The Conflicting Dimension and the Possibilities of Technological Development in Marx and Gramsci

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The article analyses the views on technological development in the works of Karl Marx and Antonio Gramsci, based on their original texts and critical commentators, establishing parallels, continuities, and highlighting differences. The aim of the paper is to reinforce the connection between productive forces and social relations, which is fundamental in Marxian theory, in order to analyse technological phenomena and innovations, in contrast to non-dialectical perspectives. Through a literature review and engagement with contemporary interpretations, the article suggests a convergence between the two authors on two points: first, their integral view of technical development, approached from the standpoint of totality; and second, the idea of the working class's potential to appropriate technology, seen as an open possibility that must emerge from the class itself through the conquest of power and hegemony. In this way, the article sets up a confrontation with, on the one hand, deterministic views, and, on the other, more negative ones, that advocate a perspective of technological palingenesis.

Technological development; Antonio Gramsci; Karl Marx; Productive forces; Social relations.

1. *Introduction*

It is not incorrect to admit that technology plays a central role in capitalist development. Technical-scientific evolution and technological changes are of such importance that they define the success or failure of social formations in international competition, in addition to being present in all aspects of our daily lives. At the same time, in common sense, technology seems to have an autonomous dynamic with an end in itself, always developing progressively and in a manner detached from the mode of production in which it is embedded[1].

[1] HARVEY 2013a, p. 186.

In capitalism, the idea of «technological illusion» is widespread, as discussed by Milton Santos[2]. In the hegemonic discourses, «technical progress is a "*deus ex machina*" and increased income through the application of industrial techniques is the objective of economic models»[3]. Even though at certain times business innovation delays some technological changes to ensure maximum capital accumulation[4], its spell does not break. In this sense, technological changes are uncontrollable like forces of nature, acting without a person behind it, in an autonomous and almost magical (or fetishist) way, as the engine of history. They can only be tamed by certain geniuses, or even those with powers beyond humanity. This «canonization» of current technology aims «to ideologically strengthen the interests of the creators of current knowledge, in order to keep it in the role of an instrument of domination and economic exploitation of the majority of humanity»[5].

In order to provide an effective answer to combat the hegemonic view in this field, we seek to analyse technological changes less from the perspective of the economic structure pre-eminence, or from the fixation on certain inventions or technical instruments. On the contrary, we seek to think about development from the perspective of the movements of history itself, approaching the notion of totality. In the evaluation of technological phenomena and innovation, it is a question of understanding the link between productive forces and social relations, fundamental in Marxist theory, seeking to contrast this link with non-dialectical views.

The methodology of the literature review is based on an analysis of the political and social context in which the authors analysed lived and produced their work, compared with analyses and critiques produced later, throughout the 20th and 21st centuries. In this sense, instead of simply comparing isolated concepts, the debate outlined here recognizes that the theories of intellectuals are influenced by their living contexts and challenges of their time, which were also in movement. The text is divided into four sections, including this introduction. We begin our analysis with the works of Marx, with emphasis on the *Grundrisse* and

[2] SANTOS 2020, pp. 45-46.
[3] MAMIGONIAN 1982, p. 38.
[4] HARVEY 2013a.
[5] PINTO 2008, p. 112.

Capital, and then we will focus on passages from three different Gramsci's *Prison Notebooks*. Finally, we present our considerations on the study undertaken.

2. *The Marxian reading: the conflictual dimension of scientific and technological development*

Although it is not a major focus of Marx and Engels' studies, the theme of technological development is a relevant topic in many of their works, especially when we address the binomial of Productive Forces and Social Relations. However, we do not believe that there is a deterministic notion of "development" in Marxian theory as some people think. In this sense, we agree with David Harvey[6], for whom this is one of the greatest errors in interpreting Marx's texts. Then we observe technological development taking into account the famous phrase from the *Communist Manifesto* of 1848: «the history of all hitherto existing society is the history of class struggle»[7].

Amy E. Wendling, who studied Marx's ideas on science and technology in relation to the concept of alienation, points out that the German philosopher's thinking is not linear on the subject of science and technology. It oscillates between more «romantic» or «critical» views on the technical and industrial development of his time (p. 2). According to the author, Marx's thinking is divided into two central points: on the one hand, technological development could fulfill the promise of freeing the workforce from the most arduous tasks and would guarantee free time for the working class; on the other, machines intensify the pace of work and production, increasing employers' profits, putting manufacturing workers out of work and transferring them to more precarious positions[8].

In the author's opinion, this instability of views was caused by the mutation of newborn industrial capitalism itself. In which science became extremely important as a way of contesting the political power against the old medieval order, helping to consolidate the power of the bourgeoisie

[6] HARVEY 2013a.
[7] MARX-ENGELS 2017, p. 22.
[8] WENDLING 2009, p. 175.

as the new ruling class. It is evidently necessary to consider that in his youth, «Marx's economic knowledge was mediocre: he was precisely "learning" from the classics; the phase of his critique and overcoming was still far away»[9]. In this sense, with greater methodological refinement, the positions of the philosopher from Trier became both more critical and more concretely directed at the capitalist society of his time.

Focusing only on the criticism of the application of science and technology in the production process, another interpretation is that Marx did not see technical-scientific development as a totality, but in a partial and subordinate manner. Thus, technology and science became means to expand the extraction of surplus value from workers, of which machinery would be another element for controlling workers[10]. This explanation is exemplified by Romero with an excerpt in which Marx criticizes Proudhon, entitled *Marx's letter to P. V. Ánnenkov*, from 1846. However, both in this letter and in other works from the same period, the debate on the technical issue is broader, focusing specifically on this dimension only in *Capital*.

In the aforementioned letter, in his critique of Proudhon, the question of productive forces is interpreted in light of the «conditions in which men find themselves, due to the productive forces already acquired, due to the social form that existed before them»[11]. For Marx, productive forces, understood as the social forms for carrying out material activities, are a «legacy» left by previous generations[12]. For the French anarchist, productive forces were directly associated with machines, as an economic category. The communist thinker confronts this position with the idea that machines would be just another productive force, «but the mode of exploitation of machines is something totally different from the machines themselves»[13].

In this way, the mode of production, and consequently technical-scientific development, was not restricted to the interior of factories. In the

[9] FINESCHI 2024, p. 20.
[10] ROMERO 2005, p. 14.
[11] MARX 2017, p. 239.
[12] Ivi, p. 240.
[13] Ivi, p. 243.

passages about Feuerbach in *The German Ideology*[14], written between 1845 and 1846, the theme of technical progress was already associated with the globalization of history and space, with the birth of modern states and their competition for markets in the colonies. In other words, it left the strict scope of factories and became intertwined with the totality of the newborn industrial capitalist social structure. Marx and Engels explain how, based on the new technical instruments, the domination of trade routes, new consumer markets, and even the extraction of commodities overseas became possible. For them, the productive forces that emerged became forces of destruction. This whole process gave rise to a class in opposition to these forces: the international proletariat, for whom the world market, ruled by the bourgeoisie - which still had something national at this time - was a strange and antagonistic force.

We must also understand that the «totality» referred here «is constituted by an objective order, belonging to a historical process, expressed in dialectical categories. It is a totality made up of conflicting opposites»[15]. Within this totality, production relations cannot be seen as a mere generalization of particular or individual human acts. When we speak of production in Marx, it is always production at a certain level of social development, and production is also the appropriation of nature by the individual and through a certain form of society[16].

Having completed this brief methodological preamble, we now proceed to the detailed examination of important excerpts on technological development in Marx, starting with the *Grundrisse* of 1857-1858.

2.1. The Fragment on machines: the liberating potential of science and machinery

The *Grundrisse* (2011) are manuscripts that guided the first version of the *Critique of Political Economy* and *Capital* (released almost ten years later), written without the intention of publication. These notebooks were translated and published for the first time in the Soviet

[14] MARX-ENGELS 2007.
[15] PINTO 2008, p. 118.
[16] LUPORINI 1974, p. 298.

editions of the works of Marx and Engels in the late 1930s, but they only became popular mainly from the 1960s onwards within the Italian *operaismo* and *autonomismo* movements (Marques, 2022). Currently, the writings have been revisited in studies on technology in several areas of study.

Marx begins the second section of the third chapter of the *Grundrisse*, entitled *Fixed Capital and the Development of the Productive Forces of Society*, by explaining that in the newborn capitalism science becomes a «productive force», assuming a role that is foreign to the worker, being linked to the machine itself[17]. And the machine serves capital accumulation, being a determinative principle for the global competitiveness of large-scale industry and for the conquest of new markets. From this point of view, the invention itself also became a «business». In more general terms, what is in the *Fragment* is the antechamber of the chapters of Marx's seminal work that we will explore later. But here the German philosopher leads the debate into the realm of the liberating possibilities of technology.

Marx presents how it was not only the development of science itself that gave birth to machine manufacturing, but also the division of labor: it «transforms the workers' operations into mechanical operations, so that at a certain point the mechanism can take their place»[18]. Machine manufacturing replaces artisan and human-centered manufacturing, also exchanging the virtuosity and skill of the craftsman in his craft for simpler and more repetitive tasks. To the point where the worker only exercises the function of mediation and supervision of the machine.

By pointing out the decrease of human labor, the author states that the «only determinative element of value» will lose «qualitative» and «quantitative» importance and will be subordinated to «general scientific work, the technological application of the natural sciences, on the one hand, as well as general productive force resulting from social articulation in total production»[19]. Marx concludes by stating that capital would thus work towards its own «dissolution as the dominant form of

[17] MARX 2011, p. 930.
[18] Ivi, p. 940.
[19] Ivi, p. 934.

production»[20]. In other words, the advancement of science and technology produces a contradiction, as it expels its value-creating element, which is human labor, from the production process[21]. Further, Marx makes it clear that this transformation, «the exchange of living labor for objectified labor» increasingly depends on the «general level of science and the progress of technology, or the application of this science to production»[22].

At this point, the author glimpses how science was being integrated into society's productive practice and could reorganize living and production conditions, becoming a definitive component in the accumulation of capital. That is, «the appropriation of the general productive force» would acquire greater importance than immediate labor and working time. In this way, the development of machinery, «fixed capital», would then be a demonstration of the accumulation of knowledge transformed into productive force, driven by the «General Intellect». This term – which was borrowed from other utopian socialists contemporary with Marx and is cited only once – signifies precisely this collective and social dimension of the transformation of science into a type of productive force. And he emphasizes that the machines produced are not products generated by natural evolution, but rather from «human industry; natural material transformed into organs of human will over nature or of its activity in nature»[23].

From this point, the «theft of other people's labor», which is the basis of «current wealth», expressed by the purchase of labor power by the bourgeoisie, would become «miserable» in comparison with the «newly developed foundation, created by means of large-scale industry itself». In this line of thinking, Marx expresses that the capitalist mode of production would be the creator of the internal possibilities of overcoming itself, by moving from the exploitation of labor power to the increasingly intensive application of science and technology. And he exemplifies that in an hypothetical future where the wealth of a nation could be measured by the amount of «time available» to individuals and society in general, and

[20] *Ibid.*
[21] MARQUES 2022.
[22] MARX 2011, pp. 940-941.
[23] *Ivi*, pp. 942-944.

not by its appropriation by a few. And thus «a nation would be truly rich when it works 6 hours instead of 12»[24].

The idea of a society based on "free time" was already presented in the same text from *The German Ideology* mentioned above. In it, the idea of individual development was placed in an imagined future that was nominally «communist». In which «each person does not have an exclusive field of activity, but can perfect himself in all the sectors that he pleases», as he would be free from the social division imposed by a «foreign power», the opposition of «his own unified power» [25]. Although technological development is not directly mentioned in this passage, it is clear that the line of thought goes in the same direction of liberation for the development of individuals through activities such as «artistic, scientific training, etc.» that is mentioned in the *Grundrisse*[26].

Here, we differ from interpretations that classify the text as "romantic", although the view that the passage is a speculative exercise rather than a prophecy is accurate. It is precisely from this perspective, along with a deeper empirical analysis of the conflictual dynamics within capitalist factories, that we will explore the major works of Marx and Engels and their pessimistic view of technological development.

2.2. The technological question in Capital and its application in large-scale industry

Marx's ideas change significantly between the *Grundrisse* and the final version of *Capital*. The potential for workers' liberation is replaced by detailed descriptions, supported by empirical data and various reports, of the use of machinery in factories under capitalist conditions. This change occurs due to the circumstances Marx was facing and the development of his research, since during the writing of the manuscripts,

> «Marx did not had yet a clear distinction between abstract labor and concrete labor; he did not distinguished yet between value and exchange value, although

[24] *Ibid.*
[25] MARX 2007, p. 38.
[26] MARX 2011, p. 942.

he already distinguished between value and use value; he had problems with the notion of constant capital, privileging the idea of fixed capital; and, most importantly, he did not had yet an adequate concept of relative surplus value»[27].

In other words, we can understand that among the factors contributing to the author's change in position is a greater methodological refinement in his analysis, as mentioned. Marques also highlights that another fundamental aspect of the German philosopher's change in position was the fact that the international economic crisis at that time came to an end, «and the capitalist production emerging from it gained strength»[28].

Another important point, highlighted by Roberto Finelli, is the evolution of the terms *Technologie* and *Technik* mentioned in Capital – an aspect that is related to the methodological evolution we mentioned. Finelli argues that one origin of the Marxian view of technology derives from the reading of German cameralist's authors. According to Finelli, Marx cites some of these authors in the Manuscripts of 1861-1863, from which he distinguishes between the terms *Technologie* and *Technik*. The first term referred to a disciplinary and scientific view of the production process, understanding it as a «network made of relations between machine, labor force and company command»[29]. The second term dealt with «the capacity of the human species to productively confront, to varying degrees depending on the different historical epochs and economic-social formations, nature as an object of labor»[30].

The controversy between the two terms was settled quickly, mainly due to simplifications made in editions translated into French and later into other languages. But it left a lasting influence on the thinking of Marx and Engels, who eventually mixed the terms in their use, emphasizing the final spelling of *Technik*. In addition to synthesizing different meanings, the technological role and specific techniques for Marx placed the worker and the producer back at the center of the debate - something that had been marginal in the cameralist discourse due to its relegation

[27] MARQUES 2022, p. 60.
[28] Ivi p. 60.
[29] FINELLI 2022, p. 93.
[30] Ivi, p. 84.

to a management function, which was related to state bureaucracy. Additionally, in this shift of the term from cameralism to capitalism, the German philosopher abandons the meaning and the «environmental» and «territorial» references that «preceded or followed the production process» and focuses the reference on the factory environment of that theory[31].

In this way, technological and technical development comprehends more than just machinery, but also the «knowledge and discipline of work practices, with which machinery was intrinsically and objectively connected». In other words, social relations are also an integral part of the Marxian notion of technology[32].

David Harvey also offers another philological perspective for studying the theme of technological development in *Capital*, based on his footnotes and related annotations. The English geographer highlights the way in which Darwinism influenced Marx. Based on a critical reading of Darwin, Marx attempted to present «the history of the formation of the productive organs of social humanity, of the material basis of every particular social organization», in the same way that «Darwin attracted interest in the history of natural technology». In his critical reading, Marx rejects the Darwinian conception «purely natural, without any reference to the role of human action in the transformation of the face of the earth», and replaces it with the idea of «evolution as a process open to historical reconstruction and theoretical investigation»[33]. This approach is well expressed in the following note:

> «[…] technology reveals man's active attitude towards nature, the immediate process of producing his life and, with that, also his social living conditions and the spiritual conceptions that arise from them»[34].

Which is interpreted by Harvey as:

[31] Ivi, p. 86.
[32] Ivi, p. 87.
[33] HARVEY 2013b, p. 352.
[34] MARX 2018, p. 446.

«In a single sentence Marx articulates six identifiable conceptual elements. First of all, there is technology. There is the relationship with nature. There is the actual process of production and, in a rather nebulous form, the production and reproduction of everyday life. Finally, there are social relations and mental conceptions. These elements are not static, but mobile, linked together by the "processes of production" that guide human evolution»[35].

From this analysis, it is important to emphasize the intertwining of different dimensions within the Marxist conception of technology, which ranges from the most immediate production process to social relations and the superstructure of society. In this way, technology cannot be seen as an «abstract and imponderable entity», as Alvaro Vieira Pinto tells us, but the technological phenomena must be understood,

«Being the form of production of some material or ideal product, technique by nature reveals itself to be historical, as it is the aspect of a human process of creation. Technique, a form assumed by the exercise of existence in its creative function, resulting from the conscious capacity to seize the objective properties of things, participates in the general historical process, unfolding at first on the biological, natural plane, and then, with the emergence of consciousness, it becomes social and ruled by purposes. Consequently, technique accompanies, as an index, the historical progress of man's conquest of nature, measures the degree and extent of his capacity to resolve the contradictions he faces, but is in no way the foundation, much less the driving force, of the productive process»[36].

This passage, located in his posthumous work, *The Concept of Technology*, dialogues directly with the note analysed in *Capital*, although it does not cite it directly but condenses the interpretations of the different authors presented so far. That the Marxist vision of technology invites us to a more integral approach, a component of a totality, and discards possible deterministic or fatalistic views, or partial views of the conception of technological development in Marx. It is within this prism that the passages from *Capital* analysed in this article need to be understood.

We can say that in Capital there is a negative view of the application of machinery, commanded by the bourgeoisie within capitalism. But

[35] HARVEY 2013b, p. 355.
[36] PINTO 2008, p. 346.

always highlighting the last words of this statement: we are talking about the internal content of a determined mode of production. In the pages of chapters 12 and 13, Marx details how manufacturing subsumed the individual worker under the collective worker, transforming what were natural and spontaneous relations of cooperation into a technical necessity for greater accumulation. So, at first we had social relations that called for a new arrangement of productive forces, in which knowledge moved away from the workers who had produced it and passed into the hands of capital.

> «In summary, in large-scale industry, capital frees itself from dependence on the worker's knowledge when the machine system becomes an instrument for the real subsumption of labor to capital. The subject-object relationship is inverted, that is, the knowledge materialized in the machinery begins to dictate the form and rhythm of the work process».[37]

From this point onwards, large-scale industry produced «new conditions for the domination of capital over labour»[38]. It was at the same time an element of historical progress and the constitution of society, and new means for the exploitation of workers. In the transition to machine manufacturing, the artisan's experience gave way to the systematic planning of fractional activities, and the old artisanal workshop became a kind of machinery, in which workers were the cogs. In other words, the centrality of the human factor in the production process was interrupted there, and together with its «anthropocentric» and «anthropomorphic» structuring based on the *metiér*[39]. From this emerged a second moment, in which the productive forces stimulated a new set of specifically capitalist social relations.

Inside the chapter 13 Marx details how the replacement of workers by machines did not bring the "liberation" of the workforce for other activities, but the opposite. Workers who were laid off from manufacturing production lines found new and more precarious positions in large-scale industry. Furthermore, due to the increase in positions caused by

[37] MARQUES 2022, p. 58.
[38] MARX 2018, p. 438.
[39] FINELLI 2022, p. 87.

the exponential growth of large-scale industry, and the relative ease of operating the new machines due to the more fragmented tasks, women and children were also required to participate in the production process, most of the time in worse conditions and with lower wages than adult males. Alessandroni[40] also reminds us that Marx noted the effect that the capitalist industry in Europe had on the colonies, with the increase in slave labor on cotton plantations in the United States to supply them.

It is important to remember that Marx is far from splitting history into before and after the machine. He comments on how in history there have always been inventions, and, more generally, tools and devices that facilitated the work process, which were naturally selected – in a logical sense «according to their proportionate improvement». He said, for an example, that the steam engine had been invented at the end of the 17th century, and «did not provoke any industrial revolution»[41].

Mechanized labor emerged on an «inadequate» material basis, and from there it developed until it revolutionized this base, which already existed, creating «a new one for itself, more appropriate to its own mode of production»[42]. The steam engine was called into necessity as the social division of labor had already developed to the point of requiring it, and workers were gradually replaced by the machine tool – or needed to be replaced in the course of social struggles or crises. Thus, human labor then became an appendage of the machine, different from what it was in the previous manufacturing period. In view of this, the clash between the new productive forces and the old social relations was inevitable, and the use of machinery on a large scale «did not take any step forward in economic-social democracy»[43], that is, in the advancement of the conquest of social rights, or liberation from capitalism.

Obviously, we cannot believe that before large-scale industry there were no revolts against labor relations, but Marx points out that it is only with the advent of machinery that workers turn «against the means of labor itself», whether in individual actions such as sabotage or collective

[40] ALESSANDRONI 2021, p. 38.
[41] MARX 2018, p. 449.
[42] Ivi, p. 456.
[43] ALESSANDRONI 2021, p. 38.

actions like strikes and riots[44]. This occurred not because of some natural characteristic of the machine, but because it was handled as a «hostile power» against the workers by the dynamics of capital[45]. The knowledge produced by workers is being used against their own class to increase productivity, that is, increasing relative surplus value in the production process and reducing the labor force employed.

Marx points to a victory of capital over workers in this immediate conflict. By stating that it would be possible to «write an entire history of the inventions that, from 1830 onwards, emerged merely as weapons of capital against workers' uprisings»[46], the author alludes to the need to overcome the capitalist mode as a definitive solution. Harvey comments that, in this context, the role of social struggles would be a «balancing factor» to slow down technological changes, while retaliation by capital prevented any more substantial change in society. Therefore, these struggles were by no means negligible, and in some way, they also served capital by slowing technological changes and preventing instabilities that could collapse the system itself[47].

The fact is that these struggles constituted a central theme in the social and political history of European countries that had a capitalist process of industrialization. Even though it was a process with ups and downs and several contradictions, a kind of cooperation was forged between capital and labor, that is,

> «Capitalists had to compromise, partly because of the sheer tenacity of the working class struggle in the factory, but also because the new production processes, rather than reducing the worker's power to fight against capital, increased, by their very complexity and interdependence, the capacity for sabotage and disorder. Capitalists therefore had to "manufacture consent" and arouse the voluntary cooperation of workers. The net result was to transform the "contested terrain" within the workplace into a "terrain of compromise"»[48].

[44] MARX 2018, p. 499.
[45] Ivi, p. 508.
[46] *Ibid.*
[47] HARVEY 2013a, p. 180.
[48] Ivi, p. 174.

In this sense, the dimension of the class struggle comes into play as a category that takes part in the productive process. Including technological development itself, through direct conflict between classes – we repeat Harvey: in a non-negligible way. It is from this conflict that workers take their part in the development of history in relation to the totality of the mode of production. And it is, in a certain way, in relation to the cooperation between capital and labor that Gramsci presents us with Americanism and Fordism as a hegemony that led to the aforementioned cooperation.

3. *The question of technological development and hegemony: the dialectic between productive forces and social relations*

In the works of the Italian philosopher Antonio Gramsci, the issue of technological development is not a central debate, although it is recurrent. The theme appears mainly related to the question of the State and the overcoming of capitalism, especially after the impact of the Russian Revolution of 1917, and is more concentrated in some of his *Prison Notebooks*. In *Notebooks 10 and 11*[49] are three important debates. The first involves the analysis of Benedetto Croce's philosophy; the second debate is Gramsci's critique of Nikolai Bukharin's *Popular Essay on Sociology*; and the third is the subsequent text, *Science and Scientific Ideologies*. In *Notebook 22*, the debate on the technological issue appears in the text *Americanism and Fordism*[50]. But the theme also appears in a dispersed manner in his articles for newspapers, especially for "L'Ordine Nuovo" during the period known as the Red Biennium of Turin, between 1919 and 1920, a period characterized by intense social struggles and by his "direct actions", such as factory occupations, which ended with the victory of fascism.

3.1. The definitions of productive forces and science in the controversy surrounding the «technical instrument»

[49] Published together in Brazil. See in references: GRAMSCI 2015.
[50] GRAMSCI 2007.

In the pages of the *Popular Essay*, Gramsci points out how the concept of «technical instrument», which is used in Bukharin's work to refer to the «material forces of production» and the «set of social relations», is incorrect[51]. The controversy revolves around an incorrect translation of the preface to Marx's *Contribution to the Critique of Political Economy*, written by Achille Loria[52]. Gramsci highlights how Benedetto Croce had already reacted to that substitution of concepts, pointing out that there was a «history of technology» in Marx, but that there was nothing written that could affirm that the technical instrument was the «ultimate and supreme cause of economic development» [53].

The exchange of terms would cause practical and methodological problems, based on a reductionism of all social relations and productive forces in the machinery or tools itself. According to Gramsci, if all disciplines were defined by their instruments, there would be countless difficulties in characterizing some activities – whether in a more pragmatic way, or philosophically, as structure or superstructure. The author gives the example of geology, whose instrument would be the hammer, which by itself could not explain the history and evolution of this discipline in question, as it was a common tool and broader and less complex than the evolution of the field; and another example would be mathematics, which not only does not depend on any instrument, but its operations become an instrument of all other natural sciences at the same time. In other words, it is not possible to reduce the history of sciences to the history of their particular instruments.

Even though language was one of Gramsci's central themes throughout *Notebook 11*, the substitution of terms for him was not just a semantic problem in this case. In his writings on Croce's philosophy, Gramsci points out that Loria was the «promoter of a widespread deviation from the philosophy of praxis»[54], referring to the incorrect translation of Marx already cited, in a passage that deals precisely with this notion of technical instrument. This "deviation" influenced the conception of other

[51] GRAMSCI 2015, p. 158.
[52] Ivi, p. 139.
[53] Ivi, p. 159.
[54] Ivi, pp. 360-361.

thinkers, such as that of the liberal Luigi Einaudi, and for Gramsci his errors would be the same as Loria's, of considering as development of the productive forces only the development of the technical instrument. In a passage in which Gramsci criticizes Einaudi's view, we have a description of what his own view on productive forces would be:

> «[...] considering that the productive forces are, for the critical economy, only material things and not also the social forces and relations, that is, human, which are incorporated into material things and of which the right to property is the legal expression; [...]»[55].

From the above quote, with the reading of *Notebooks 10 and 11*, it is possible to understand that Gramsci's vision of productive forces and the technical phenomena itself, has a broader and more integral dimension. It also connects with social relations, moving away from a merely "economicist" or reductionist dimension. In other words, an understanding in clear accordance with the *Critique of Political Economy* cited there, but also with Marx's writings in general.

Returning to the *Notebooks*, we can understand that it is at this moment that the notion of productive forces, which includes techniques, connects with that of science for the Sardinian communist. For Gramsci, science is constituted from the union of an objective fact with one or a set of hypotheses that are historically conditioned – therefore they are also political, and can overcome the mere objective fact itself[56]. Technical instruments and machines would then already be the «application of the sciences themselves», while the tools of science would be of an «intellectual nature»[57].

For Gramsci (2015), such objective facts and the system of hypotheses can be apprehended through processes of abstraction contained in the scientific methodologies themselves, and with this it is possible that «a social group can appropriate the science of another group, without accepting its ideology»[58]. Here a direct connection can be made with

[55] *Ibid.*
[56] *Ivi, p. 177.*
[57] *Ivi, p. 140.*
[58] *Ibid.*

Marx's *Grundrisse*, at the point where we speak of the possibilities engendered by technological development. It is in this that experimental science «has been, until now, the terrain in which such unity has reached its maximum extent: it has been the element of knowledge that has contributed most to unifying the spirit, to making it more universal»[59]. In Gramsci, «the theme of experimental science intersects with the theme of translatability in relation to the question of cosmopolitanism»[60]. This means that there are possibilities of translating ideas, concepts, and even applications of science itself between different social formations through a process of *traduzione*, given that these are processes driven by political action and historicized. And this is precisely where we must focus to better understand the author's reading of *Americanism and Fordism.*

3.2. The possibility opened by technological development: Americanism and Fordism in a perspective of *traducibilità*

It is clear in *Notebook 22* that Gramsci was interested, in a certain way, in finding an Americanism that could be adapted to the masses, taking into account both the development of social relations and the productive forces. The author makes a cold analysis of the possibilities of incorporating the objective improvements that were observed in the Fordist mode of production, in relation to what he saw in the industries of the old continent, where the parasitic classes were interested in the fast capture of industrial surplus value, which did not return as an investment.

Gramsci wanted a modern system of production that would produce a new worker and would be carried out without the "heritage of misery" from the old modes of production. Especially regarding the legacy of the old systems, in Europe the author refers more centrally to the medieval system and its clashes with the new. What happened there was that the attempts to introduce the Fordist production line were driven by the «old plutocratic layer», including the clerical classes and the aristocracy, who sought to reconcile the outdated social structure with a modern form of

[59] GRAMSCI 2015, p. 135.
[60] SCLOCCO 2022, p. 227.

production. In this way, Europe wanted to «make an omelet without breaking eggs», because the dominant classes wanted the benefits of the «modern» Taylorist system without questioning its archaic social structure, including «its army of parasites», which did not reinvest the profits obtained from the exploitation of workers in the modernization of production systems[61].

This perspective reinforces the "progressive way" that Americanism could have had in that period in relation to the old continent, without losing sight of the "modern miseries" created by capitalist exploitation. For the Sardinian communist, the Ford method is «rational», that is: it has a progressive element (comparatively, as we have explained) and should become widespread. However, for this to occur, a long process is necessary in which a change in social conditions, customs and individual habits must occur, which cannot be done only through «coercion», but also through «self-discipline» and real gains for workers[62], or rather, through consensus production and by the working class.

What happened under Fordism was that adaptations to new work methods were implemented through coercion by the ruling classes and so-called «puritanism». These practices aimed only at deepening coercive discipline to ensure that workers were alive, day after day, to continue their work routine with maximum productivity. This included prohibitions, such as those of alcohol and drugs, to the intervention on sexual routine of workers, which were internal to their private lives, through inspections[63]. These coercions, which aimed to develop psychophysical balance, were external to the worker and ended up being harmful precisely because they were aligned with the logic of capital accumulation.

For Gramsci, the link between "consensus" and "coercion", which was the basis of political hegemony, could be adjusted and internalized if it were proposed «by the worker himself and not imposed from outside, by a new form of society, with appropriate and original means»[64]. Here we can make a connection with the Italian philosopher's articles on the

[61] GRAMSCI 2007, p. 242-243.
[62] Ivi, p. 273.
[63] Ivi, pp. 249-250.
[64] Ivi, p. 267.

organization of factory councils, which bring the notion of workers as the producers.

Technological progress through large-scale industry should be achieved by considering both the productive forces and social relations in an interconnected manner. For this to occur, there should be a combination of self-discipline and persuasion. Its content should be the improvement in the quality of life, «also in the form of high wages, that is, the possibility of a better standard of living» and «the possibility of achieving a standard of living appropriate to the new modes of production and work». In the case of Ford's Americanism, these aspects were only guaranteed to a working-class aristocracy and were not generalized, but were related to the monopoly capacity of certain companies: «monopoly profits correspond to monopoly wages»[65].

For Gramsci, «the technical element», which included managers to the workmen, should "predominate" over the «capitalist» element, it means: «the alliance between captains of industry and bourgeoisie should be replaced by a bloc of all the elements directly effective in production». Such elements would be the workers capable of organizing themselves in unions and councils to build the «productive corporation»[66]. At the same time, when he spoke of the day work routine, it is clear that the new industrial techniques did not frighten Gramsci or the workers' movement (in an abstract way). Therefore, as for Marx, a "*Luddite*" vision of historical development is not at stake here. He stated that the Italian specialized workers, «[…] they never opposed innovations aimed at reducing costs, rationalizing work, introducing more perfect automatisms and more perfect technical organizations of the company »[67].

In the excerpts cited above, we can see again how the factory organization itself appears as a technical issue, which ends up being mixed with the political issue, or rather, in the political use – and direction and control – that is made of technology. Here we see a reading very similar to Marx's in *Capital*, which brings out the difference between what would be the machine and automation and their application within a political-

[65] Ivi, pp. 273-275.
[66] Ivi, pp. 255-256.
[67] Ivi, p. 257.

economic system, which, as we have already discussed, would be a weapon against workers.

In other words, Gramsci understands that for the implementation of Americanism to be beneficial to workers, the entire society has to be transformed. After all, «new work methods are inseparable from a certain way of living, thinking and feeling life; it is not possible to achieve success in one field without obtaining tangible results in the other»[68]. Here we also return to that point in *Notebook 10*, the impossibility of separating the technical instrument from social relations.

We add to our analysis the interpretation of Losurdo, who comments that the pages of the work «do not speak only of the United States, but also of Soviet Russia, and perhaps deal more with Soviet Russia than with the United States»[69]. Gramsci's balanced, and even positive, view of modern means of production cannot be seen as an abandonment of his communist positions. In fact it is an understanding of the need to achieve socialism – which was embodied at the time by the USSR under the leadership of the Bolshevik Party – to «assimilate all that is precious among the achievements of science and technology»[70]. That is, to combine power and «Soviet administrative organization with the most recent advances of capitalism»[71]. In short, Gramsci aimed for an Americanism in a perspective of «*traducibilità socialista*»[72].

4. *Conclusion*

At the end of the analysis, we can confirm that there are oscillations in marxist thought on technological development. As Marx was observing concrete situations, his analysis evolved, his methodology was refined and even his concerns were transformed. At the same time, we disagree with the attribution of a "romantic" thought to the young Marx, given that his concerns with overcoming capitalism were already present before

[68] GRAMSCI 2007, p. 266.
[69] LOSURDO 2017, p. 33.
[70] Lenin *apud* LOSURDO 2015 p. 211.
[71] Gramsci *apud* LOSURDO 2017, p. 34.
[72] SILVA 2013, p. 10.

the writing of the *Fragment on Machines*, and remain active in *Capital*, intertwined with an analysis of a certain mode of production and its overcoming. We also disagree with the idea that the debate on technological development is partial and subordinate, both due to the priority with which it is viewed during *Capital* and the broad dimension with which it is related in other works.

We add to the debate that technological development in the *Grundrisse* should be understood as a materialist position with a strong moral dimension. It serves as a reminder that Marxism's general concerns were specifically with workers and the overcoming of the capitalist mode of production. In this sense, the emphasis we should give to the interpretation of the General Intellect is less on «redistribution» (in this case of knowledge and science accumulated by society) and more on «recognition», in the key to the interpretation of Marxism that Losurdo[73] gives to the expression. We would also like to add that we should consider workers as producers of this knowledge that should be reappropriated by the class.

Furthermore, a brief parenthesis should be added here too. If considering Marx a determinist is a mistake, much less is there in Marx and Engels a "palingenetic" idea, or translated in a current key as "anti-modernity". The destruction of machines that occurred in the revolts within the factories was seen by the author as a naive attitude, which should be aimed at the economic system as a whole. According to the authors: «the communist revolution turns against the form of activity existing until then, abolishes work and overcomes [*aufhebt*] the domination of all classes by overcoming the classes themselves». From this, the liberation of each individual is achieved, and from there history fully develops as world history[74]. Thus, we agree here with Emiliano Alessandroni, who understands that «the direct identification between machinery and its capitalist use, which is at the basis of the Luddite movement, was, albeit with the opposite judgment, the same made by the ideologists of positivism». While for Marx, the main challenge of the working class is «to take possession of the machinery on a theoretical and practical level, without

[73] LOSURDO 2015.
[74] MARX-ENGELS 2007, p. 42.

internalizing its ideology and the capitalist use historically connected to it»[75].

Aware of this challenge, unlike his interlocutors, Gramsci does not adopt a perspective that privileges the economic dimension in the analysis of the technical question. In an earlier preparative fragment on instruments, written in *Notebook 4*, he clarifies: «logically and chronologically, we have: social structure – superstructure – material structure of the superstructure»[76]. There, Gramsci highlights the «double phenomenology» of technical instruments, which can be simultaneously structure and superstructure, within the social totality that gives rise to them. Thus, we can conclude that «strictly speaking, we are faced with the centrality placed by Gramsci […] in the correlations of forces that emerge from the historical bloc»[77], which outline the dispute over the development and appropriation of science and technology – a process that reflects the class struggle.

The Sardinian communist captures the dimension of the possibility left open by the founders of historical materialism, which became essential especially after the Revolution of 1917. With this in mind, in our interpretation, there is in Gramsci's work, and especially in *Notebook 22*, a theoretical proposal for re-appropriation – without naming it – of what we could continue to call the General Intellect, according to the term created by Marx and still debated. This proposal intersects with the dispute and conquest of hegemony, within a perspective of *traducibilità* of sciences, and does not leave room for a determinism of the development of productive forces without considering the change in social relations and the conquest of power.

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