

Marx and Technology

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Marx's portrayal of social relations under capitalism deviates from a technologically determinist reading of history. While industrialization appears to dictate social relations by alienating workers, worsening working conditions, increasing unemployment, and expanding the working day, Marx's analysis of history draws emphasis toward the social relations and hidden forces in the capitalist mode of production that precede the introduction of machinery. More specifically, he argues the will of capital is its relentless growth; acting through the capitalist,¹ it drives society's implementation of new machinery to increase productivity, lower costs, and allow the capitalist to remain competitive in the market, which in turn expedites worker exploitation. Moreover, Marx argues that the ownership and control of the means of production in society determines social relations. Under industrial capitalism, only a small minority of capitalists possessed the wealth required to obtain expensive machinery, giving them more control over society's means of production than in preceding eras. Hence, although technology itself may appear to determine the conditions of society, it is actually the ownership of the means of production and the pursuit of expanding capital that determines the social relations underpinning man's state in industrial capitalism.

A prerequisite for a capitalist's expansion of his capital is the extraction of surplus value from his labourers. In the capitalist mode of production, the productive labour of workers is reduced to a commodity that can be bought and sold. Capitalists purchase the productive labour

¹ Robert Tucker, *The Marx-Engels Reader*, "Capital, Volume One," 334.

of their workers at a rate below the value that the worker's labour produces. Surplus value represents this difference, and its rate is determined by the quotient of surplus labour time divided by necessary labour time, where the latter is defined as the labour time spent fulfilling the labourer's basic needs, and the former is the unpaid labour time that extends beyond what is required in meeting those needs.² The capitalist aims to maximise the rate of surplus value by increasing surplus labour time and minimising necessary labour time in order to achieve a "relative surplus value."³ The two primary mechanisms that the capitalist employs in obtaining relative surplus value include his extension of the working day and his attempts to increase the productivity of labour. In extending the working day, the labourer's necessary labour time remains largely unchanged, and the excess time he works increases surplus labour time; thus, industrial capitalism preceding the Factory Acts⁴ is characterised by long working days. Marx argues that the working day has limits that are constrained by a labourer's maximum expenditure of vital force, his requirement in satisfying his physical needs, and his intellectual and social wants.⁵ However, capital's pursuit of surplus labour intrudes upon these bounds,⁶ impeding workers' ability to care for themselves. It is thereby the social relations of production and the compulsion to expand capital through the generation of relative surplus value that extends the working day.

The capitalist inclination to achieve relative surplus value through increased productivity functions by decreasing the worker's necessary labour time. A more productive worker is able to fulfil his basic needs in a shorter period of time, and the capitalist reaps the remaining time in the working day as surplus labour time. In the Industrial Age, the extensive use of machinery

² *ibid.*, 361.

³ *ibid.*, 379.

⁴ *ibid.*, 376.

⁵ *ibid.*, 362.

⁶ *ibid.*, 373.

represents the primary mechanism through which productivity is boosted.⁷ However, the extraction of surplus value in prior eras of history (e.g., primitive accumulation) did not include such technology. For instance, in the manufacturing era, it was notably the division of labour that was responsible for the greater part of productivity improvements.⁸ Thus, it appears the nature of the capitalist mode of production, and not necessarily machinery, that the labourer's working day includes surplus labour time. Moreover, Marx argues that the exchange value of a commodity is determined by the amount of socially necessary labour time required to produce it, which in turn reflects the productive labour expended given the average skill and productivity of a society at a specific period.⁹ Because exchange value is defined by labour, some of the value that the worker brings to his product is seized when the capitalist sells this product for more than he expended in labour costs; this exploitation is inherent to capitalist society and not a product of technology.

The means of production (e.g., tools, infrastructure, raw materials) are used to transform labour into goods with exchange value. An individual's access to the means of production is crucial in his ability to realise his labour power,¹⁰ or his potential to perform labour given his skills and experience.¹¹ In capitalist society, one's fulfilment of his basic physical needs generally demands that he has a product to sell such that he can afford sustenance; if a labourer does not control the means of production, he has only his labour power to sell. The owners of the means of production under industrial capitalism are a handful of wealthy capitalists, who invest in these assets to satisfy their compulsion for the continued growth of capital. Thus, when

⁷ *ibid.*, 403.

⁸ *ibid.*, 394.

⁹ *ibid.*, 306.

¹⁰ Labour is a process of productive consumption; it acts upon existing materials (Robert Tucker, *The Marx-Engels Reader*, "Capital, Volume One," 348–349, 352.). Labour does not have value until it produces a commodity with utility (*ibid.*, 320–321, 325.).

¹¹ Robert Tucker, *The Marx-Engels Reader*, "Capital, Volume One," 337.

Marx describes the pursuit of capital in the form “M—C—M” (money — commodity — money), the commodities he refers to include labour and the means of production. Furthermore, the advance of technology in the Industrial Age expanded the scope of the means of production to include expensive machinery, contributing further to the capitalists’ control over society and the labourer’s lack of freedom. However, the conditions which permitted the progression and implementation of technology, and by extension those developments, precede the Industrial Age.

Marx states that the compulsion for this wide scale technological development is born from the capitalist relations of production from the manufacturing era. In this era, the majority of society’s wealth and its means of production came to fall under a small class of capitalists who aspired to maximise productivity. Initially, the division of labour was the primary mechanism through which productivity gains were achieved, but the growing requirement for labour under such a system became unsustainable.¹² The introduction of labour-saving devices followed, bringing about industrial capitalism.¹³ The widespread adoption of such machinery was the result of the capitalists’ imperative to remain competitive; technology increased surplus value by boosting productivity, allowing capitalists with machinery to reap higher profits and undercut their competitors. Thus, the manufacturing era brought about the Industrial Age’s new technologies and large-scale production processes by consolidating society’s wealth and power, and advancing the compulsion to generate capital.

Following industrialisation, the nature of labour and social conditions became redefined. The worker was now the appendage of the machine,¹⁴ forced to perform repetitive, monotonous tasks in dangerous and unhealthy conditions, with little autonomy or control over his work. Furthermore, he became subject to the rhythms of the machine, working long hours with little

¹² *ibid.*, 397–402.

¹³ *ibid.*, 389–393.

¹⁴ Robert Tucker, *The Marx-Engels Reader*, “Manifesto of the Communist Party,” 479.

rest or leisure time. The conditions of broader society also underwent several major changes under industrial capitalism, one of which was the formation of an industrial reserve army. As machinery lowered the strength requirements for labour (allowing the employment of women and children) and increased its productivity,¹⁵ the supply of labour increased while its demand dropped. Although in some sense the industrial reserve army was set free by machinery, those comprising it also became free to starve and were often impoverished.¹⁶ The presence of an industrial reserve army caused conflict as they fought for jobs with active labourers, and forced them to endure worse conditions.¹⁷ Despite these symptoms appearing to be the result of technology, they are equally caused by the underlying nature of the capitalist mode of production. The increased efficiency of labour following industrialisation required that fewer capable workers exercised their working potential. The resulting industrial reserve army demonstrates the great contradiction of capitalism — that the labourer is required to sell his labour power for his subsistence (disregarding his potential to lead a life of vagrancy) but is often incapable of finding a buyer. Under a different economic system, the widespread use of machinery may have had completely different consequences on the conditions of society.

Marx outlines several forms of alienation present in the capitalist mode of production. He argues that it produces estrangement because it does not prioritise human needs, but rather functions within a framework of capital expansion; capitalists exploit their labourers, utilising their power over the means of production to satisfy their insatiable profit motives, while the industrial reserve army is left to starve. Furthermore, man's working activity under capitalism also causes man's alienation from the production process, the product of his labour, and his "species-being." Capitalism's separation of workers from the production process leads to

¹⁵ Robert Tucker, *The Marx-Engels Reader*, "Capital, Volume One," 404.

¹⁶ *ibid.*, 413.

¹⁷ *ibid.*, 427–428.

workers being alienated from the very thing that gives them purpose, which is their ability to produce and create. The alienation of the worker from the product of their labour naturally follows. The worker no longer feels a sense of connection or ownership over what they produce, but instead becomes a mere instrument used by the capitalist to produce goods and generate profit.¹⁸ In being alienated from the products of their labour, the objects workers produce are disconnected from their being, causing their labour to be objectified.¹⁹ Marx also claims that capitalism causes man to become alienated from his “species-being,” expanding upon a Rousseauian presentation of man.²⁰ Rousseau argued that, unlike other animals, man is conscious of his actions and driven by will rather than instinct.²¹ Marx applies this notion to capitalism, where man’s consciousness does not allow for labour to be fulfilling merely because it meets his instinctual need for sustenance. When the labourer merely works for the money he needs in order to live, he is denied his capacity to exercise free and creative labour. Moreover, his life becomes defined by his work, as his earnings from the necessary labour time in his working day simply grants him the sustenance that allows him to reproduce his labour the following day. The worker’s labour must align with his will, but capitalism strips him of his freedom from instinct and denies him the capacity to shape the natural world according to his desires.²² Industrialisation exacerbated some of these problems. For instance, when a worker becomes the appendage of a machine, he is further estranged from the process of production as

¹⁸ Robert Tucker, *The Marx-Engels Reader*, “Economic and Philosophic Manuscripts of 1844,” 74.

¹⁹ *ibid.*, 71.

²⁰ *ibid.*, 75.

²¹ Rousseau writes, “man has some share in his own operations, in his character as a free agent...the brute cannot deviate from the rule prescribed to it, even when it would be advantageous for it to do so; and, on the contrary, man frequently deviates from such rules to his own prejudice. Thus a pigeon would be starved to death by the side of a dish of the choicest meats, and a cat on a heap of fruit or grain; though it is certain that either might find nourishment in the foods which it thus rejects with disdain, did it think of trying them” (*A Dissertation On the Origin and Foundation of The Inequality of Mankind and is it Authorised by Natural Law?*, <https://www.marxists.org/reference/subject/economics/rousseau/inequality/ch01.htm>). In other words, man is driven by his own will rather than instinct, which is a unique trait among animals.

²² Robert Tucker, *The Marx-Engels Reader*, “Economic and Philosophic Manuscripts of 1844,” 76–85.

he does not sense that he is producing the good, but rather allowing technology to do so on his behalf. Nonetheless, these forms of estrangement — representing the conditions of society — are predominantly caused by the nature of selling one's labour under capitalism.

The arguments presented throughout Marx's writings seem to indicate that technology alone does not determine the conditions of society. Rather, these conditions under industrial capitalism must be viewed through a lens of pre-existing social relations in the capitalist mode of production. The capitalist's control over the means of production and his compulsion to pursue capital precede the industrial age. In Marx's view, technology is one element that interacts with other social, economic, and political forces to shape the course of historical development — it is not the only factor. A technologically determinist reading of Marx assumes that machinery is the dominant force in defining the conditions of society, but this one-dimensional interpretation does not explain the compulsion to innovate and implement new technology. By framing these industrial developments in terms of other forces in the capitalist mode of production, it becomes clear that machinery is simply a new expression of the same capitalist dynamics presented during the manufacturing era.

Bibliography

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