# PRODUCT INNOVATION WITHIN THE MARXIAN THEORY OF VALUE AND CAPITAL

Francisco Paulo Cipolla[1]

I   Introduction

In his book Capitalism, Socialism and Democracy Schumpeter argues that Marx´s theory of value is incompatible with innovation because it presupposes perfect competition.[2] According to him, only perfect compecttition could distribute surplus value proportionately to capital advanced, generating equal rates of profit. Innovation, as search for extra-profits is thus seen to be incompatible with Marx´s labor theory of value.

Marxists, on the other hand, have not done much in the way of theorizing on product innovation. This is due to the fact that the debate about technical progress evolved mainly around the issue of the tendency of the rate of profit to fall. This debate took into account process change only, while assuming as given the composition of the social product. One of the few marxists, if not the only one, to take up the issue of product innovation was Lebowitz (1976). Unfortunately, he chose to conceive of product innovation from an underconsumptionist point of view.

This paper derives product innovation from Marx´s theory of value, social need and capital implicit in the Grundrisse and the three volumes of Capital.

I will argue that the drive to decrease production time leads necessarily to changes in the social composition of production, as the increasing buying power which comes with the cheapening of commodities weakens the rate of consumption of some kinds of products relative to others. This approach differs from Pasinetti (1993), for whom increased buying power only shifts demand within a pre-established set of commodities. While for Pasinetti demand determines the changing pattern of production, in this paper demand only signals that capital has to innovate so as to keep the rate of growth of demand compatible with a given rate of valorization. In other words, the social composition of production is not pre-determined.

## II. Product Innovation in the Grundrisse

Marx argues in the Grundrisse that capital is pressed to create new products because the use value character of the product sets a limit to demand. The social need for each commodity represents a limit to the ever present drive to expand value. In other words, use value manifests itself as the limit to the exchange value of the product (Marx 1968, pp. 209-211). It is clear from this analysis that product innovation emerges from the limit that the use value nature of the product poses to the valorization of capital. It is therefore striking that Lebowitz (1976) has chosen to derive product innovation from an underconsumptionist viewpoint. In fact, there is an unavoidable contradiction in his entire argument: the underconsumptionist theory of product innovation requires an ever increasing value of labor power as new commodities have to constantly reshape the standard of living of the workers.  This is at odds with the tendency of capital to restrict workers buying power relative to the social net product implicit in the underconsuptionist aproach.

In the present work product innovation is conceived within the notion of capital in general.

III. The Nature of Capital

Capital is value that seeks its own expansion at a maximum rate per unit of time. Marx´s formula for the circuit of industrial capital immediately reveals the importance of time in the concept of capital:

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        LP
M -- C          . . . . P . . . . C'  -- M'
        MP
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As Marx emphasized, capital is the unit of production and circulation, each one of these two phases requiring a definite amount of time to be executed. Production time encompasses the period in which labor power (LP) uses the means of production (MP) so as to produce new use values (C'). That is, the production period is equal to the duration of the labor process, except in those cases where production processes require the maturation of the product without any intervention of labor. The production period is the time required to transform the means of production into new commodities:

LP

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[1] Universidade Federal do Paraná. Rua Dr. Faivre 405, CEP 80060-140, Curitiba - PR, Brasil.
  E-mail: Cipolla@sociais.ufpr.br.
[2] Schumpeter (1951, p.90 and following).

. . . . P. . . . C'

MP

Circulation time, on the other hand, is simply the time it takes for the commodity form of capital to be transformed into money:

C'  -- M'

The faster the production process, the more rapidly can a given productive capital be used again in order to extract more surplus value. The faster the circulation period, the more rapidly can a given volume of capital generate new value. Thus, the rate of valorization of capital depends crucially on the periods of production and circulation.

Let us define turnover time as the sum of production time and circulation time, that is, the total time it takes for a given money capital to pass through the whole circuit of industrial capital. We can now define the number of turnovers within a period of one year as

$$t = \frac{1}{T_p + T_c}$$

It goes without saying that if the sum of Tp and Tc is equal to one year then the number of turnovers is equal to one. It follows that the smaller the production and circulation periods the greater will be the number of turnovers.

The annual measure for the rate at which capital expands as it goes through its circuit is called the annual rate of profit. If we take into account a pure circulating capital model we can express the annual rate of profit in terms of Tp and Tc. Let us define m as the markup over circulating capital costs. The annual rate of profit ra, can then be expressed as follows:3

$$r_a = m\frac{1}{(T_p + T_c)}$$

The rate of expansion of value can be said to be a continuous struggle against the time it takes for capital to go from Productive Capital to Commodity Capital and then from Commodity Capital to Money Capital 4. The strive to reduce the time it takes to go through the valorization circuit is the realm of innovation from the point of view of capital. Innovation appears therefore to emerge from the nature of capital as value striving for maximum expansion per unit of time. To the extent that innovation is implicit in the nature of capital, it can be said to be independent from competition.

IV. Productivity and Product Change

We shall now explore the relationship between production time and circulation time. The decrease in production time may affect circulation time in two opposite ways. The decrease of production time implies that the amount of labor required to produce a given commodity has been reduced. Inasmuch as this results in the cheapening of commodities, it tends to increase the rate of consumption per unit of time. This increase in the rate of consumption per unit of time is equivalent to a decrease in the circulation period.

Yet, the cheapening of commodities raises real income. Insofar as the rise in real income leads to a decrease in the rate of consumption of certain commodities, it causes also an increase in the circulation time for those capitals producing those commodities. To the extent that rising real income slows down the consumption rate of certain goods, it has a negative effect on the annual rate of profit of capitals engaged in the production of those goods. We can, therefore, associate production time with supply conditions and circulation time with demand conditions.5

Production time determines supply conditions insofar as it determines the social value of commodities. Demand, on the other hand, is basically defined by the notion of social need (Marx 1976, p.183). Marx defines social need as "the quantity of commodities that society is capable of paying at the ruling social value" (idem, p. 182).6 He goes

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3 The above expression for the profit rate is based on Foley (1986, chapter 5). For the sheer purpose of simplifying, I have chosen to exclude here the time required to convert *money capital* into *productive capital*, $T_f$, in Foley´s notation.

4 In referring to capital as a unit of production and circulation Marx says: "Capital invents mechanisms in order to shorten the phase in which it has to lie immobilized (in circulation; parenthesis mine, FPC). Instead of allowing these two conditions to coexist side by side capital makes them succeed one another" (Marx 1968/III, p.200).

5 Lebowitz (1976, pp.246-247), for instance, argues that the increase in circulation time results from underconsumption. This idea, although at odds with the main thrust of the present paper, supports the notion that circulation time is associated to demand conditions.

6 This definition of *social need* corresponds to Smith´s concept of *Effectual Demand*. However, Smith´s concept is contradictory. Effectual demand, according to him, is the volume demanded when price is at its natural level (Smith, 1965, p.56). But natural prices depend on the natural rates of wages, profits and rents. The natural rate of wages, in turn, depends on the prices of the consumer goods which compose the subsistence

on to add that social need is limited by the nature of the commodity itself. There is only so much bread that can be consumed by a single stomach.

It follows that the lower value of commodities tends to increase consumption. However this increase is circunscribed by the conditions ruling demand, i.e., social need. Social need together with supply will determine the exchange value of commodities, that is, their market values.7

For the full social value of commodities to be realized it is therefore necessary that they be produced to the extent required by social need at the ongoing social value. If supply exceeds social need, then the market value, vm, will be lower than the social value, vs:

$$\text{Supply} > \text{Social Need} \quad \Rightarrow \quad vm < vs$$

This can be better seen if we define $\xi$ as the rate of growth of demand and t as the rate of growth of labor productivity. The market value of a commodity will depend on the social value of that commodity as well as on the relative effects of productivity change, t, and demand growth, $\xi$:

$$v_m = v_s + v_s(\xi - t)$$

Market values and social values will be equal when the fall of social value brought about by rising productivity is equal to the increase in consumption brought about by the fall in social value. Market values will fall bellow social values when the effect of productivity on the social value is larger than the effect of social value on demand:

$$v_m < v_s$$

In this last case there is a loss of value to the extent of the difference between (vs - vm) per unit of product. The total unnecessary labor time for the production fo this particular commodity can be calculated as the product of (vs - vm) times the total amount of units produced.

V.   Superfluous Capital and Product Innovation

The difference (vs - vm) is an index of the excess capital engaged in the production of a particular commodity. The amount of excess capital engaged in the production per unit of product can be expressed as the product of the difference between social value and market value times the capital/output ratio,   k:

$$\sup erfluous.capital = (v_s - v_m)k$$

This superfluous capital has to be invested in the production of a new commodity 8 if it is to attain the rate of profit prior to the increase in productivity. Otherwise, the struggle to reduce production time will result in a devaluation of capital relatively to the previous rate of return.

The aggregate tendency to reduce production time may therefore lead to an increase in circulation time for certain goods. If it does so then it devalues the mass of produced value below the amount of labor bestowed in the production of those goods. It is through this mechanism that the continuous reduction of production time sistematically creates superfluous capital within the old composition of production. The productive use of this superfluous capital requires the opening up of new branches of production or the continuous invention of new commodities from within the pre-existing branches of production. The process of development of productive forces implies necessarily the development of new social needs, i.e, new use values.

VI. Conclusions

Contrary to what Schumpeter has suggested, innovation can be derived from the circular flow of Marx´s capital circuit and on the basis of his theory of value. Specific market structures can be grafted upon the abstract analysis presented above. When competition is allowed for, the notion of indidbual value is added to the interplay of   social values and market values. Absolute concentration may accur if increases in productivity cause social values to sink below individual costs of production for any particular producers.

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wage. Natural prices are thus dependent on prices. The argument is irremediably circular. In Marx, on the other hand, social need is defined relative to a value not yet transformed in price by the action of demand. The magnitude of social need relative to the social value of a certain amount of supply will determine the market value (market price in Marx).

[7] I am adopting here Giussani´s terminology (Giussani 1996). In Marx, the notion of *market value* in chapter X  of volume III of *Capital* corresponds to the notion of *social value* of chapter XII of  volume I of *Capital*. In this paper, *market values* correspond to what Marx calls *market prices* in chapter X of volume III of *Capital*.

[8] Marx (1968/II, p.213). In this passage Marx refers only to the increase in supply following the adotion of a more productive method. He does not analyse the effect of this new method of production on the price of the product. Yet, the increased production may lead to greater  demand if the price of the product falls. The process of freeing capital for the production of new use values has to take into account not only the increasing supply but also the behavior of prices and demand.

Contrary to Lebowitz (1976), product innovation is derived not from the restriction of workers buying power but from the demand relative to a given composition of the social product.

Without increases in productivity, the system can expand extensively fueled by demand created within the schemes of reproduction. Rising productivity however requires a continuously changing composition of production so as to keep up the rate of capital self-expansion.

It is important to say that the increase in real income which results from rising productivity is taken by the system of firms as a starting point for their activity. That is to say, firms do not wait for the rate of growth of demand for their products to decelerate in order to begin their product innovation plans. If they did so the new product would be unavailable by the time deceleration took place. Reality thus gives us the impression that innovation is simply caused by the interaction of capitals in competition.

VII. References

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