External Manifestations and Internal Mechanisms of the Technological System——A Critical Review of Jacques Ellul's Theory of the Technological System

Sun Zhanling[1] Xu Chenjie[2]

1 School of Marxism Harbin Normal University, Harbin Heilongjiang，150025；

2 College of Marxism Zhengzhou University, Zhengzhou Henan，450001；

Abstract：Jacques Ellul argues that in our contemporary world, technology is no longer content with being a primary or decisive factor; rather, it has developed into an integrated whole with its own inherent logic—a technological system. Beginning with a broad understanding of technology, this article examines the external manifestations of the technological system—namely technological autonomy, unity, and universality—and analyzes its internal operational mechanisms, including self-augmentation, automation, causal progression and interminability, and acceleration. The article concludes by assessing the fundamental challenges posed by the technological system to human subjectivity, human existence, and social governance as human beings are increasingly absorbed into the system as its components, and explores the possibility of preserving human meaning and dignity from within the system itself.

Keywords: Jacques Ellul; technological system; technology; efficiency

DOI：10.69979/3041-0843.26.01.027

1 What Is Technology?

The point of departure for Ellul's theory of the technological system is a probing inquiry into the question "What is technology?" Ellul contends that the stage of the "technological society" has already passed; "every so-called characteristic of modernity is secondary and ultimately points toward technology"[1]. Whether in our technological society—where "technology refers to the totality of methods rationally arrived at and having absolute efficiency in every field of human activity"[2] —or in the new era in which "technology is the ensemble of the most efficient means available at any given moment for achieving a given end"[1], the core judgment about technology—namely the primacy of the "principle of efficiency"—remains unchanged.

As the quantity and density of technologies grow, individual techniques no longer remain isolated; they combine and interconnect, forming a technological system that covers vast areas of human activity and gradually acquires a certain "wholeness" and "autonomy." A technological system is a dynamic whole composed of interdependent and continuously integrated technological elements. These elements form dense internal linkages and are connected through the collection, transmission, and feedback of information, operating according to a logic of continuous self-improvement and evolution. Technology thus ceases to be a set of isolated tools and becomes a systemic structure that possesses coherence, internal cohesion, and self-propulsive force. "In the technological order, the computer system plays the role of the nervous system; all other comparisons are uninteresting, childish fantasies, or half-baked knowledge"[1]. The computer is not merely a tool but a crucial hub that organizes, integrates, and feeds back the various subsystems—administrative, transportation, scientific, productive, and so on. In this sense, the computer accelerates the shift from "multiple parallel techniques" to an integrated technological system. Its creation of "usable collective memory" and "continuous linkage of information flows" generates accumulation, amplification, and chain reactions among previously scattered technological effects, thereby producing systemic behavior.

Technology as a system is no longer a mere collection of tools but a whole centered on information integration, mutual dependency, and feedback structures. It restructures state governance, administrative organization, power relations, cultural production, knowledge systems, economic operations, and labor structures, gradually integrating society into a unified technological universe governed by technological logic. Once such a large-scale system takes shape, it becomes unrealistic to imagine a simple "de-technologization," for the technological environment has penetrated every aspect of life. Although the system appears relatively autonomous, it is not self-generated apart from human beings and society. Ellul repeatedly stresses that technology should neither be mythologized nor reduced to a mere product of human will; analysis must navigate between the two extremes. The debate over whether computers will ultimately replace human beings or achieve "machine autonomy" remains unresolved; while Ellul highlights their integrative power, he also insists on acknowledging their limits. He further warns that the study of technology should not isolate individual techniques or rely on abstract empirical "point-like" data. Only by adopting an integrated perspective—examining the interrelations and informational linkages among different technologies—can we grasp the actual impact of technology on society.

2 External Manifestations of the Technological System

2.1 The Autonomy of Technological Phenomena

The core characteristic of the technological system lies in its autonomy. This "autonomy" does not imply that technology can exist independently of society, but rather that technology, as an internally driven whole, increasingly follows its own inherent logic in its development, evolution, and modes of operation. It tends toward self-determination and self-reinforcement, shaping its external environment in return. Technology's functions are no longer primarily oriented toward external, pre-established purposes but toward the perfection and expansion of the system itself. As Baudrillard emphasizes, "function does not refer to the adaptation of ends but to the adaptation of order or system." Simondon further clarifies through the notion of "concretization" that "the technical object is the condition of itself and of the mixed techno-geographical environment in which it exists"[3], revealing that technical objects actively structure the very environment enabling their operation and expansion, thereby foregrounding the structural dominance of technology in modern society.

Such autonomy also manifests in technology's overriding influence over the political and economic spheres and in its exclusion and replacement of traditional moral frameworks. In the interplay between technology, politics, and the economy, political and economic decision-making is frequently displaced by the imperatives of technological rationality; real-world situations emerge in which "political decisions are subordinated to technological necessities," with decisions made not by political leaders but by scientists and technical experts. The technological system "cannot tolerate any moral evaluation," treating ethical considerations as external obstacles irrelevant to technological rationality. This exclusion is not value-neutral; it reconstructs a new framework of legitimacy rooted in technological feasibility. "Whatever technology allows human beings to do, they will do"[1] —traditional ethics becomes suspended, even ineffective, under the logic of technology.

2.2 The Unity of Technological Phenomena

The unity of the technological system is the necessary extension and result of its autonomy. It signifies that, despite profound differences in culture, political institutions, and ideology, societies are ultimately absorbed into a convergent set of methods, standards, and practices driven by the autonomous logic of technology. The functional demands and systemic pressures of technology progressively dissolve local particularity, producing high levels of homology in social structures, organizational forms, and even modes of thought.

First, unity manifests in the global convergence of technological methods and standards. In pursuing maximum efficiency and unlimited expansion, the technological system must eliminate all obstacles to proceduralization, standardization, and replicability, thereby promoting universal technological norms. Across production, transportation, and communication, the dominant technological logic produces a universal grammar of technology that transcends national and cultural boundaries. Second, this unity is reflected in the "technological convergence" of political and economic institutions. Technological autonomy transcends ideological divides, compelling states with different political systems to adopt similar organizational structures, administrative techniques, and management practices to accommodate the demands of the technological system. The logic of efficiency further redraws institutional boundaries: "the reclassification of public and private activities—the distinction between these two domains of economic activity is disappearing"[1]. Consequently, political and economic institutions are steered toward structural and operational convergence under technological pressure. Finally, technological unity standardizes cultural practices and lived experience. From education and healthcare to urban design and leisure, the technological system fashions a lifestyle reproducible across geographies. This unity is not the product of cultural exchange or integration but the result of technology's systematic "colonization" of social life. Technology creates a new "technological geographic environment" in which human behavior and experience are increasingly defined and disciplined by a singular technological rationality.

2.3 The Universality of Technological Phenomena

"We encounter technology everywhere today; the technological system is expanding into every domain"[1]. Universality manifests first in its environmental and activity-based dimensions. Technology is no longer an external instrument but a structural component of the lifeworld, reshaping attitudes and everyday experience. Many activities become redefined as operable techniques—"reading techniques, clarification techniques, cultural animation techniques, meeting-moderation techniques"—as behavior is increasingly programmed and standardized. Education and knowledge systems display a dual "encyclopedic" universality under technological logic: the organization and dissemination of knowledge become standardized, while the technological system itself forms a new semiotic universe—"the technological system is a real universe, a symbolic system in its own right"—reshaping meaning and spiritual practice, including traditional disciplines such as Zen or yoga, now absorbed as operable "techniques." Second, universality is geographical. As a system with stable operational logic, technology crosses cultural and institutional boundaries: "Wherever a machine is transported, it remains a machine; it has no Arab or Chinese mode of use, nor a capitalist or socialist mode of use"[1]. Thus, technology promotes worldwide convergence in methods, organization, and ways of life.

3 Operational Mechanisms of the Technological System

3.1 The Mechanism of Self-Augmentation

The technological system is not a passive collection of human-made artifacts; "it grows by virtue of an internal, inherent force"[1]. Its central mechanism can be summarized as self-augmentation. Self-augmentation is jointly propelled by "the internal necessity of technology" and "unconscious human behavior." Once the technological ensemble reaches a certain stage, its internal structure and functional relations naturally lead to further technological outputs. As Diebold puts it, "technological progress is in fact self-generated; technology itself produces new discoveries and the expansion of new fields"[4]. In practice, self-augmentation appears in the following ways:

(1)Technological interventions generate new problems, which are then addressed by more complex technologies, creating new demands and new technological challenges.

(2) Innovation ceases to rely on the inspiration of individual genius and becomes a systematized, programmed collective process. Through "creative methods," teamwork, and research management, invention becomes "the result of a series of procedures and operations."

(3) "Technological progress is achieved not through great or astonishing inventions, but through thousands of minute improvements."

Through internal necessity and the structured integration of human behavior, the system realizes continuous self-augmentation. Expanding through a cycle of problem-creation and problem-solving, and through incremental, institutionalized innovation, it reinforces its own path-dependency, forming a quasi-autonomous "closed world" that advances its logic beyond the decisions of individual agents.

3.2 The Mechanism of Automation

Automation in the technological system does not refer to the automatic operation of machines but to a systemic logic of self-regulation. The system automatically selects, excludes, adapts, and evolves, with its decision-making process largely bypassing subjective human will, seemingly following an internal and necessary law. At its core, automation operates through the principle that, when facing multiple possibilities, the system automatically chooses the most efficient option while eliminating outdated or inefficient alternatives. This process is not a pre-programmed computational routine; rather, it emerges dynamically from the system's operational logic. For example, in the early development of nuclear energy, countries pursued different technological paths, but the only viable formula eventually proved to be uranium enrichment—an outcome imposed by technological results themselves rather than human decision-making.

The essential rule of automation is: "Whatever can be done, must be done"[1]. Any technologically feasible option will inevitably be realized. "Possibility," rather than human "choice," becomes the driving force of technological progress. Once a technological possibility emerges—such as containerized shipping—it not only enters into use but also triggers chain reactions throughout related technological subsystems. Conversely, any older technologies or standards that impede such adaptation will be eliminated under systemic pressure. While human agents may appear to make decisions, their choices within the automated system are largely ineffective: "Human beings first obey technology, and then provide themselves with ideological justifications, clothing their obedience in the guise of freedom"[1]. Human decision-makers are shaped by technological ideology, and their range of choice is strictly confined within the system's permissible framework.

3.3 Causal Progression and Interminability

Technological development is not guided by lofty human-defined goals but follows its inherent logic of "causal progression," which produces an "interminable" trajectory. "Causal progression" means that technological advancement does not originate in distant ends but arises directly from existing means and possibilities. It proceeds through a chain reaction: the current state of technology is both the "effect" of past development and the "cause" of future advancement. The system is thus self-propelled. "Interminability" refers to the fact that the technological system, as a whole, has no ultimate end or external telos. The goals human beings ascribe to technology—such as happiness, truth, or national glory—are largely retrospective rationalizations or ideological veneers rather than authentic motivations of technological growth.

The technological system operates as a self-driving closed loop whose impetus is not external purpose but internal causal progression. Existing techniques generate new ones, which then become the causes of further developments. The direction of technological growth is not toward a final endpoint but toward an open horizon of possibilities. Because possibilities are infinite, technological development is inherently without end. Human beings are not the "masters" of technology but participants drawn into this vast causal process. Their decisions occur only within the possibilities the system makes available and are ultimately subsumed into the logic of self-augmentation. Technology must be understood at the level of causal relations; its evolutionary processes exclude ultimate ends, and new technological forms justify themselves as the "final clauses" of ongoing evolution.

3.4 The Mechanism of Acceleration

The technological system manifests not only growth in scale and complexity but, more importantly, continuous acceleration. This acceleration is not accidental but the result of internal systemic logic and external environmental pressures. The rising tempo of technological change is evident throughout modern history. Computing technologies exemplify this: components evolved rapidly from vacuum tubes to transistors to microcircuits and integrated circuits, with performance increasing exponentially. "Technological development occurs through the combination of earlier technological elements"[1]. The deepest driver of acceleration lies in the geometric proliferation of technological combinations. This "combinatorial explosion" turns the system into a self-catalyzing process in which each new technological element exponentially increases the range of future innovations, producing ever-faster systemic acceleration.

Acceleration generates a fundamental tension. On the one hand, internal causal logic rooted in combinatorial proliferation contains the potential for limitless acceleration. On the other hand, external constraints—human cognitive limits, social adaptability, economic capacity, and the system's own rising complexity—set boundaries on acceleration. Thus, the actual trajectory of the technological system is not a simple exponential curve but the outcome of a dynamic balance between internal forces of acceleration and external forces of constraint. Whether the system continues to accelerate, stabilizes, or declines into disorder remains uncertain.

4 Conclusion

Under the pervasive penetration and structuring force of the technological system, human beings are no longer "subjects" in the traditional sense. We do not stand outside technology to observe, choose, or critique it; rather, we are already embedded within it as part of its operation. Technology is not merely a tool but an environment, a mode of thinking, and even a mode of existence. From birth onward, humans inhabit a technological milieu in which technological artifacts and systems form the "natural" background of cognition. We are not the "masters" of technology but its "participants" and, in some respects, its "products." While we cannot escape the technological system, we may seek limited autonomy from within—not through confrontation, but through sober understanding and selective, localized acts of choice. The challenge ahead is not whether to accept technology but how to preserve human meaning and dignity within the technological system. This calls for continuous reflection on the nature of technology, vigilance against its totalizing tendencies, and efforts to defend the non-technifiable values intrinsic to human existence.

References

[1]Jacques Ellul. The Technological system[M] . trans. Joachim NeuGroschel. New york: continuum, 1980.
[2]Jacques Ellul. The Technological society[M] . trans. John wilkinson. New york: Alfred A. knopf, 1964.
[3]Simondon, Gilbert. On the Mode of Existence of Technical Objects. Trans. Yuk Hui. Nanjing: Nanjing University Press, 2024.
[4]DIEBOLD J. Automation: the advent of the automatic factory [M]. New York: Van Nostrand, 1952: 138.

Author Profile: Sun Zhanling (born 1999), male, of Han ethnicity, is a graduate student from Cangzhou, Hebei Province. Currently enrolled at the School of Marxism, Harbin Normal University, his research focuses on international Marxism. Xu Chenjie (2000 -), female, Han ethnicity, from Xuchang, Henan Province, is a current postgraduate student. Her institution is the School of Marxism at Zhengzhou University, and her research focus is on the study of foreign Marxism.