

CHAPTER IX

PRODUCTION

1. **Extractive Industries.**—It was stated in an earlier chapter that the purpose of social science is to study the laws and principles which underlie the lives of men in society and to work out rules of procedure whereby these laws and principles may be utilized to increase human happiness. So far attention has been given primarily to the analysis and explanation of the character of human society, and the most important forces which actuate it, with only occasional applications of these forces to practical ends. We must now study in greater detail some of the practical problems involved, and the methods of solving them. As the primary activities of men are those concerned with supplying the material needs of the body, it will be well to devote attention first of all to the concrete problems of economics, or the creation and utilization of wealth.

The first commonly recognized division of economics is what is called "production." Under this head are included all activities and agencies by which wealth is extracted from nature and made available for human satisfaction. In general, production may be divided into three aspects; extraction, manufacturing and exchange. Among the extractive industries are included all those activities by means of which men take material substances from the land. Manufacturing industries include those activities by which natural substances not suitable for immediate human use are changed into forms that directly satisfy human desires, or help to

produce other objects which will satisfy human desires.¹ The exchange activities of production include those means whereby items of wealth find their way to those individuals who value them most highly, which in its final analysis is primarily a question of getting the wealth produced to the ultimate consumer.

The extractive industries may conveniently be divided into six heads: collection, hunting, fishing, agriculture, stock raising and mining. The character of collection and hunting activities has been sufficiently described, and they have passed into such relative insignificance in modern production that they demand no further consideration here. Fishing is still an important industry, but it, too, is relatively unimportant in the great total of modern production, and its methods are relatively simple. It has shared in the application of capital, however, and in its commercial form is now carried on with the assistance of highly developed instruments of wealth.

2. **Agriculture.**—The basis of the food supply of modern societies is agriculture, supplemented by what the United States census bureau has come to call "animal husbandry." The basis of our mechanical equipment is mining. In both agriculture and mining it is characteristic that capitalistic methods have been widely introduced, so that even in these forms of primary production machinery is scarcely less important than in

¹ The word "manufacturing" is really a misnomer when used in this sense. Manufacturing means making things by hand, whereas the characteristic feature of this department of production today is that things are made by machines. It is an evidence of our recent and sudden transition from hand production to machine production that this word has received its present meaning. Probably it will retain it now for all time to come.

the secondary phases of production, which we call "manufacturing." The importance of this development in releasing the resources of nature can hardly be overemphasized.

A brief survey of the evolution of agricultural methods reveals not only the importance of capital, but the exceedingly gradual stages by which the modern perfection of the art has been achieved. It is evident that without capital only the most rudimentary forms of agriculture can be carried on. Some primitive tribes have had the practice of burning off timber or underbrush and sowing seeds in the soil opened up and fertilized by this process, but no appreciable advance in agriculture is possible until means are devised for cultivating the soil, for sowing the seed and for the destruction of undesirable vegetation. For these, man's unaided hands are quite inadequate, and some simple implements must be devised. The first of these consisted merely of a sharpened stick or a stick with a hook at the end. Out of the former are developed the spade and similar instruments, the hoe probably from the latter, or perhaps from the primitive pick or hatchet. In primitive countries we find agriculture still carried on mainly by instruments of this sort.

The next improvement comes when the hooked stick is enlarged and dragged thru the ground, first by manpower and later by animals. This is the beginning of the plow. Even in countries as highly developed as Greece one need not go far from the leading cities to find peasants still using the wooden plow, improved only by a metal tip at the blade. It is interesting to observe that when the first cast-iron plow was invented by a resident of New Jersey, in the closing years of the eighteenth century, the farmers feared it would poison

the land. The most modern implements of cultivation are improvements upon these early devices.

3. Machinery in Modern Agriculture.—The processes of agriculture may be divided into three types: planting, cultivation and reaping. In its main features the modern cultivator is similar to a plow, the chief difference being that the blade is designed to break up the soil rather than to turn it over. A large amount of cultivation is still done by the hoe and even by the unaided hands.

Harvesting consists first in gathering the ripened fruit of the plants, and in the case of grain in separating it from the straw and chaff. Out of the early sickle has developed the modern mowing machine and reaper, and out of the early flail—still in use in remote sections of New England—has grown the modern threshing machine. The perfection of harvesting machinery is found in the combination machines in use on the great plains in the middle West, which reap, thresh and sack the grain in one continuous operation. Thus from the very beginning a certain amount of capital has been essential to agriculture, but only in recent years has the importance of machinery become so great as to bring agriculture itself into full participation in the capitalistic system.

Agriculture and animal husbandry have long been closely associated and dependent upon each other. The domestication of animals is not a form of primary production, but a genuinely capitalistic enterprise, flocks and herds being among the earliest forms of capital; the live stock which still constitutes so important a part of the ordinary farm equipment is itself an application of capital to agriculture. Conversely agriculture is of

great service to animal husbandry, by increasing the food supply for animals.

One effect of the wide application of machinery to agricultural pursuits has been to release a considerable part of the rural population and make it available for manufacturing activities. Two or three men with modern machinery can produce more agricultural wealth than could several times that many a hundred years ago. There is some reason for fearing that this process has gone too far, and that even with all the resources of modern machinery not enough agricultural labor is now available to supply materials needed for manufacture. For in this connection it should be remarked that not all agricultural activities are devoted to the production of food materials. A considerable proportion is applied to the raising of vegetable substances needed in production, such as cotton, hemp and other fibers, wood, vegetable oils, dyes, etc. At present considerably less than one-third of the population of the United States are engaged in the pursuits of agriculture and animal husbandry and this percentage is steadily declining.

4. Forestry and Mining.—A special form of extractive production, which really ought to come under the head of agriculture but does in fact come under that of collection, is forestry. As ordinarily practised, particularly in the United States, forestry consists merely in gathering the useful timber provided by nature. It is an example of the wasteful exploitation which has characterized so much of our economic activities. The principles of conservation require that forestry should be as truly a matter of planting, cultivation and harvesting as the growing of wheat or corn. Only the first steps in this direction have been taken in the United States,

and if progress is not made rapidly, we shall awake too late to find that we have wasted a large body of natural resources, for the cutting of timber under improper conditions destroys the very soil itself upon which the timber grows.

Under the head of mining is included the extraction of those inorganic substances, primarily minerals, which exist in the land in a fixed supply, and which do not replace themselves and cannot be replaced. Among the most important substances of this kind are coal, iron, lead, zinc, copper, tin and the precious metals, gold and silver. There is something almost awe-inspiring about mining, not only because of the striking physical conditions under which it is carried on, but even more because the thought is always present that what we take today is gone for all time, and that we must look forward with certainty to the eventual exhaustion of all existing supplies. This is in no sense a contradiction of the statement made earlier, that the actual quantity of each element of the earth is the same today as it was when the world was created. Not one atom of iron, or carbon, or gold, or silver has been destroyed. But the significant fact is that in the processes of use these substances are so changed in form that they cannot be recovered by any known process. When coal is burned it is no longer coal, and by no method yet devised can that carbon again be utilized as fuel. When an iron hoe rusts away, that iron has lost its possibilities of usefulness.

These considerations emphasize the importance of the conservation movement. Perhaps the most urgent problem is that of coal. Estimates differ widely as to the probable future date when the coal supply of the world will be exhausted, but in view of the rapidly accelerating use of this fuel, the day of its final exhaustion cannot be

very far in the future, as human history goes. A similar situation exists with reference to mineral oil and natural gas. Perhaps no grave apprehension is called for in this matter, because man's resourcefulness and ingenuity are apparently unlimited, and new expedients hitherto undreamed of may be devised to meet future necessities. But the fact that genuine progress in civilization involves not only the use of new expedients but the continuation of old ones, emphasizes the importance of conserving these natural supplies to the utmost possible extent.

5. Manufacturing.—As in agriculture, so in mining, mechanical inventions have been applied to increase production. As already observed, one of the earliest uses of the steam engine was to pump water from mines, and many other mechanical devices in the way of hoists, drills, etc., are now in use. In the modern coal mine the actual mining is done largely by machines, thereby eliminating a number of human workers.

The most characteristic applications of mechanical achievement have been in the field of manufacturing. In manufactured goods rather than in any other type the great increases in modern wealth are found. Here, as elsewhere, each new invention tends either to create a new desire or to extend existing forms of desire more widely. Men have apparently unlimited capacity for developing new desires, and there is no reason to believe that the most civilized groups of men come any nearer to a complete satisfaction of them than did men living in the collection stage. It might seem, then, that all this progress was useless, since it leaves an equal amount of unsatisfied desires. But such is not the case, as the measure of human happiness is not the negative one of

unsatisfied desires, but the positive one of satisfied desires. Happiness increases with man's capacity for happiness, that is, with the variety and fulness of his life. It is necessary that the elemental needs of life be satisfied, but when that is done, there remains the great realm of higher satisfactions, the extent and quality of which are the true tests of any civilization or culture.

A fully developed manufacturing industry embodies all the productive resources of modern society and is particularly characteristic of our contemporary civilization. First it requires land; primarily, the land upon which the factory is built and the machines rest; and secondarily, the land that supplies the raw materials of the industry, for no manufacturing activity is or can be carried on except by utilizing materials which come ultimately from the land. Second, such an industry must have capital in the form of buildings, engines, machinery and the raw materials themselves. Third, there must be the human element which we call "labor" working upon these machines and raw materials. Even the most highly developed automatic machine will not entirely run itself. Serving it somewhere, must be a human hand and brain. Capitalistic industry has immeasurably reduced not only the volume of labor necessary for a certain product, but also the relative importance of labor in the whole process of production. However, it has not eliminated labor and there is no prospect that it ever will.

Finally, such an enterprise demands an organizing and managing head, sometimes called the "entrepreneur" or "enterpriser." He is responsible for putting the other three factors into proper relationships with each other and keeping the whole enterprise moving efficiently. Because this man is frequently (more so in

the past than at present) the owner of the capital and perhaps of the land, he is sometimes spoken of as the capitalist, and his function is confused with that of the man who supplies the capital, or even of the capital itself; but the two factors are entirely distinct and should be carefully discriminated. Land, labor, capital and organization are accordingly recognized as the four great factors in production, and are all present in varying proportions in every type of production except collection itself. The nature of land and capital have already been considered at some length since they are prominent objects of desire. Labor and organization require some further consideration.

6. Non-Material Factors in Production.—Labor and organization are similar in that they are the non-material factors in production. The difference between them is one of degree rather than of kind, but the difference in degree is so wide as to throw them into really separate categories and to involve different principles in dealing with them. Labor is the effort expended by human beings in the gratification of desire. It is directly associated with a human body and is under the control of the "ego" which inhabits and cannot be dissociated from that body. This peculiar characteristic differentiates it from land and capital, and makes it difficult to deal with labor as an economic factor. This difficulty has existed ever since the right of the human being to the possession of his own body was recognized. Under conditions of slavery the labor problem was no more difficult than the problem of utilizing farm animals. There was, in fact, no real labor problem at all. Slaves were a peculiar form of capital, just as domesticated animals are. With the abolition of slavery arose the problem of

the terms upon which this factor of production was to be associated with the others in such a way as to make production possible, for labor and land are the two indispensable factors of production.

Labor can be utilized to satisfy human desires directly, without the assistance of either land or capital, except as land is always necessary merely for the support of human bodies. An illustration of this statement is furnished by the practice of massage, whereby the labor of one individual is directly applied to the body of another to satisfy the latter's desires. There is clearly, then, a certain body of desires, with their complementary gratifications, which are different from anything hitherto discussed. These may be called "desires for personal service," and the labor which satisfies these may be called simply "personal service."

Desires of this kind and their corresponding services evidently cover a wide range, from the simple case just cited to the singing of an opera star. It is a question whether service of this kind ought to be included in production. If so, it is a special kind of production, and the question is simply one of definition. This kind of labor satisfies desire just as truly as any other kind, but does so directly instead of by producing wealth. The matter of the definition is not important provided it is clearly recognized that if such labor is designated as non-productive there is no implication of any absence or inferiority of utility in the service rendered. This is evident from the fact that personal service includes the contributions of the doctor, the lawyer, the preacher and the teacher, as well as those of the barber and the bootblack.

As in almost every other sociological classification, the dividing line between personal service and other forms

of labor is not clear-cut, since practically all classes of workers use instruments of capital, such as the doctor's thermometer or the barber's razor and scissors. For the most part, however, labor at the present time is used as an adjunct of land or capital, and it is in these connections that the genuine labor problem arises.

7. "Manual" vs. "Brain" Labor.—The man who supplies the organization of a modern productive plant is in a sense a laborer, but he is such a highly specialized form of laborer that he holds a place by himself. The qualities which put him where he is are similar to those in highly specialized forms of personal service, such as law or medicine—that is, qualities of the intellect or brain. This differentiation in the qualities of labor is so great that we often distinguish the types of labor as "manual labor" and "brain labor." It would be more accurate if we said "muscular labor" and "brain labor," because the ditch digger and the machine operative use the muscles of many other members of their body beside the hands. But even the distinction between muscular labor and brain labor is likely to be misleading, because even the lowest grade of muscular laborer uses his brain to a certain extent and would be entirely inefficient without it; on the other hand, the highest grades of brain workers cannot render any practical service without the use of some muscles of the hand, throat, eye, etc. The practical misinterpretations arising from the confusion of brain and muscle are due principally, not to an overestimation of the muscles of the high grade worker, but to underestimation of the part played by the brain of the low grade worker. This point is worthy of further analysis.

In watching an unskilled laborer at work on what we

call a manual task, the idea commonly and very naturally arises that he is paid primarily for the muscular energy which he expends. We see him breaking up the pavement with a pick, or shoveling dirt from a ditch, or carrying mortar or bricks up a ladder. There is a display of physical exertion particularly impressive to one not experienced in that kind of work. It is easy to think of such a laborer as being nothing more than a substitute for mechanical power. But from the point of view of energy developed, human power ordinarily is so much more expensive than power generated by coal or water that it would be entirely wasteful to employ it, if it did not possess some unique quality which makes it more useful than any other form. This unique quality in human power is its flexibility, adaptability and intelligence.

Human power is particularly valuable because it is self-directed power, which can be instantly modified and adapted to varying conditions. What does the directing is really the brain of the individual whose body furnishes the power. The demands made by manual labor upon the intelligence and brain power of the worker are not heavy, and are matters of such every-day experience that it is easy to overlook them entirely. Thus we fall into the habit of assuming that the money we pay to a manual laborer is for his muscular energy rather than for his mental exertion. This is what leads to the discrimination between hand workers and brain workers, a misleading distinction really lying at the bottom of much of the misunderstanding which characterizes our present industrial situation. The difference between the various types of labor is really more of degree than of kind.

8. Intelligence of Laborer.—Two or three simple illus-

trations will serve to make this point clear. When you engage an expressman to bring a trunk to your house from the railroad station, you pay a certain sum for the entire service. You recognize that a part of this covers the overhead expense of the truck which brings the trunk, the gasoline used, etc.; another part as paying for the exertions of the man with wiry muscles and broad back who delivers the trunk safely within your house. But if you think of this payment as being exclusively or mainly for energy expended there is a fallacy of the sort just discussed. The truck has provided a hundred times as much power in transporting the trunk as the laborer has used in carrying the trunk from the station platform to the truck and from the truck to your room. If it were possible to devise a machine which could have picked up the trunk, brought it to your house, carried it up the stairs and deposited it where you wanted it, carefully dodging chairs and bedposts, such a machine would have been available to do the work. That no such machine is possible emphasizes the truth that it is the intelligence of the worker for which you really pay. This is further shown by the fact that if his intelligence fails, and he bumps the trunk against the door casing or a choice piece of furniture, the adjective which springs to the mind is "stupid" or "careless," not "weak." Again, if a man is employed to trim your lawn with a lawn mower, you think of him as being engaged primarily for his muscular power; but as far as that is concerned, a gasoline-driven mower would furnish it for a fraction of the cost, but would not know where to stop, where to turn, or how to avoid your favorite rose bushes. It is primarily intelligence for which you pay.

This becomes clearer in the case of a workman of a more skilled type, a carpenter, for instance, who uses

his tools with remarkable dexterity to build a bookshelf in one corner of your living room. Exactly the same principle holds good of the dentist or the surgeon. It is all a question of the relative proportion between brain power and muscular power and the quality of each. Both the brain power and the muscular power of the surgeon are of a finer and more highly developed quality than those of the ditch digger.

A certain amount of human labor is absolutely required for all production. But in the total mass of the economic activities of society the relative importance of muscular power has been steadily diminishing, because men have become extraordinarily proficient in creating machines which will work with a precision and flexibility approximating that of man himself. This process will continue. As a result, the man whose equipment for production consists primarily in muscular power and only to a limited extent in brain power, will find himself less and less in demand. The type of worker who can demand great rewards is one whose brain quality fits him to devise machines, or to superintend their employment, or in some way to organize the productive activities of his group.

REVIEW.

What is meant by the extractive industries? Name them.

Trace the evolution of agricultural methods.

Name the four great factors in production.

Why is the usual discrimination between hand workers and brain workers misleading and false?

Why is the importance of muscular power diminishing?
