

Original Article

Sociology of Technology: A Sociological Study of Technology, Society and Social Change

Pradeep Kumar Patel

Assistant Professor Sociology

Government Naveen College Saragaon Janjgir Champa Chhattisgarh

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Abstract

Technology today is not merely a set of tools or machines; it has become a powerful social force that shapes culture, relationships, economy, governance, education, and identity. The sociology of technology examines how technology is socially constructed, how it influences social structures, and how society responds to technological change. This research paper discusses the relationship between technology and society from classical sociological perspectives to contemporary theories such as Social Construction of Technology (SCOT), Actor-Network Theory (ANT), Technological Determinism, and the Information Society approach. It explains how technology affects social institutions like family, education, economy, politics and healthcare. Special focus is given to digital technologies, social media, surveillance systems, artificial intelligence and algorithmic governance. The paper highlights both positive impacts such as communication, development and social inclusion, and negative consequences like inequality, alienation, unemployment, privacy loss and digital divide. This paper argues that technology is neither completely neutral nor fully deterministic; rather it is shaped by social power relations, cultural values, economic interests and political control. In conclusion, the sociology of technology offers critical tools to understand modern society and to ensure technology is used for human welfare, democratic development, and social justice.

Keywords: Technology, society, social change, digital divide, social construction, surveillance, information society, artificial intelligence

Introduction

Human civilization has always developed through tools and technological innovation. From stone tools to industrial machines and now digital and artificial intelligence-based systems, technology has shaped the way humans live, work and interact. However, technology is not simply a technical phenomenon. It is deeply embedded in social life and is strongly connected to cultural values, political power and economic systems. Sociology of technology is the branch of sociology that studies the social aspects of technology, including how technologies emerge, who controls them, how they affect relationships and institutions, and how they produce social inequalities or social transformations.

Technology influences the structure of social life in multiple ways. It changes how people communicate, how families operate, how education is delivered, how work is organized, and how governments manage citizens. At the same time, technology is not created in a social vacuum. It is produced within society by institutions like corporations, governments, military systems, researchers and social groups. Therefore, it reflects social needs, social interests and social power relations. Sociology of technology attempts to understand technology not as an independent force but as a social product and a social agent.

In contemporary society, digital technologies have created a new world of social interactions. Social media platforms influence identity formation and social norms. Smartphones have transformed daily routines. Artificial intelligence affects labor markets, decision-making and governance. Surveillance technology influences privacy and social freedom. Such developments make it essential to study technology through sociological perspectives, because it directly impacts human rights, democracy, social justice and inequality.

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Address for correspondence:

Pradeep Kumar Patel, Assistant Professor Sociology, Government Naveen College Saragaon Janjgir Champa Chhattisgarh

Email: ppradeep730@gmail.com

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Conceptual Understanding: Sociology of Technology

Sociology of technology can be understood as the study of the complex relationship between society and technological systems. It explores technology as a cultural artifact and examines the social processes behind technological development. This field also analyzes the consequences of technology on social behavior, social institutions and social structures. Sociology of technology emphasizes that technology is not neutral; rather it reflects human decisions and social values.

Technology includes not only machines and tools but also systems like the internet, social networks, digital databases, automation, medical devices, and smart governance tools. Technology influences social relations and social institutions. For example, online communication changes family interactions. Automated manufacturing changes labor relations. Digital banking changes economic transactions. The sociology of technology views technology as "socially embedded," meaning technology exists within social arrangements.

Classical Sociological Perspectives on Technology

- **Karl Marx and Technology**

Karl Marx viewed technology as a major force in shaping economic production and class relations. In Marxist perspective, technology is not simply an instrument of progress; it becomes a tool used by the ruling class to increase profit and control labor. The capitalist system introduces technological innovations primarily to improve productivity and reduce labor costs. As a result, workers become dependent on machines, and their skills get devalued. Marx argued that in capitalism, technology can increase exploitation by intensifying work and by creating unemployment through mechanization.

Marx also believed that technology influences social structure because it changes the means of production. When the mode of production changes, social relations also change. Thus technology can contribute to social change, including class struggle and economic transformation.

- **Max Weber and Rationalization**

Max Weber focused on the process of rationalization. He argued that modern society is characterized by increasing rational, bureaucratic and technical systems. Technology supports rationalization by enabling efficiency, calculation and control. The growth of technological systems leads to increased bureaucracy and formal organization. Weber's concept of the "iron

cage" suggests that modern rational systems, including technology, can restrict human freedom and creativity.

From Weber's perspective, technology contributes to the formation of modern institutions such as bureaucratic government, rational economy and legal authority. Technology becomes a tool of domination through rational management, record-keeping and systematic control.

- **Emile Durkheim and Social Solidarity**

Durkheim was concerned with social integration and solidarity. He believed that industrialization and technological development transform societies from mechanical solidarity to organic solidarity. In modern societies, individuals become more specialized due to division of labor. Technology supports specialization and interdependence. This increases organic solidarity, but it also creates risks such as anomie (normlessness), social disconnection and moral decline.

Durkheim would view technology as a factor that strengthens social complexity and functional interdependence. However, if technological change is too rapid or poorly regulated, it can weaken collective conscience and create social instability.

1. **Information Society and Network Society**

Modern sociologists such as Manuel Castells emphasize that contemporary society is a network society where information and communication technologies shape economic and cultural life. In the network society, power is based on control of information networks. Social relations are increasingly based on digital connections rather than physical communities.

The concept of information society highlights that knowledge and information become the main resources of economic development. Technology creates new forms of work, new industries and new social identities.

2. **Technology as Social Power**

Technology is closely connected with power. Those who control technology often gain political and economic dominance. Governments use technology for surveillance, law enforcement, and citizen monitoring. Corporations use technology to collect consumer data and shape market behavior. Technology also gives power to individuals by enabling free communication, social movements, and access to information.

However, the power distribution of technology is unequal. Rich groups access advanced

technologies, while poor groups struggle. Thus technology can reproduce social inequality. Technology becomes an important element of social stratification, similar to class, caste, gender and education.

Modern Theories of Technology and Society

1. Technological Determinism

Technological determinism is the view that technology drives social change and determines social structure. According to this theory, technology acts as an independent force that shapes human behavior, culture and institutions. Examples include the belief that the internet creates globalization or that smartphones create new social habits.

However, many sociologists criticize technological determinism because it ignores the role of social context. Technology itself is shaped by human decisions, economic interests and political power. Therefore, technology cannot be seen as a purely independent force.

2. Social Construction of Technology (SCOT)

The social construction of technology argues that technology is shaped by society. It claims that technological development depends on social groups, cultural values, political interests and economic forces. According to SCOT, different groups interpret technology differently and influence its design. For example, early bicycles were designed differently based on gender norms and class preferences.

SCOT highlights that technology is not fixed or inevitable; it is flexible and shaped through social negotiation. This theory helps in understanding why certain technologies succeed while others fail.

3. Actor-Network Theory (ANT)

Actor-Network Theory proposes that both humans and non-human objects (machines, software, devices) are actors in social networks. ANT argues that technology and society are interconnected networks, and technology influences society through relationships between actors. For example, a smartphone influences behavior not only because of human use but because of apps, algorithms, interface design and network systems.

ANT helps sociologists understand how technology becomes powerful through complex networks rather than through isolated invention.
Technology and Social Institutions

- **Technology and Family**

Family life has transformed due to technology. Communication technology allows families to stay connected across distance. Smartphones and social media influence family interaction

patterns. Parents and children often spend time on devices rather than direct conversation. While technology supports coordination and safety, it may reduce emotional intimacy.

Marriage and relationships are also influenced by dating apps and online interaction. Technology changes the meaning of love, romance and social norms. At the same time, family conflicts arise due to online addiction, cyber relationships and privacy issues.

- **Technology and Education**

Education has been deeply transformed by technology. Online learning platforms, digital classrooms, smart boards and AI-based personalized learning systems have changed teaching methods. Technology has increased access to education for remote communities. Students can access global knowledge resources and online courses.

However, technology also creates inequality in education. Students from rural or poor backgrounds may lack internet and devices. This creates a digital divide. Moreover, excessive dependence on technology may reduce critical thinking and social learning.

- **Technology and Economy**

The economic system has been revolutionized by technological innovation. Automation and artificial intelligence increase productivity and efficiency. Digital platforms create new business models such as e-commerce, gig economy and online services.

But technology also causes unemployment by replacing human labor. Workers face job insecurity and skill requirements increase. Those with digital skills benefit, while unskilled workers suffer. Thus technology creates new class divisions and labor exploitation.

- **Technology and Politics**

Technology influences politics through digital governance, e-voting systems, online campaigns and social media activism. Political parties use digital platforms to shape public opinion. Governments use digital tools for policy implementation, citizen services and public monitoring.

At the same time, technology can threaten democracy through misinformation, fake news and algorithm manipulation. Social media creates polarization and hate speech. Surveillance technology may reduce civil liberties.

- **Technology and Healthcare**

Medical technology improves health services through telemedicine, diagnostic tools, robotic surgery and health data systems. People in

remote areas can receive consultations online. Technology helps in disease control and health awareness.

However, healthcare technology also creates inequalities. Rich people access better technology. Data privacy is another issue because health data is sensitive. Technology-driven healthcare raises ethical concerns regarding decision-making and algorithm bias.

- **Digital Divide and Inequality**

Digital divide refers to unequal access to digital technology and internet. It exists between urban and rural areas, rich and poor, educated and uneducated, men and women. Digital divide creates social exclusion and limits opportunities.

Technology is often presented as neutral and universally beneficial, but sociology highlights that technological access depends on economic resources and social privileges. Therefore, digital inequality becomes a major social problem. Digital divide affects employment, education, governance and social participation.

- **Technology, Culture and Identity**

Technology shapes culture through media, entertainment, communication and social networking. Social media platforms create new cultural norms, trends and lifestyles. Memes, viral content and digital influencers shape youth culture.

Technology also influences identity formation. Online identity may differ from real-world identity. People present curated images of themselves. Social media impacts self-esteem and social comparison. Technology can support identity exploration but also leads to anxiety and pressure.

- **Technology and Social Interaction**

Modern technology has redefined social interaction. People communicate through messaging apps, video calls and online communities. Technology enables new forms of friendship and community across geographical boundaries.

However, it also produces social isolation. People spend time online but feel lonely in real life. The quality of interaction changes. Face-to-face communication reduces, and digital communication increases. Sociology examines how technology changes human emotions, social bonding and community life.

1. **Surveillance, Privacy and Control**

Surveillance technology is one of the most significant sociological concerns today. Governments and corporations collect data through CCTV, biometric systems, internet tracking and AI-based monitoring. This creates

a surveillance society where privacy becomes weak.

Sociologists argue that surveillance is not just a technical issue; it is political. It can be used for social control and repression. Citizens may lose freedom when they are constantly monitored.

At the same time, surveillance is justified for security and crime control. Thus sociology of technology examines the balance between security and civil rights.

2. **Artificial Intelligence and Algorithmic Society**

Artificial intelligence has become a powerful technology shaping society. AI systems influence decision-making in banking, recruitment, policing, healthcare and education. Algorithms decide what content people see, what news becomes popular and what advertisements appear.

However, AI may reproduce social biases because algorithms are trained on biased data. This can lead to discrimination. For example, AI recruitment systems may prefer certain gender or class groups. Predictive policing may target marginalized communities.

The sociology of technology argues that AI is not neutral; it reflects social values and power relations. Therefore, AI must be regulated ethically and socially.

3. **Technology and Social Change**

Technology plays a major role in social change. It transforms economy, institutions, culture and lifestyles. Technology accelerates globalization. Digital technology spreads ideas quickly and enables social movements. For example, social media supports activism and protests.

But social change through technology is not always positive. Rapid technological change may create instability, unemployment and social tension. Social norms take time to adjust. Therefore, technology can produce both progress and crisis. Sociology studies these complex impacts.

4. **Technology, Environment and Sustainability**

Technology affects environment in multiple ways. Industrial technology causes pollution, climate change and resource depletion. Digital technology also produces e-waste. Technological development increases energy consumption.

At the same time, technology can support sustainability through renewable energy, smart agriculture, green transport and climate monitoring. Sociology of technology examines how environmental policies, corporate interests and consumer behavior influence technological

choices. Sustainable technology requires social awareness and political commitment.

Conclusion

The sociology of technology provides an essential lens to understand modern society. Technology is not merely a tool but a social phenomenon shaped by culture, economy, politics and power relations. It influences social institutions, social interaction, identity and inequality. Modern theories like SCOT, ANT and network society help us analyze technology as socially embedded. This paper concludes that technology should not be seen as purely beneficial or purely harmful. Its impact depends on who controls it, who accesses it, and how it is regulated socially and politically.

To achieve social justice and sustainable development, society must ensure equal access to technology, ethical regulation of AI, protection of privacy and democratic control over technological systems. Sociology of technology helps in creating critical awareness about technological change so that technology serves human welfare rather than social domination.

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Conflicts of interest

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