MARXISM AND ENVIRONMENTAL SCIENCE

MARX'S REPRODUCTION SCHEMES, MILITARISM AND THE ENVIRONMENT

1. Introduction

The topic of this essay are Marx's befamed reproduction schemes, presented in the last part of *Capital II.* Marx constructed these reproduction schemes to show how complex the process of social accumulation really is. In drafting them, he was inspired by the efforts of his physiocrat precursor Francois Quesnay, who in the 18th century had devised a reproduction scheme, which consisted of one sector which the author considered 'productive', being the sector of agriculture, and a sector operated by, as he called it, the 'sterile' class of industrial artisans, being the manufacturing sector. Quesnay quite obviously believed that the production of food and of other agricultural crops, such as cotton, formed the very cornerstone of human progress (1). Marx's reproduction schemes were structured differently, for Marx based his schemes on the differentiation between two major Departments' of Production, each consisting of a large number of economic sectors, each Department manufacturing a distinct category of commodities, being means of production **(MP**), and means of consumption (**MC**). Department I brings only the first category of goods onto the market, whereas Department II exclusively produces the second mentioned category. Further, contrary to Quesnay, Marx discussed both a situation of simple and of expanded reproduction (2). The first situation, of *simple* reproduction, is essentially a hypothetical condition, a condition where the size of the total social product, and that of each Department, remains the same during consecutive cycles of production. The second situation, that of *expanded* reproduction, is a situation which more closely resembles the real-'life' situation of capitalism, of growth in cycles. Below, I will very briefly review Marx's reproduction schemes, and try to summarize their key limitations. Although Marx's schemes had real scientific value, his schemes failed to address the role of the militarist state and of arms' production, as also the question of the exploitation and abuse of nature's wealth.

2. From Simple to Expanded Reproduction

The first point to be noted regarding both Marx's scheme for simple reproduction, and regarding his scheme for expanded reproduction, is that they are squarely based on his own theory of value. The labour theory of value holds, as indicated before (3), that the commodity **C'** which is brought onto the market by capitalist entrepreneurs, has three value components, i.e. **c, v** and **s**, which letters refer to constant, variable and surplus capital. The same, in Marx's view, holds for the social product for the two Departments, being the composite of the commodities produced by all the individual entrepreneurs in the respective Departments. This social product too is designated as **C'**, and consists in the three value parts already mentioned. Again, whether we presume a hypothetical situation of simple reproduction, where the total volume of production in the two Departments, and the total product of the two Departments combined remains the same

through consecutive cycles of production; or presume that there is an accretion in the size of the social product in consecutive cycles of production – in both cases the outcome of production in the two Departments is composed of three value parts. In all cases, production according to Marx's theory, emanates in a product which embodies surplus value **s** , on top of the value incorporated in the commodities bought at the start of the production process.

Further, Marx is very clear about the basic points of difference between simple and expanded reproduction. In the first case, the whole surplus is *unproductively* consumed. This means, in his scheme of things, that both the surplus produced by the entrepreneurs in Department I (**MP**), and the surplus produced in Department II (**MP**) is spent by the entrepreneurs, who are the owners of the surplus under capitalist conditions of production, on luxury items, i.e. on items which are manufactured by entrepreneurs located in Department II (**MC**). Not a penny is re-invested into enlargement of production, both **s** in the commodity product **C'** of I, and **s** in the commodity product **C'** of II, are wasted by the industrialists on the maintenance of a privileged life-style (4). Not so in the case of expanded reproduction. Here a differentiation takes place between two parts of the surplus **s**, and such occurs both for the surplus value incorporated in **C'** (I), and for the surplus value incorporated in **C'** (II). One part of both continues being spent by the owners on spending luxury items, - the other being re-invested in an expansion in the scale of production. Thus, under conditions of expanded reproduction, **C** bough at the start of the circuit is larger during each consecutive cycle of production, and both the quantity of **C (MP**), the means of production, bought, and the quantity of **C (L**), labour power, grows steadily.

Now, these points of differentiation between simple and expanded reproduction make for different equations that need to be maintained, in order to ensure that capitalist production can occur smoothly. Under conditions of simple reproduction, there first needs to be equivalence between the value of the output of I (**MP**), and the quantity of value invested in constant capital in each department of production. In short, I **C'** (**MP**) = I **c** + II **c**. Again, since all surplus in both Departments is spent on luxury goods, and thus flows to II (**MC**), and since the value part **v**, the variable capital required to buy daily necessities, too flows towards Department II (**MC**), there also needs to be equivalence between the value of the social product of II, **C'** (II), and the value parts **v + s** which are spent, respectively created, in the two Departments. In short, II **C'** (**MC**) = I **v + s** + II **v+ s**. Thirdly, there is an exchange equation to be maintained between the value of the commodities which flow from Department I to Department II, and the value of the commodities flowing in reverse direction, from II to I. This exchange equation logically poses the equivalence between those value elements which are not absorbed within the respective Departments, being variable and surplus capital in the case of I **(MP**), and constant capital in the case of II (**MC**). This equation, then, is the equation I **v + s** = II **c**. As part of his presentation, Marx offers mathematical figures to bring out how this works (5).

Under conditions of expanded reproduction, none of the equations which have just been described, continue to hold validity, none would be helpful towards ensuring

that expanded reproduction can occur. Instead, a reproduction scheme which is to bring out how a gradual process of accumulation, where each cycle of production results in a larger total social product, can occur, is ruled by a different logic. In the last part of *Capital II,* Marx records several quantitative examples for expanded reproduction. Rosa Luxemburg, in her insightful review of Marx's reproduction scheme, argues that expanded reproduction can only be effective, if it be based on a *double disproportion*. On the one hand, the size of means of production created in each cycle of production (I **C'**) must be *larger* than the amount of constant capital that had, during the given production cycle, been invested in constant capital in the two Departments (I **c** + II **c**). On the other hand, the amount of consumer goods produced during each cycle of production (II **C'**) must be *smaller* than the amount paid out in wages, and the aggregate surplus value produced (I **v** + II **v** + I **s** + II **s**) in the given cycle. These double disproportions again can be expressed via mathematical figures, figures with which it is possible to juggle, which one can manipulate. Nevertheless the example cited brings out that a capitalist system with two Production Departments, both being fully dependent on the market, *can* work (6).

3. Some Key Limitations

Having summed up in a nutshell Marx (and Luxemburg)'s conceptualisation of simple and expanded reproduction, let's now try to briefly sum up the essential limitations of his scheme. To start, and in line with the then prevailing *laissez faire* views of bourgeois economists, Marx presumed that the Departments of Production are all market Departments, meaning that all exchanges of commodities necessarily need to take place between independent, market actors. In reality, however, the world capitalist system, more particularly the American economy, through much of the second half of the 20th century has consisted not in two, but in three Production Departments, the third Department being that for the manufacturing of arms and armament systems. This Department has been called the Department for production of the Means of Destruction (**MD**). Contrary to the commodities **C'** which are manufactured in I and II, armaments manufactured in III do not generally flow to participants of I and II (or III), but instead flow towards the domestic state, and/or foreign states. Whereas the entrepreneurs based in III do buy means of production and labour power on the market, whereas the components of III **C (MP/L**) are procured from I and II, the output of Department III is not exchanged for any value parts produced by Marx's two Production Departments. Hence, writers who have analysed the special characteristics of military production, have termed Department III (**MD**) a *non-reciprocal* Production Department (7).

Now, Marx can of course not be blamed for having ´ignored´ Department III, since the military sector of the US economy has only obtained its role as Department long after Marx´s death. However, there is another 'actor', whose role within the process of social accumulation needs to be considered, namely the capitalist state. From the period of the rise of capitalism in Europe, the state has played an economic double role, which has always been very consequential. On the one hand, the state became a revenue holder, i.e. a holder of a part of the social surplus manufactured in the various industrial sectors. On the other hand, the state from the time of the Italian city states onwards, took upon it

the task of organizing military production, in production units known as *arsenals*, where the division of labour between different skilled artisans was from early on well developed (8). Presuming we can speak of 'Departments of Production' when referring to the characteristics of the system in the period of the rise of capitalism, we have to admit that a part of the surplus of the commodity product **C'** of I and II got rechannelized, redirected, towards the state, and that the state gave this section of the surplus a different destination than the various destinations of the surplus which are pinpointed in Marx's schemes. Surely, throughout the history of capitalism the state has been a key economic actor, and to ignore this fact when discussing the social accumulation of capital is simply wrong.

A second major limitation of Marx's schemes concerns the role of nature. Neither nature's role as source, nor the role of nature as dump, is visible in Marx's diagrams on simple and on expanded reproduction. As to nature as source – Marx was not entirely unaware that nature contributes its wealth to the capital circuit in certain sectors. For instance, in the first part of *Capital II*, when discussing the circuit of commodity capital, Marx stated that a non-commodity element enters production in the agricultural sector, meaning that seeds were not procured from the market, as was the case with other means of production, but re-entered the same labour process out of which it came in the shape of a commodity (9). Again, in the section of *Capital II,* where he analyzed the 'turnover time' of capital, Marx briefly discussed the case of the mining industry. In the case of mining, such as the mining of copper, no raw material is used at all, because the subject of labour in the mines is a product of nature, which 'must first be appropriated by labour' (10). Yet no matter how sharp these observations, they had no impact on the overall reproduction schemes which Marx drafted to explain the nature of the capitalist system. The given cases of dependence on non commodity elements were treated as exceptions, whereas Marx projected all production in Department I and II as invariably being dependent on the purchases of commodities available on the market. As I will argue in a subsequent Chapter - the limitations of Marx's schemes can only be overcome by projecting the mining sectors as a separate subdivision of Department I (11).

Lastly, the use of nature as a dump too needs to be taken account of, when analysing the process of social accumulation. In my essay on the Marxian labour theory of value, I have already analyzed Marx's general formula for the outcome of capitalist manufacturing, the formula **c + v + s.** As stated then, the presumption underlying this formula was that all production results in added value incorporated in the final product, the commodity **C'**. Yet capitalist production processes do never emanate only in commodities with added use- and exchange value, for each and every production process has one or more side-effects, - side-effects which need to be depicted as negative value-outcomes (**– *wu/we***) alongside the commodity with surplus value. And precisely since the production of non-commodity waste, containing disvalues, is a general feature of capitalist manufacturing, this aspect cannot be completely ignored when discussing the social accumulation of capital. One could agree to temporarily abstract from the implications of accumulation for nature, just as Marx abstracted from key aspects relating to expanded reproduction, in his first round of discussion, on simple reproduction. Yet ultimately, a scheme which projects the outcome of Department I and II as **c + v + s**, does

not do justice to nature; it tends to grossly overlook the ways in which entrepreneurs abuse nature as a dump.

4. Conclusion

In this essay I have reviewed in a nutshell, and described key limitations, of Marx's reproduction schemes, presented in *Capital II.* Following Quesnay, Marx sought to highlight the complexities of *laissez faire* capitalism. Towards this end, he devised original concepts and formulas, in line with the concepts and formulas which he had already introduced when presenting his labour theory of value (in *Capital I),* and when presenting his analysis of the individual circuit of capital. Marx's reproduction schemes were proposed at a time, i.e. in the 19th century, when periodic crises had become a regular feature of the capitalist system, and when few economic theoreticians cared to admit that these crises were the logical consequence of market capitalism. Marx showed that smooth accumulation required the maintenance of precise exchange equations, which were not automatically forthcoming. Yet even admitting the critical significance of Marx's schemes, in the context in which they were drafted, - it is necessary to recognize the limitations of his theoretical work. First, as stated above, Marx ignored the role of the state and of military production. Yet the state has from the dawn of capitalism in Europe played an active role in the process of social accumulation, promoting an expansion in the scale of production, amongst others via the manufacturing of arms in the *arsenal.* Further, in the hegemonic economy, that of the US, the military sector in the decades of the second half of the 20th century has functioned as a Production Department, the Department of the Means of Destruction I (**MD**). Moreover, Marx's reproduction schemes completely 'overlooked' the role which industrial entrepreneurs, operating to maximise their surplus value, their profits, demand Nature to play. The reproduction schemes neither brought out that all industrial production is predetermined on the existence of nature's resources, resources which are freely drawn upon to supply all entrepreneurs; nor did the schemes bring out how nature was and is relied on to serve as a dump. Given these key limitations, there is a need to rethink Marx's reproduction schemes.

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October 14, 2005

References:

(1) on Quesnay´s reproduction scheme, see eg. Shigeto Tsuru's summary in Paul Sweezy, *The Theory of Capitalist Development* (Monthly Review Press/K.P.Bagchi, New York, USA/Calcutta, India, 1991), p.365; also Frank Dietz/Wim Hafkamp/Jan van der Straaten, *Basisboek Milieu-Economie* (Boom, Amsterdam/Meppel, the Netherlands), p.27;

(2) Karl Marx, Capital. *A Critique of Political Economy. Volume Two* (Progress Publishers, Moscow, USSR, 1967), Chapter .XX, p.396, and Chapter XXI, p.493;

(3) see the Chapter ´Towards a Labour-Nature Theory of Value´;

(4) ibid, p. 401; also Rosa Luxemburg, *The Accumulation of Capital* (Monthly Review Press, New York. USA, 1964, p.76;

(5) Karl Marx (1967), op.cit, p.401; Rosa Luxemburg (1964), op.cit., p.84;

(6) Rosa Luxemburg (1964), op.cit., p.114; here she cited the following quantitative figures for the case of expanded reproduction;

I. 4,000c + 1,000v + 1,000s = 6,000
II. 1,500c + 750v + 750s = 3,000
Total: 9,000

(7) for a discussion on the military sector as Department III, see Ernest Mandel, *Der Spaetkapitalismus. Versuch Einer Marxistischen Erklaerung* (Suhrkamp Verlag, Frankfurt am Main, Germany, 1972), p.255; for an analysis of money production as a case of a non-reciprocal sector, see Rosa Luxemburg (1964), op.cit., p.100/101;

(8) for the history of arms´ production and the role of the state, see for instance Werner Sombart, *Krieg und Kapitalismus* (in German: War and Capitalism – Verlag von Dunker & Humboldt, Muenchen and Leipzig, Germany, 1913); and Fredric Chapin, *Venetian Ships and Shipbuilders of the Renaissance* (Johns Hopkins Press, Baltimore, USA, 1934);

(9) Karl Marx (1967), op.cit., p.65;

(10) ibid, p.199;

(11) see further the Chapter ´The Extractive Industries and the Analysis of Social Reproduction´ below.