Applying Marx's Theory of Value:

The Role of Knowledge in the Production of Commodities

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A common problem in discussing "knowledge" as a factor in production is determining its "value," and what value it adds to goods during production. Toffler, for example, says, "Knowledge adds value."

But what is "value?" An economics textbook defines "value added" as simply "the revenue from selling a product minus the amounts paid for goods and services purchased from other firms." This definition is unsatisfactory. Is "value" only realized through the "selling" and the "purchasing"--that is, only in the realm of circulation? What about the production process? Is value really only tied to the vagaries of fluctuating supply and demand? What if the "goods and services" can't be sold, say, because potential users do not have the money to purchase the product? Does the product therefore have less (or no) value?

Recognizing the central role of commodities in capitalism, Marx began Capital with an extended analysis of the question of the "value" of commodities. He identified two different kinds of "value" in commodities. In order to be exchanged, a commodity must fulfill some need or want for another human being. Marx called this subjective and qualitative aspect of a commodity its use value. At the same time, in order to exchange goods of different use values, Marx argued that there needs to be some common basis of assessing a value of the commodities, some quantitative, measurable aspect. Marx identifies "socially necessary labor" as that "thing" common to all commodities. It represents the amount of abstract human labor added during production, and the "dead" labor embodied in the raw materials and machinery used up during production. Marx called this aspect of commodities exchange value. The purpose of production, the reason that humans come toge in economic activity, Marx argued, is to create use values, to satisfy needs and wants. The process of production, however, is the expenditure of past and present human labor, measured as exchange value. The exchange value of knowledge, then, is the "socially necessary labor" that goes into the research, the analysis, and the expression required to develop it.

Marx defines "socially necessary labor" as "that required to produce an article under the normal conditions of production, and with the average degree of skill and intensity prevalent at the time." The concept of "socially necessary labor" that defines the exchange value of a commodity recognizes an "average" technology stage or platform upon which production takes place. The "socially necessary labor" then, implies also a certain common level of knowledge about production processes. The uses of computerized typesetting in newspaper production, of robotics in automobile manufacture, or of crop rotation in agriculture are examples of a technology platform. Some producers may be ahead of the average, because of some special knowledge or technique, and some may be behind the average, because they are unaware of a technique, or have not invested in state-of-the-art technology. A commodity made by a worker employed by the "behind the average with outdated technology or using outdated techniques does not have more value because the worker took longer to make it. Nor does the commodity have less value if an especially productive worker, using state-of-the-art equipment with the latest techniques takes less time to make it.

In the latter example, a capitalist enterprise can realize extra profit from use of some particular knowledge as long as the knowledge enables its workers to produce commodities whose value is less than the "average" value of that commodity from all producers, both slow and fast, both backward and advanced. The advanced producer's commodities contain less labor than the socially necessary labor-- the enterprise ahead of the innovation wave is producing commodities more cheaply than its competitors, but selling them at the same price on the market. Thus, certain kinds of knowledge become sought-after resources; and competition drives forward technological development, although in a haphazard and socially haphazard way, because maximum profitability is the overriding goal.

Once knowledge becomes the new social average (that is, it becomes widely disseminated so now everyone is using the new technique), its ability to enable the innovator to accumulate extra profit is lost. To maximize profit from knowledge, then, the capitalist must enjoy the exclusive use of it.

In order to preserve the value of knowledge for the originator, knowledge used in production must be contained, and prevented from becoming the social average. The innovator tries to keep new techniques that give the firm an advantage hidden from competitors. At the same time, however, competing capitalists want to get hold of the newest technology to effectively compete. The patent and copyright system was developed, and continues to develop through laws and the courts, to attempt to resolve these two contradictory demands by competing capitalists--protection of profit (protecting the producer of the knowledge or technology) vs. access to profits (access by competitors who want the knowledge or technology). Copyrights and patents are the legal mechanisms for maintaining exclusive rights to a particular technique. They are treated as assets on company balance sheets, and represent sources of revenue, like mineral deposits or trade routes or right-of-ways.

The economics of "knowledge production" is such that the initial version requires a substantial investment (a high fixed cost), but subsequent copies have a relatively low reproduction cost. Thus, the exclusive, original copy of the knowledge has high exchange value. But just as machinery loses value as cheaper versions come into use, copies of knowledge, because of the relatively low cost of duplicating knowledge (hence cheaper versions of the original), quickly depreciate the exchange value of the original knowledge. For subsequent users, the knowledge, once it becomes the social average (i.e., widely known or distributed) continues to add to the mass of use values, but transfers little or no exchange value to commodities in the course of production. Each copy (book, computer disk, tape, etc.) of "knowledge" consumes almost no material relative to its development cost, so has little exchange value to transfer to the final product. Compare this with, say; a machine cut "copy" of the cutting tool consumes additional steel, energy, labor, and so forth, so it may have a substantial exchange value to transfer to the final product.

A century and a half ago, Marx noted that "all means of production supplied by Nature without human assistance such as land, water, metals in situ, and timber in virgin forests" fall into a category of things which transfer use value, without transferring exchange value. Elsewhere, Marx referred to the "gratuitous" work of machines, as the result of the machinery mobilizing natural forces. He also recognized that "the productive forces resulting from cooperation and division of labor cost capital nothing. They are natural forces of social production. So also physical forces, like steam, water, etc. when appropriated to productive processes cost nothing." "Cooperation" and "division of labor" -- learned ideas of how to organize production -- are examples of knowledge. Once discovered, knowledge costs nothing (i.e., transfers little or no exchange value), but enhances productivity, and thus adds to the mass of use values. This is the character contemporary productive

forces. So when Toffler says "knowledge adds value," he is correct in the sense that it adds to the mass of use values. But in another sense he is wrong, because knowledge reduces the exchange value of commodities.

Adding machinery to production increases the constant portion of capital. It is development based on expansion of requirements - more raw materials, more fixed capital. Knowledge, on the other hand, reduces the constant portion of capital and production requirements, while at the same time expanding output. The cost of computing power, for example, has plummeted because of new materials and new designs. Miniaturization, computerized controls, conservation techniques and new composite "smart" materials reduce raw material and energy requirements in manufacturing and agriculture. Computerized inventory control and digital telecommunications reduce inventory requirements and speed the turnover of capital. Some economists assign a majority, and in some countries, more than 75%, of the postwar economic growth in the West to improved productivity via technology, as opposed to growth resulting from increased inputs like more labor, raw materials and machinery. Knowledge, as a special for information, now dominates production itself, and overwhelms the contributions from traditional inputs to the final product.