative effects on different sectors, countries, and individuals. In the United States, technological advancement has led to economic growth, particularly in the technology sector. According to the Bureau of Economic Analysis, the technology sector accounted for around 11% of the US economy in 2019.⁵⁷ However, it has also led to job displacement and wage stagnation in some industries, particularly in manufacturing and retail. According to a report by the Centre for Global Policy Solutions, automation could lead to the displacement of up to 25 million jobs by 2030.⁵⁸ In India, technological advancement has led to economic growth, particularly in the areas of e-commerce and digital payments. The country has seen a rapid increase in the number of internet users, with over 600 million people online as of 2021.⁵⁹ This has led to a significant increase in the number of online transactions, with the e-commerce market expected to reach \$200 billion by 2026.⁶⁰ However, it also poses a threat to traditional brick and mortar businesses which are struggling to survive. In the European Union, technological advancement has led to economic growth in some sectors, particularly in technology and digital services. However, it has also led to job displacement and wage stagnation in some industries, particularly in manufacturing and transportation. According to a report by the European Commission, around 25% of jobs in the EU are at high risk of automation.⁶¹ However, technology has also opened up new opportunities for workers, particularly in the areas of digital skills and the gig economy. In conclusion, technological advancement has led to economic disruption, as it has changed the way goods and services are produced and consumed. This disruption has had both positive and negative effects on different sectors, countries, and

⁵³ Colleen McClain, Emily A. Vogels, Andrew Perrin, Stella Sotiropoulos and Lee Rainie, The Internet and the Pandemic 4-8, PEW Research Organisation (2021).

⁵⁴ *Id.* at 69.

⁵⁵ Part 2 Digital India Report 8-12, Nielsen, IAMAL (2019).

⁵⁶ ELENA SÁNCHEZ NICOLÁS, Digital gap: 42% of EU citizens lack basic digital skill, EU Observer (September 11, 2024), <https://euobserver.com/eu-political/148629>.

⁵⁷ Jessica R. Nicholson, New Digital Economy Estimates, Bureau of Economic (September 11, 2024), <https://www.bea.gov/system/files/2020-08/New-Digital-Economy-Estimates-August-2020.pdf>.

⁵⁸ *Id.* at 7.

⁵⁹ *Id.* at 7.

⁶⁰ *Id.* at 7.

⁶¹ Eurostat, Living conditions in Europe - income distribution and income inequality, (September 14, 2024), https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Living_conditions_in_Europe_-_income_distribution_and_income_inequality&oldid=585980#:~:text=In%202021%2C%20the%20income%20quintile,population%20with%20the%20lowest%20income.

individuals. While technology has created new opportunities, it has also led to job displacement and wage stagnation in some industries. Governments, organizations, and individuals must work together to address these challenges and find ways to harness the benefits of technology while minimizing its negative impacts.

Market Competition

Technological advancement can result in competition law-related issues in various ways. In the United States, for example, the Federal Trade Commission (FTC) has acted against tech companies for alleged anti-competitive practices, such as Google's search practices⁶² and Facebook's acquisitions⁶³ of potential competitors. In India, the Competition Commission of India (CCI) has investigated companies such as Google⁶⁴ and Amazon⁶⁵ for alleged abuse of market dominance. In the European Union, the European Commission has acted against companies such as Google⁶⁶ and Apple⁶⁷ for allegedly violating competition laws. One of the key concerns in the tech industry is the issue of market dominance. As technology companies continue to grow and innovate, they may acquire or develop market power that allows them to control prices or exclude rivals. This can lead to reduced competition and higher prices for consumers. In the US, for example, the FTC has alleged that Google has used its dominance in the search market to favour its own products and services over those of competitors.⁶⁸ Another concern is the issue of mergers and acquisitions. As tech companies continue to grow and expand, they may seek to acquire or merge with other companies to gain market share or access to new technologies. However, these acquisitions can lead to reduced competition and higher prices for consumers. In India, for example, the CCI has investigated Google for allegedly engaging in anti-competitive practices in the online search market through its acquisitions of companies like Waze, a social mobile map.⁶⁹ Companies like Google and Facebook have access to vast amounts of personal data, which they can use to target ads and improve their services. This gives them an advantage over rivals and can lead to reduced competition. In the EU, the European Commission has acted against Google for allegedly using its dominance in the online search market to promote its own services at the expense of competitors, and the EU's General Data Protection Regulation (GDPR) implemented in 2018 addresses some of these concerns.⁷⁰

Furthermore, the issue of data privacy and security also raises competition concerns, as companies like Google and Facebook have access to vast amounts of personal data, which they can use to target ads and improve their services. This gives them an advantage over rivals and can lead to reduced competition. For instance, one example of a case in American antitrust jurisprudence is the case of *United States v. Microsoft Corp.* In 2000, the Department of Justice (DOJ) brought an antitrust lawsuit against Microsoft, alleging that the company had engaged in anti-competitive practices by using its dominant position in the market for personal computer operating systems to stifle competition in the market for web browsers. The case went to trial and in 2001, District Judge Thomas Penfield Jackson ruled that Microsoft had engaged in illegal monopolistic practices and ordered the company to be broken up. However, the ruling was eventually overturned on appeal, and Microsoft ultimately reached a settlement with the DOJ. Similarly in Indian competition law jurisprudence is the case of *Reliance Industries Ltd. vs. Indian Petrochemicals Corporation Ltd. (IPCL)*. In 2002, IPCL filed a complaint with the Competition Commission of India (CCI) alleging that Reliance Industries, a large conglomerate, was abusing its dominant position in the market for petrochemical products by charging excessively high prices. The CCI investigated and found that Reliance Industries had indeed engaged in anti-competitive practices. However, the CCI did not impose any penalties on the company, citing the lack of specific provisions in the Indian Competition Act, 2002 that would allow it to do so. Likewise, one example of a case in EU competition is the case of *RWE AG v. Commission*. In 2007, the European Commission imposed a fine on German utility company RWE AG for abuse of its dominant position in the German electricity market. RWE challenged the decision in front of the EU's General Court, which annulled the decision in 2011, stating that the commission had not established that RWE had abused its dominant position. The court also stated that the EU's competition law framework at the time did not provide adequate guidance on how to define an abuse of a dominant position in the electricity

⁶² *United States v. Google Inc.*, No. 3:12-cv-04177 (N.D. Cal. Nov. 16, 2012).

⁶³ *Federal Trade Commission vs. Facebook Inc.* Case No.: 1:20-cv-03590 (N.D. Cal. Jan. 13, 2024).

⁶⁴ *Kshitiz Arya And Another vs Google LLC and Others* (Case No. 19 of 2020).

⁶⁵ *Amazon Seller Services Private vs Competition Commission of India* (W.P. NO.3363 OF 2020).

⁶⁶ *Google and Alphabet v Commission* (T-612/17).

⁶⁷ *Ireland v Commission* (T-892/16).

⁶⁸ *Id* at 81.

⁶⁹ *Id.* at 83.

⁷⁰ GDPR. art. 23.

sector, which led to the lack of evidence to prove RWE's guilt. This case highlights the challenges faced by the EU in addressing anti-competitive practices by dominant firms in regulated sectors and the need for more specific legislation at that time.

The opportunity to conduct in-depth research and contribute to the understanding of these complex issues was too compelling to pass up. The researcher is eager to explore the various ways in which technological disruptions have led to anti-competitive conduct and to investigate potential solutions to these issues. The researcher believes that my research will make a valuable contribution to the field, and the researcher looks forward to the opportunity to share my findings with the academic community. The researcher shall endeavour to work and provide a comprehensive and insightful analysis of the anti-competitive implications of technological disruptions and will contribute to the development of effective solutions for addressing these issues.