

Chapter VI.

Of Causes Affecting The Efficiency Of Production.

§ 1. General Causes of Superior Productiveness.

The most evident cause of superior productiveness is what are called natural advantages. These are various. Fertility of soil is one of the principal. The influence of climate [is another advantage, and] consists in lessening the physical requirements of the producers.

In spinning very fine cotton thread, England's natural climate gives in some parts of the country such advantages in proper moisture and electric conditions that the operation can be carried on out-of-doors; while in the United States it is generally necessary to create an artificial atmosphere. In ordinary spinning in our country more is accomplished when the wind is in one quarter than in another. The dry northwest wind in New England reduces the amount of product, while the dry northeast wind in England has a similar effect, and it is said has practically driven the cotton-spinners from Manchester to Oldham, where the climate is more equably moist. The full reasons for these facts are not yet ascertained.

Experts in the woolen industry, also, explain that the quality and fiber of wool depend upon the soil and climate where the sheep are pastured. When Ohio sheep are transferred to Texas, in a few years their wool loses the distinctive quality it formerly possessed, and takes on a new character belonging to the breeds of Texas. The wool produced by one set of climatic conditions is quite different from that of another set, and is used by the manufacturers for different purposes.

In hot regions, mankind can exist in comfort with less perfect housing, less clothing; fuel, that absolute necessary of life in cold climates, they can almost dispense with, except for industrial uses. They also require less aliment. Among natural advantages, besides soil and climate, must be mentioned abundance of mineral productions, in convenient situations, and capable of being worked with moderate labor. Such are the coal-fields of Great Britain, which do so much to compensate its inhabitants for the disadvantages of climate; and the scarcely inferior resource possessed by this country and the United States, in a copious supply of an easily reduced iron-ore, at no great depth below the earth's surface, and in close proximity to coal-deposits available for working it. But perhaps a greater advantage than all these is a maritime situation, especially when accompanied with good natural harbors; and, next to it, great navigable rivers. These advantages consist indeed wholly in saving of cost of carriage. But few, who have not considered the subject, have any adequate notion how great an extent of economical advantage this comprises.

As the second of the [general] causes of superior productiveness, we may rank the greater energy of labor. By this is not to be understood occasional, but regular and habitual energy. The third element which determines the productiveness of the labor of a community is the skill and knowledge therein existing, whether it be the skill and knowledge of the laborers themselves or of those who direct their labor. That the productiveness of the labor of a people is limited by their knowledge of the arts of life is self-evident, and that any progress in those arts, any improved application of the objects or powers of nature to industrial uses, enables the same quantity and intensity of labor to raise a greater produce. One principal department of these improvements consists in the invention and use of tools and machinery.(114)

The deficiency of practical good sense, which renders the majority of the laboring-class such bad calculators--which makes, for instance, their domestic economy so improvident, lax, and irregular--must disqualify them for any but a low grade of intelligent labor, and render their industry far less productive than with equal energy it otherwise might be. The moral qualities of the laborers are fully as important to the efficiency and worth of their labor as the intellectual. Independently of the effects of intemperance upon their bodily and mental faculties, and of flighty, unsteady habits upon the energy and continuity of their work (points so easily understood as not to require being insisted upon), it is well worthy of meditation how much

of the aggregate effect of their labor depends on their trustworthiness.

Among the secondary causes which determine the productiveness of productive agents, the most important is Security. By security I mean the completeness of the protection which society affords to its members.

§ 2. Combination and Division of Labor Increase Productiveness.

In the enumeration of the circumstances which promote the productiveness of labor, we have left one untouched, which is co-operation, or the combined action of numbers. Of this great aid to production, a single department, known by the name of Division of Labor, has engaged a large share of the attention of political economists; most deservedly, indeed, but to the exclusion of other cases and exemplifications of the same comprehensive law. In the lifting of heavy weights, for example, in the felling of trees, in the sawing of timber, in the gathering of much hay or corn during a short period of fine weather, in draining a large extent of land during the short season when such a work may be properly conducted, in the pulling of ropes on board ship, in the rowing of large boats, in some mining operations, in the erection of a scaffolding for building, and in the breaking of stones for the repair of a road, so that the whole of the road shall always be kept in good order: in all these simple operations, and thousands more, it is absolutely necessary that many persons should work together, at the same time, in the same place, and in the same way. [But] in the present state of society, the breeding and feeding of sheep is the occupation of one set of people; dressing the wool to prepare it for the spinner is that of another; spinning it into thread, of a third; weaving the thread into broadcloth, of a fourth; dyeing the cloth, of a fifth; making it into a coat, of a sixth; without counting the multitude of carriers, merchants, factors, and retailers put in requisition at the successive stages of this progress.

Without some separation of employments, very few things would be produced at all. Suppose a set of persons, or a number of families, all employed precisely in the same manner; each family settled on a piece of its own land, on which it grows by its labor the food required for its own sustenance, and, as there are no persons to buy any surplus produce where all are producers, each family has to produce within itself whatever other articles it consumes. In such circumstances, if the soil was tolerably fertile, and population did not tread too closely on the heels of subsistence, there would be, no doubt, some kind of domestic manufactures; clothing for the family might, perhaps, be spun and woven within it, by the labor, probably, of the women (a first step in the separation of employments); and a dwelling of some sort would be erected and kept in repair by their united labor. But beyond simple food (precarious, too, from the variations of the seasons), coarse clothing, and very imperfect lodging, it would be scarcely possible that the family should produce anything more.

Suppose that a company of artificers, provided with tools, and with food sufficient to maintain them for a year, arrive in the country and establish themselves in the midst of the population. These new settlers occupy themselves in producing articles of use or ornament adapted to the taste of a simple people; and before their food is exhausted they have produced these in considerable quantity, and are ready to exchange them for more food. The economical position of the landed population is now most materially altered. They have an opportunity given them of acquiring comforts and luxuries. Things which, while they depended solely upon their own labor, they never could have obtained, because they could not have produced, are now accessible to them if they can succeed in producing an additional quantity of food and necessaries. They are thus incited to increase the productiveness of their industry. The new settlers constitute what is called a *market* for surplus agricultural produce; and their arrival has enriched the settlement, not only by the manufactured articles which they produce, but by the food which would not have been produced unless they had been there to consume it.

There is no inconsistency between this doctrine and the proposition we before maintained,(115) that a market for commodities does not constitute employment for labor. The labor of the agriculturists was already provided with employment; they are not indebted to the demand of the new-comers for being able to maintain themselves. What that demand does for them is to call their labor into increased vigor and efficiency; to stimulate them, by new motives, to new exertions.

From these considerations it appears that a country will seldom have a productive agriculture unless it has a large town population, or, the only available substitute, a large export trade in agricultural produce to supply a population elsewhere. I use the phrase "town population" for shortness, to imply a population non-agricultural.

It is found that the productive power of labor is increased by carrying the separation further and further; by breaking down more and more every process of industry into parts, so that each laborer shall confine himself to an ever smaller number of simple operations. And thus, in time, arise those remarkable cases of what is called the division of labor, with which all readers on subjects of this nature are familiar. Adam Smith's illustration from pin-making, though so well known, is so much to the point that I will venture once more to transcribe it: "The business of making a pin is divided into about eighteen distinct operations. One man draws out the wire, another straightens it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head; to make the head requires two or three distinct operations; to put it on, is a peculiar business; to whiten the pins is another; it is even a trade by itself to put them into the paper.... I have seen a small manufactory where ten men only were employed, and where some of them, consequently, performed two or three distinct operations. But though they were very poor, and therefore but indifferently accommodated with the necessary machinery, they could, when they exerted themselves, make among them about twelve pounds of pins in a day. There are in a pound upward of four thousand pins of a middling size. Those ten persons, therefore, could make among them upward of forty-eight thousand pins in a day. Each person, therefore, making a tenth part of forty-eight thousand pins, might be considered as making four thousand eight hundred pins in a day. But if they had all wrought separately and independently, and without any of them having been educated to this peculiar business, they certainly could not each of them have made twenty, perhaps not one pin in a day."

§ 3. Advantages of Division of Labor.

The causes of the increased efficiency given to labor by the division of employments are some of them too familiar to require specification; but it is worth while to attempt a complete enumeration of them. By Adam Smith they are reduced to three: "First, the increase of dexterity in every particular workman; secondly, the saving of the time which is commonly lost in passing from one species of work to another; and, lastly, the invention of a great number of machines which facilitate and abridge labor, and enable one man to do the work of many."

(1.) Of these, the increase of dexterity of the individual workman is the most obvious and universal. It does not follow that because a thing has been done oftener it will be done better. That depends on the intelligence of the workman, and on the degree in which his mind works along with his hands. But it will be done more easily. This is as true of mental operations as of bodily. Even a child, after much practice, sums up a column of figures with a rapidity which resembles intuition. The act of speaking any language, of reading fluently, of playing music at sight, are cases as remarkable as they are familiar. Among bodily acts, dancing, gymnastic exercises, ease and brilliancy of execution on a musical instrument, are examples of the rapidity and facility acquired by repetition. In simpler manual operations the effect is, of course, still sooner produced.

(2.) The second advantage enumerated by Adam Smith as arising from the division of labor is one on which I can not help thinking that more stress is laid by him and others than it deserves. To do full justice to his opinion, I will quote his own exposition of it: "It is impossible to pass very quickly from one kind of work to another, that is carried on in a different place, and with quite different tools. A country weaver, who cultivates a small farm, must lose a good deal of time in passing from his loom to the field, and from the field to his loom. When the two trades can be carried on in the same workhouse, the loss of time is no doubt much less. It is even in this case, however, very considerable. A man commonly saunters a little in turning his hand from one sort of employment to another." I am very far from implying that these considerations are of no weight; but I think there are counter-considerations which are overlooked. If one kind of muscular or mental labor is different from another, for that very reason it is to some extent a rest from that other; and if the greatest vigor is not at once obtained in the second occupation, neither could the first have been indefinitely prolonged

without some relaxation of energy. It is a matter of common experience that a change of occupation will often afford relief where complete repose would otherwise be necessary, and that a person can work many more hours without fatigue at a succession of occupations, than if confined during the whole time to one.(116) Different occupations employ different muscles, or different energies of the mind, some of which rest and are refreshed while others work. Bodily labor itself rests from mental, and conversely. The variety itself has an invigorating effect on what, for want of a more philosophical appellation, we must term the animal spirits--so important to the efficiency of all work not mechanical, and not unimportant even to that.

(3.) The third advantage attributed by Adam Smith to the division of labor is, to a certain extent, real. Inventions tending to save labor in a particular operation are more likely to occur to any one in proportion as his thoughts are intensely directed to that occupation, and continually employed upon it.

This also can not be wholly true. "The founder of the cotton manufacture was a barber. The inventor of the power-loom was a clergyman. A farmer devised the application of the screw-propeller. A fancy-goods shopkeeper is one of the most enterprising experimentalists in agriculture. The most remarkable architectural design of our day has been furnished by a gardener. The first person who supplied London with water was a goldsmith. The first extensive maker of English roads was a blind man, bred to no trade. The father of English inland navigation was a duke, and his engineer was a millwright. The first great builder of iron bridges was a stone-mason, and the greatest railway engineer commenced his life as a colliery engineer."(117)

(4.) The greatest advantage (next to the dexterity of the workmen) derived from the minute division of labor which takes place in modern manufacturing industry, is one not mentioned by Adam Smith, but to which attention has been drawn by Mr. Babbage: the more economical distribution of labor by classing the work-people according to their capacity. Different parts of the same series of operations require unequal degrees of skill and bodily strength; and those who have skill enough for the most difficult, or strength enough for the hardest parts of the labor, are made much more useful by being employed solely in them; the operations which everybody is capable of being left to those who are fit for no others.

The division of labor, as all writers on the subject have remarked, is limited by the extent of the market. If, by the separation of pin-making into ten distinct employments, forty-eight thousand pins can be made in a day, this separation will only be advisable if the number of accessible consumers is such as to require, every day, something like forty-eight thousand pins. If there is only a demand for twenty-four thousand, the division of labor can only be advantageously carried to the extent which will every day produce that smaller number. The increase of the general riches of the world, when accompanied with freedom of commercial intercourse, improvements in navigation, and inland communication by roads, canals, or railways, tends to give increased productiveness to the labor of every nation in particular, by enabling each locality to supply with its special products so much larger a market that a great extension of the division of labor in their production is an ordinary consequence. The division of labor is also limited, in many cases, by the nature of the employment. Agriculture, for example, is not susceptible of so great a division of occupations as many branches of manufactures, because its different operations can not possibly be simultaneous.

(5.) "In the examples given above the advantage obtained was derived from the mere fact of the separation of employments, altogether independently of the mode in which the separated employments were distributed among the *persons* carrying them on, as well as of the *places* in which they were conducted. But a further gain arises when the employments are of a kind which, in order to their effective performance, call for special capacities in the workman, or special natural resources in the scene of operation. There would be a manifest waste of special power in compelling to a mere mechanical or routine pursuit a man who is fitted to excel in a professional career; and similarly, if a branch of industry were established on some site which offered greater facilities to an industry of another sort, a waste, analogous in character, would be incurred. In a word, while a great number of the occupations in which men engage are such as, with proper preparation for them, might equally well be carried on by any of those engaged in them, or in any of the localities in which they are respectively established, there are others which demand for their effective performance special personal

qualifications and special local conditions; and the general effectiveness of productive industry will, other things being equal, be proportioned to the completeness with which the adaptation is accomplished between occupation on the one hand and individuals and localities on the other."(118)

§ 4. Production on a Large and Production on a Small Scale.

Whenever it is essential to the greatest efficiency of labor that many laborers should combine, the scale of the enterprise must be such as to bring many laborers together, and the capital must be large enough to maintain them. Still more needful is this when the nature of the employment allows, and the extent of the possible market encourages, a considerable division of labor. The larger the enterprise the further the division of labor may be carried. This is one of the principal causes of large manufactories. Every increase of business would enable the whole to be carried on with a proportionally smaller amount of labor.

As a general rule, the expenses of a business do not increase by any means proportionally to the quantity of business. Let us take as an example a set of operations which we are accustomed to see carried on by one great establishment, that of the Post-Office. Suppose that the business, let us say only of the letter-post, instead of being centralized in a single concern, were divided among five or six competing companies. Each of these would be obliged to maintain almost as large an establishment as is now sufficient for the whole. Since each must arrange for receiving and delivering letters in all parts of the town, each must send letter-carriers into every street, and almost every alley, and this, too, as many times in the day as is now done by the Post-Office, if the service is to be as well performed. Each must have an office for receiving letters in every neighborhood, with all subsidiary arrangements for collecting the letters from the different offices and redistributing them. To this must be added the much greater number of superior officers who would be required to check and control the subordinates, implying not only a greater cost in salaries for such responsible officers, but the necessity, perhaps, of being satisfied in many instances with an inferior standard of qualification, and so failing in the object.

Whether or not the advantages obtained by operating on a large scale preponderate in any particular case over the more watchful attention and greater regard to minor gains and losses usually found in small establishments, can be ascertained, in a state of free competition, by an unfailling test. Wherever there are large and small establishments in the same business, that one of the two which in existing circumstances carries on the production at greatest advantage will be able to undersell the other. The power of permanently underselling can only, generally speaking, be derived from increased effectiveness of labor; and this, when obtained by a more extended division of employment, or by a classification tending to a better economy of skill, always implies a greater produce from the same labor, and not merely the same produce from less labor; it increases not the surplus only, but the gross produce of industry. If an increased quantity of the particular article is not required, and part of the laborers in consequence lose their employment, the capital which maintained and employed them is also set at liberty, and the general produce of the country is increased by some other application of their labor.

A considerable part of the saving of labor effected by substituting the large system of production for the small, is the saving in the labor of the capitalists themselves. If a hundred producers with small capitals carry on separately the same business, the superintendence of each concern will probably require the whole attention of the person conducting it, sufficiently, at least, to hinder his time or thoughts from being disposable for anything else; while a single manufacturer possessing a capital equal to the sum of theirs, with ten or a dozen clerks, could conduct the whole of their amount of business, and have leisure, too, for other occupations.

Production on a large scale is greatly promoted by the practice of forming a large capital by the combination of many small contributions; or, in other words, by the formation of stock companies. The advantages of the principle are important, [since] (1) many undertakings require an amount of capital beyond the means of the richest individual or private partnership. [Of course] the Government can alone be looked to for any of those works for which a great combination of means is requisite, because it can obtain those means by compulsory

taxation, and is already accustomed to the conduct of large operations. For reasons, however, which are tolerably well known, government agency for the conduct of industrial operations is generally one of the least eligible of resources when any other is available. Of [the advantages referred to above] one of the most important is (2) that which relates to the intellectual and active qualifications of the directing head. The stimulus of individual interest is some security for exertion, but exertion is of little avail if the intelligence exerted is of an inferior order, which it must necessarily be in the majority of concerns carried on by the persons chiefly interested in them. Where the concern is large, and can afford a remuneration sufficient to attract a class of candidates superior to the common average, it is possible to select for the general management, and for all the skilled employments of a subordinate kind, persons of a degree of acquirement and cultivated intelligence which more than compensates for their inferior interest in the result. It must be further remarked that it is not a necessary consequence of joint-stock management that the persons employed, whether in superior or in subordinate offices, should be paid wholly by fixed salaries. In the case of the managers of joint-stock companies, and of the superintending and controlling officers in many private establishments, it is a common enough practice to connect their pecuniary interest with the interest of their employers, by giving them part of their remuneration in the form of a percentage on the profits.

The possibility of substituting the large system of production for the small depends, of course, in the first place, on the extent of the market. The large system can only be advantageous when a large amount of business is to be done: it implies, therefore, either a populous and flourishing community, or a great opening for exportation.

In the countries in which there are the largest markets, the widest diffusion of commercial confidence and enterprise, the greatest annual increase of capital, and the greatest number of large capitals owned by individuals, there is a tendency to substitute more and more, in one branch of industry after another, large establishments for small ones. These are almost always able to undersell the smaller tradesmen, partly, it is understood, by means of division of labor, and the economy occasioned by limiting the employment of skilled agency to cases where skill is required; and partly, no doubt, by the saving of labor arising from the great scale of the transactions; as it costs no more time, and not much more exertion of mind, to make a large purchase, for example, than a small one, and very much less than to make a number of small ones. With a view merely to production, and to the greatest efficiency of labor, this change is wholly beneficial.

A single large company very often, instead of being a monopoly, is generally better than two large companies; for there is little likelihood of competition and lower prices when the competitors are so few as to be able to agree not to compete. As Mr. Mill says in regard to parallel railroads: "No one can desire to see the enormous waste of capital and land (not to speak of increased nuisance) involved in the construction of a second railway to connect the same places already united by an existing one; while the two would not do the work better than it could be done by one, and after a short time would probably be amalgamated." The actual tendency of charges to diminish on the railways, before the matter of parallel railways was suggested is clearly seen by reference to Chart V (p. 137).