

A Primer on Engels' Technical Thought and Its Contemporary Value

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Keywords: Engels; Scientific and Technical Thought; Technological Alienation; Contemporary Value

Abstract: The development of the two industrial revolutions boosted the level of industrialization of society, liberated social productive forces and increased the accumulation of social wealth. However, the utilization of big machines in capitalist society has also brought about a series of problems, namely, the widening of the social gap between the rich and the poor and the intensification of social class conflicts. Based on this, Engels turned his scrutiny to the field of technology, and based on the standpoint of dialectical materialism and historical materialism, he broke through the limitations of examining technology in the economic field, and probed deeply into the dialectical relationship between technology and human beings, nature and society. Engels' technological thought is distinctly comprehensive, practical and forward-looking, providing theoretical guidance for the steady progress of China's socialist modernization.

1. Introduction

Engels, as a spiritual leader of the proletarian revolution, always maintained a high level of interest and concern for the development of technology. Engels' technological thought is based both on the study of the social realities resulting from the use of techno-capitalism, and at the same time is supported by the results of the natural sciences. When Darwin's *Origin of Species* was published, Engels spoke highly of it, and never before has there been such a large-scale attempt to prove the historical development of nature, which draws closer the close connection between the earth and man. Based on his heightened interest in technology and the techno-cult fervor that was emerging in capitalist society at the time, Engels launched his study of technology.

2. Background to the Formation of Engels' Technological Thought

2.1. Context of the Times

The Industrial Revolution brought a mechanized mode of large-scale industrial production to Europe in the nineteenth century, and the use of machines liberated social productive forces, promoted social and economic prosperity, and laid a solid material foundation and technical support for the research and discovery of the natural sciences and humanities. However, technology has always been used by capitalism to achieve the capital expansion of the capitalists, and instead of becoming the

masters of their own labor due to the development of technology, the workers have become subordinate to the machines in their labor. Laborers no longer compete with people whose productivity is at the same level of measurement, but with machines. As the use of technology in the field of production expands, the worker becomes more and more degraded into a production machine in order to achieve physical survival. The more value a worker creates in production, the poorer he or she becomes and the more surplus value is squeezed out of him or her by the capitalist. The immediate consequence of this is the rapid accumulation of wealth in the hands of a handful of capitalists, with workers struggling to maintain their physical existence in self-denying labor.

In the face of the capitalists' long-term inhumane exploitation and the ever-widening wealth gap in society, workers' interests in survival and development, on which they rely for their survival, have been continuously undermined, and the acute class conflicts have led to social unrest, so workers have no choice but to unite in resistance to reclaim their rights and interests. Inspired by the three major workers' movements, Engels delved into the productive life of the proletariat. Engels synthesized the effects of capitalist technologization on workers, nature, and social development based on an analysis of the workers' situation, and the book *The Condition of the Working Class in England* marks the starting point of Engels' technological thought.

2.2. Theoretical Sources

Kant, as a representative of empiricism, divided the objective world into two elements, namely, phenomenon and essence, through the "nebular hypothesis". In Kant's view, technology, as a creative product of human genius, is a category of judgment belonging to the human ontology, an artistic creative ability embedded in the subject. The freedom of technology is manifested in the fact that it is not bound by the objective laws of nature nor by the moral norms of society." Genius is a natural talent, an inborn endowment of the mind." ^[1]Kant initially articulated the logical relationship between human beings and technology, i.e., that human beings are the most fundamental meaning and value, while technology is only a means to realize this value. Kant's view that the generation of technology is not subject to the laws of nature has a certain idealistic flavor; In addition, although Kant emphasized the dignity and status of human beings in the field of technology, he simply regarded technology as a means of realizing the value of the human subject, and failed to see the nature of technology as the externalization of the power of human nature.

Hegel did not stop at a purely subjective interpretation of the nature of technology, but took technology as a means for the subject to transform the object, which could realize the combination of subject and object. In his *Principles of Philosophy of Law*, Hegel points out that individual labor is simplified using technology and the division of labor, but people's subject-objectifying activities are also inevitably mechanized with the use of technology, and furthermore, ever-innovating technology will undermine and suppress human labor, and devalue the usefulness of human beings. In Hegel's view, the socialized use of technology in promoting social production at the same time leads to the abstraction and mechanization of production, the subjectivity of human beings in the process of production is dissolved, and ultimately leads to the replacement of workers by machines. In fact, Hegel's thought has already involved the alienation problem and performance of technology in the use of technology, but on this point Hegel only superficially mentioned, and did not carry out an in-depth analysis.

3. Key Elements of Engels' Technological Thought

3.1. The Nature of Technology

For Engels, the most essential difference between man and animals lies in the purposefulness and

planning of human activity. Animals can only realize their influence on the objective world through their own existence, while man, in addition to his own objective existence, has the most important influence on the material world in that he carries out the transformation of the perceptual world through his own free and conscious activity to achieve his subjective purpose, and pushes the external world into the service of man. This process of conscious transformation of the objective world is the process of labor, which is the way of human existence and development. In the early days, technology connoted the making and use of tools, " Man's original instrument was his own limb. However, these limbs must be in his own possession. It is only after there is a product for use in a new creation, even if it is just a stone that kills an animal, that the real labor process begins." [2] True labor begins with the manufacture and utilization of the means of labor, i.e., tools, so that skilled labor is not only man's corroboration of the nature of his own class, but also a prerequisite for the existence of human society.

According to Engels, from the beginning, the emergence and development of technology and human beings have an intrinsic identity. On the one hand, technology arises from the labor process of human beings and is constantly innovated in the process of labor, which puts forward the objective requirements and orientation for the emergence of technology; on the other hand, technology is the objective realization of the subjective will of human beings, and it is the outward manifestation of human beings' essential power, and human beings are realizing the development of themselves while developing their technology. The history of human development is the history of technological development using technology to carry out labor, labor technology or industry is the unity of the subjective purpose of human practice and the objective regularity of the operation of nature, and human beings are also in the process of gradual transformation from the early main reliance on natural resources to the main process of technological survival.

3.2. Relationship between Technology and Man, Nature and Society

Technology is the materialization of man's essential power, and while man creates technology, it is also the process by which technology creates man. Engels considered labor to be the essential issue that distinguishes man from animals, and technology to be a property specific to the material activity of human beings in transforming the sensual world. Labor, as an essential attribute of man, is the basis of human life, so that we can in a sense say that: "Labor creates man himself." [3] That is, technology as the epitome of human labor, and in revealing the nature of technology, Engels is revealing the nature of humanity. First, in examining the nature of man, Engels begins by emphasizing that man is a product of nature, On the other hand, man differentiates himself from nature through labor, confirming the nature of man as a human being. Technology, as the materialization of man's subjective consciousness in labor, not only promotes the process of labor, but also highlights the dynamic power of man. Thus, we say that it was under the study of technology that Engels was able to realize his argument for the nature of man. Secondly, Marx and Engels pointed out that human nature in its reality is the sum of all social relations. Technology, as the intermediary and means of human practice, promotes the expansion of the connotation and field of human labor, liberates people from heavy labor, realizes the higher-order management of human labor, and promotes the search for a broader field of human labor. Therefore, technology plays an important function in the object-oriented activities of man in manifesting the nature of his reality.

Nature, as the object world of human existence and development, is the body of human sensibility. Without nature, human creative activity would not be possible. Nature provides the means of production and means of subsistence for man's dynamic activities, which are manifested as objects of labor and means of subsistence as means that can be directly used to sustain man's physical existence, and the existence of nature provides space and materials for man's survival and development. Technology, as an intermediary for the realization of labor, achieves an increase in the speed,

effectiveness, scale, and extension of the field of human labor, and the dynamic role of man in nature is realized and continuously strengthened with the assistance of technology. However, this has also brought about a series of problems, namely, the use of technology has led to a growing contradiction between the scale and speed of man's demand for nature and the carrying capacity and resilience of nature, and ultimately led to the retaliation of nature." Let us not be overly enamored of our human triumphs over nature. For every such victory, nature retaliates against us."^[4] Unreasonable use of technology invites nature's punishment. So, was Engels negative about technology? Not really. Engels advocated relying on technology on the basis of the unity of purpose and regularity to realize the harmonious coexistence of man and nature, "Since the great strides of the natural sciences in the present century, it has become more and more probable that we will learn to recognize and therefore control those more distant natural consequences which at least are induced by our more distant natural consequences of ultimately common productive behavior."^[5]

Unlike his predecessors and contemporaries, who confined their study of technology to the economic sphere, Engels explored it in a variety of perspectives, including economic, political, cultural, and social interactions. Engels pointed out that the relationship between technology and society is dialectical and not simply one determining the other. On the one hand, technology drives the process of socio-historical development. It can be said that the history of human development is the history of mankind's practice of using technology, and the use of tools of different natures has become an important symbol for the division of different historical periods, including the primitive era, which is mainly based on the use of stone tools, the slave and feudal era, which is based on the use of metal tools, and the capitalist era, which is based on the production of large-scale mechanized technology, and the development of technology through the use of tools of labor in the form of a specific form of labor plays a direct role in the change of the labor mode. The development of technology through the specific form of labor tools has played a direct role in the change of labor mode. On this basis, technology in the expansion of social production at the same time also inevitably promote the transformation of the superstructure and promote the change of the historical form of human society. On the other hand, social existence, as the objective environment that breeds technology, has a guiding role in its development. Engels emphasized how technology, as a product of social development, is constrained and shaped by society while advancing it. Technology, as an externalization of man's subjective will, is limited first and foremost by the development of man's thinking, reason and logic. Man is a social product, and the influence of the social environment on man is intuitive, just as people a thousand years ago could not have imagined that man could realize his dream of "flying in the sky". In addition, the development of technology stems from man's practical needs to produce material goods. After the realization of low-level needs, human beings inevitably have higher-level needs, so when the material needs of society exceed the current state of technological means to achieve the situation, a higher level of technology was born, and "once there is a technological need in the society, such a need will be more likely to push the science forward than ten universities. forward."^[6]

3.3. Technological Alienation Ideology

Because of inheriting Kant's ideas on technological alienation, Engels argued in detail about the nature of technological alienation, its manifestations, and the fundamental way to abandon it.

"Technological alienation" is a concept that applies the "alienation" of human beings under the capitalist system to the field of technology, i.e., the transformation of technological means and systems from serving, developing, and confirming human beings to becoming an externalized and alienating force that dominates and oppresses human beings. The more one uses technology, the more one tends to deny oneself because of it. For Engels, capital, as the supreme norm of capitalist society,

becomes the standard by which all activities and values are measured. Capitalism's use of technology is much less about simply promoting social production and freeing people from the drudgery of production in order to achieve free human development. Rather, it is for the purpose of achieving a more insidious and brutal exploitation of workers' surplus value through technology and the multiplication of capital, and capitalist private ownership is at the root of the emergence of technological alienation.

The alienation of technology manifests itself in two ways. On the one hand, there is human alienation. The development of technology brought capitalism a mode of large-scale industrial production, which led to the development of productive forces and the refinement of the social division of labor." Workshop craftsmanship creates deformed human beings, and it suppresses the worker's intrinsic productive nature, his talents, to achieve the dirty purpose of turning the worker into a production machine." [6]Mechanized production breaks down the wholeness of social production, and workers are bound to a fragmented, digitized, and one-sided production process. The subjectivity of man is obliterated, and his object labor degenerates into externalized labor, becoming subordinate to the machine. On the other hand, it is nature's revenge. In his *Dialectic of Nature*, Engels mentions that man as a natural being should make every effort to coexist peacefully with nature. That human attempts to use technology to conquer nature are often counterproductive, even though " Each of these victories, at the beginning, did achieve the desired results, but in the second and third steps had a completely different and unexpected impact. " [7]

Engels, as a proletarian revolutionary, He argues that for human liberation to be achieved there must be a breakthrough in technological alienation. The capitalist use of technology under private capitalist ownership is at the root of the emergence of technological alienation, Labor does not serve as a means of man's self-realization but as a means of maintaining the survival of the character's rationality. Therefore, Engels believes that a thorough critique of technological alienation does not lie in the denial and abandonment of technology, but rather in the demand that the proletariat unite to carry out a social revolution in order to transform the social system, i.e., to eliminate the capitalist system of private ownership of the means of production, so that the transformation of the superstructure feeds back into the economic base to realize the free and comprehensive development of human beings.

4. The Contemporary Value of Engels' Ideas on Technology

Although Engels' technological thought was formed a century ago, the forward-looking and prescient nature of his technological thought is still of constructive guiding significance to the reality of the current socialist modernization and development of our country.

We should face up to the social function of technology and realize the synergistic development of all aspects of society through technological innovation. Engels saw the deterministic relationship between technology and society as reciprocal, with society nurturing technology and technology feeding back into and advancing society. At present, China's development has entered a new era, and there are new changes in development; In addition, international competition nowadays is emphasized as the competition of comprehensive national power with economy and science and technology as the core, and the position of technology in the current national development is becoming more and more prominent. In this regard, we should introduce the development of technology into the "five-in-one" development layout, enhance technological innovation capabilities, especially the construction of core technologies, and grasp the key technologies, in order to enhance China's comprehensive national strength and international competitiveness and to enhance the right to speak in the international arena.

Breaking through the technological dilemma to achieve sustainable social development through

technological development. In his monographs, Engels extensively described the ecological destruction and environmental pollution brought about by the operation of technology under capitalization, and discussed the dire consequences that would ultimately be incurred based on the unlimited exploitation of nature. The socialist system provides the possibility for the appropriate use of technology, but due to the historical orientation of the primary stage of socialism in China, the promotion of economic development by technology was regarded as the main contradiction in the early stage of construction, while ecological construction was neglected. In recent years, the party and state leaders began to pay attention to the construction of ecological civilization, since the 18th Party Congress, based on the status quo of the development of science and technology at home and abroad and the analysis of various shortcomings. The idea of green science and technology was put forward, advocating the use of low-carbon recyclable resources and the development of clean and efficient new technologies, and calling for the construction of a beautiful China based on an ecological civilization and the development of an ecological civilization supported by the implementation of green science and technology.

5. Conclusions

Engels' reflection on science and technology is extremely revolutionary and innovative, and he pioneered the systematic study of philosophical issues in the study of natural sciences in the theoretical system of Marxism, greatly enriched the theoretical system of Marxism, and highlighted the ideological qualities of dialecticality and scientificity, practicability and theoreticality, epochal and openness, and subordination and systematicity of his scientific and technological thought.

At present, our country is in a new period of comprehensive construction of socialist modernization, the world development situation has entered a hundred years of unprecedented changes, 5G technology, artificial intelligence as the representative of the new round of technological revolution makes us must place the development of science and technology in the national strategic layout of the key position, the only way to continue to open up the development of China's road ahead, to master the advantages of the core technology in order to face the world's scientific and technological frontiers! Only in this way can we continue to open up the way forward for China's development, master the core technology. Although the scientific and technological ideas of Engels are limited by the limitations of the times and individual points of view are no longer in line with the realistic needs of China's current national development, the kernel of his scientific and technological ideas is still shining with the glory of truth, providing useful methodological guidance for the development of China's contemporary science and technology and for the construction of a beautiful China, and for the advancement of the development of socialist modernization. In this regard, the study of Engels' scientific and technological thought and its contemporary value not only has important theoretical significance, but also has strong practical value.

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