Materialism in Macrosociology

Man is an intelligence in servitude to his organs. — Aldous Huxley

According to Marx, Spencer, Durkheim, and Weber—the most important founders of the discipline of sociology—society is a system with a pronounced materialistic causal order. Material variables such as population and production are central in explaining the origin, maintenance, and change of sociocultural systems. The prime material factors considered by these founders to be behind the vast social changes that were transforming their societies from agrarian to industrial, from monarchies to democracies, were changes in population, technology, division of labour, and the environment. One can see this with Marx focusing on the production and reproduction of life; with Spencer and Durkheim emphasizing population growth, density, technological development, and an increasing division of labour; and with Weber rooting his concepts of bureaucratization and rationalization in the growth of population and material production. It is not that these theorists assert that material conditions are independent of other parts of the system; rather, they claim that
material conditions are critical in determining these other parts. It is not that social structures and cultural ideas do not matter in the analyses of these materialists; they are, in fact, critical in both affecting and motivating human behaviour. Rather, for the materialist, it is a matter of first principles: material conditions cause certain structures to arise and endure; material conditions allow particular ideas and not others to gain widespread acceptance. These conditions are not the only determining factors, but they are often the ultimate cause. The various elements of other parts of the sociocultural system—structures and culture—also exercise their influence on the course of human events (including material conditions), but such influence is secondary to material conditions.

Even Marx and Engels, the two most identified with a purely materialist position, never assert that a material base is all that matters, for it is a sociocultural system.\textsuperscript{1} It is through population and production technologies that a society manipulates its environment by modifying the amount and type of resources needed for the survival of its population. Like all life on earth, human beings must obtain subsistence from their environment. All human action is therefore necessarily limited by environmental constraints—chiefly, the availability of food. The amount of food that a particular environment can provide is limited by environmental factors (such as land fertility, the existence of animals with potential to be domesticated, climate, and rainfall patterns), human technologies (such as the domestication of plants and animals, fertilizers, irrigation, the plow, and insecticides), and the division of labour. The amount of food that a particular sociocultural system needs is determined by its population size. It is through modifications of the technologies and population practices that societies increase or decrease the type and amount of resources required from their environment. All of these material factors—environment, population, production technology, and labour—are interrelated and directly affect other elements of the sociocultural system. It is not the case, however, that these factors alone determine all other aspects of the sociocultural system. In other words, structures and
ideal factors are not merely passive effects that can be reduced to material causes. The non-material parts of the system are in mutual interaction with the material factors; structures and cultural ideas and ideologies are continually being transformed by material forces, which, in turn, are affected by the structural and cultural parts of the system. It is, indeed, a sociocultural system.

While the founders of sociology rooted their analyses in material conditions, much of their sociology was concerned with the effects of structural and ideal factors on human behaviour. For example, Max Weber claimed that growth in population and in the complexity of the mode of production (material factors) is directly responsible for the growth of bureaucracy in the social structures of societies. His sociology is primarily concerned with the impact that these bureaucratic structures and the consequent rationalization of cultural ideals have on the rest of the sociocultural system. Structures and ideas often determine people’s interests and motivations; they are successful in motivating human behaviour, however, only to the extent to which they are compatible with material conditions. While materialists recognize that structures and ideas motivate human beings, they insist that life starts (and ends) with material conditions and that these conditions therefore form the foundation of any sociocultural system. And it is with these material conditions, then, that social scientists must begin their analyses (Carneiro 2003, 216).

This chapter reviews the material conditions identified by macrosociologists as critical for understanding the origin, maintenance, and change of sociocultural systems. We will examine the significant characteristics that make up a society’s infrastructure—population, mode of production, and division of labour—and the ways in which these material factors are related to one another and to other parts of the sociocultural system. Finally, we will look at the causes and consequences of the intensification process, a process by which massive increases in population and production have devastating consequences on our environment and on the rest of the sociocultural system.
Unfortunately, T. Robert Malthus is generally ignored in sociology. His principle of population is actually a very subtle theory of the relationship between population and production, two primary material factors affecting the rest of the sociocultural system. First, Malthus (1798, 11) proposes a link between the production of food and the growth of population: “That population does invariably increase where there are the means of subsistence, the history of every people that have ever existed will abundantly prove.” Increase the food supply, he says, and food becomes cheaper and more abundant, nutrition improves, and more children are born or are allowed to live to adulthood. But, he adds, this can only be a temporary phenomenon. As population increases, it inevitably comes up against the limits of what the environment can provide under current production processes. Coming up against these limits then stimulates growth in food production by expanding land under cultivation or by developing more intensive farming technology or techniques. This, however, only causes population to further expand: increasing the supply of food causes a drop in its price, cheaper food gives potential parents more of an incentive to have additional children, and increased access to food allows more children to survive infancy. Child mortality rates in Malthus’s day were extremely high, as they still are in many areas of the world, largely due to nutritional factors.

For Malthus, the principle of population “keeps the inhabitants of the earth always fully up to the level of the means of subsistence; and is constantly acting upon man as a powerful stimulus, urging him to the further cultivation of the earth, and to enable it, consequently, to support a more extended population” (115). Malthus thus postulates that the relationship between population and production is autocatalytic in nature: that is, as one grows, it necessarily stimulates growth in the other. But this process is rarely smooth. Generally, technological advances (or the discovery of new land) stimulate the growth of population until the new resources are consumed, and then the limits reassert themselves. Once new plants and animals
are domesticated or new technologies developed to increase the yield of the earth, population increases until the new surplus is consumed.

Unless a society is in the immediate aftermath of expansion into virgin territory or the adoption of more productive technology, its population is always at the limit of what the environment can provide given the prevailing technology and distribution of resources. Existing at this environmental limit means that population growth must be constantly checked, a necessity, Malthus says, that has profound effects on societal institutions and culture. There are only two forms of population checks: “positive checks,” generally through the premature death of large segments of the population, or preventive checks. Examples of positive checks include malnourishment leading to increased susceptibility to disease, high infant mortality, or infanticide. Positive checks are usually much more widespread among the poor. In other segments of the society, population checks are more likely to be exercised through preventive means: later marriage, birth control, or the loosening of prohibitions on non-procreative sex. The fact that our species’ ability to produce children will always be greater than our ability to provide for them means that there must always be checks on population growth. And this, writes Malthus, forms the foundation for the rest of the sociocultural system. Specifically, Malthus details this imbalance as the root cause of inequality in our institutions and distribution of resources, dominant marriage patterns within the society, approved and prohibited forms of sexuality, infanticide, abortion, gender inequality, and the provision of welfare.

Malthus makes clear his materialist credentials in citing population factors as first or ultimate causes of many widespread social institutions and practices. For example, he attributes the low population density in hunting-and-gathering societies to the fact that the subsistence resources are scattered over a large area: “In the rudest state of mankind, in which hunting is the principal occupation, and the only mode of acquiring food, the means of subsistence being scattered over a large extent of territory, the comparative population must necessarily be thin” (14). Without the stimulus of population
coming up against these environmental limits, he notes, “it is probable that man might never have emerged from the savage state” (114).

According to Malthus, it is physical want that stimulates human thought and action, and it is the drive to satisfy material needs that is responsible for the development of civilization.³ People are motivated to action by opinions and ideas, he claims, but we are not entirely rational animals; the thoughts and opinions we hold are strongly influenced by our physical needs and desires. “The voluntary actions of men may originate in their opinions, but these opinions will be very differently modified in creatures compounded of a rational faculty and corporal propensities from what they would be in beings wholly intellectual” (79). While thought normally precedes action, he writes, our ideas and ideologies are strongly influenced by our material interests—the satisfaction of our physical needs and desires. “I am willing to allow that every voluntary act is preceded by a decision of the mind, but it is strangely opposite to what I should conceive to be the just theory upon the subject, and a palpable contradiction to all experience, to say that the corporal propensities of man do not act very powerfully, as disturbing forces, in these decisions. The question, therefore, does not merely depend upon whether a man may be made to understand a distinct proposition or be convinced by an unanswerable argument” (80). And this is true of individuals as well as whole societies. “An Alaric, an Attila, or a Zingis Kahn, and the chiefs around them,” Malthus writes (1798, 15), “might fight for glory, for the fame of extensive conquests, but the true cause that set in motion the great tide of northern emigration, and that continued to propel it till it rolled at different periods against China, Persia, Italy, and even Egypt, was a scarcity of food, a population extended beyond the means of supporting it.” For Malthus, population and the means of supporting it are the foundation of all sociocultural systems. All other components of the system are based upon this foundation.

Ester Boserup (1965) looks at the relationship between population and agricultural production from early horticultural societies to agrarian societies. Malthus’s main line of reasoning, she says, is
that agricultural production severely limits population growth. At any point in time, population level is seen as dependent upon previous changes in agricultural productivity. Increases in agricultural productivity result from technological innovation—either within the society itself or as a result of cultural transmission—or from the expansion of agriculture to new lands. Only when agriculture expands does population rise to meet the new level of food production, after which it is again checked.

Boserup (1965, 11) focuses instead upon the line of causation that runs in the opposite direction—that population growth stimulates greater food production. Because of natural limits on the fertility of the land, societies practicing primitive agriculture did not have permanent fields; rather, they shifted their cultivated plots from place to place within the land holdings of a given tribe. All land holdings were in use in such systems as cultivated plots, fallow land, pasture, or hunting grounds. “This fact,” Boserup notes, “which seems to have been ignored by classical economists, is fundamental for our problem, for it follows from it that in primitive types of agriculture there is no sharp distinction between cultivated and uncultivated land, and it is impossible likewise to distinguish clearly between the creation of new fields and change of methods in existing fields” (12–13). In such a case, the researcher must drop the distinction between cultivated and uncultivated lands and recognize that the entire area of the tribe is a necessary part of its agricultural system.

Soil fertility, rather than being an immutable gift of nature, is highly variable and closely associated with agricultural methods. Since, as Boserup points out, the fertility of the land can be greatly increased through human activity, one must focus directly on the intensity of the work on that land and the frequency with which the land can be cultivated as a result of that intensity. According to Boserup, the true measure of the intensification of agriculture is the frequency of cropping. She argues that both fertilization and cultivation become more labour intensive with the shortening of fallow (25–26). Societies that practice forest-fallow agriculture clear plots of land within the forest and plant for a year or two, or until the natural
fertility is exhausted. The land is then left fallow for twenty to twenty-
five years to allow the forest to regenerate. When it has, the people
burn the forest, creating sufficient ash to return nutrients to the soil,
and plant again. The burning of forest loosens the soil and frees the
land of weeds, and hoeing is completely unnecessary. With bush-
fallow agriculture, the fallow period is usually only six to ten years.
When the period of fallow is shortened, only bushes, saplings, and
weeds take root; burning these is not an effective method of clearing
or returning fertility to the land, so the hoe is needed. Short-fallow is
a system in which the fallow period is only one or two years, during
which time the land is invaded by wild grasses. Grasses are difficult
to remove through hoeing; plowing then becomes not only necessary
but possible, given the absence of bush and tree roots. Boserup adds
that the grasslands that replace forests with the shortening of fallow
are often invaded by nomads seeking to feed their herds. Thus, ani-
mals suitable for cultivation and fertilization appear “around the
time when the local cultivators need them and become able to use
them” (25). With annual cropping (which includes crop rotation),
the land is left uncultivated for only several months between har-
vost and planting. The final stage of intensification, multi-cropping,
occurs when the same plot of land bears two or more crops every
year; such a system involves no real fallow period (15–16). “Even if
we cannot be sure that systems of extensive land use have preceded
the intensive ones in every part of the world,” Boserup concludes,
“there seems to be little reason to doubt that the typical sequence of
development of agriculture has been a gradual change—more rapid
in some regions than in others—from extensive to intensive types of
land use” (17–18).

While more intensive methods produce more crops per acre, they
also require far more human labour to produce those yields—and the
increases in yield are not commensurate with the effort. Much more
work is needed to produce food; with population increase, a household
has to work harder to maintain its standard of living. The short-term
effect of intensification, Boserup maintains, is necessarily to lower
output per man-hour. “But sustained growth of total population and
of total output in a given area has secondary effects which—at least in some cases—can set off a genuine process of economic growth” (118). These secondary effects of intensification include a compulsion to work harder and more regularly, a more detailed division of labour, changing work habits, and the raising of overall productivity; intensification facilitates the spread of urbanization, communication, and education, as well as population and urban growth, which stimulate the further intensification of agriculture.

Boserup insists that agriculture must be understood as part of a system, in which changes in one area provoke changes elsewhere. As population increases, most of the land brought under more frequent cultivation in a given area is already being used for something: fallow, hunting ground, or grazing areas. “It follows that when a given area of land comes to be cropped more frequently than before, the purpose for which it was hitherto used must be taken care of in a new way, and this may create additional activities for which new tools and other investments are required” (13–14). Thus, population changes often have direct effects upon the development of new agricultural technology and further division and intensification of labour. For this reason, Boserup claims, even primitive agricultural output can be increased significantly—far more than neo-Malthusian authors assume—by additional inputs of labour. Intensification, Boserup argues, could only take place in response to population pressures within a given area. Even when people have access to more intensive techniques and tools, the investments in labour are so large that they are not likely to be made unless population pressure makes such investment necessary. Unless population pressures are keenly felt, people may well reject more intensive methods of cultivation as being a bad bargain—far more work for only marginally more food (41).

Boserup’s argument for the relationship between population growth and the intensification of production had great influence on ecological-evolutionary theory as proponents attempted to explain the Neolithic Revolution. Mark Cohen, Marvin Harris, Jared Diamond, and others used Boserup’s basic argument to link population pressure to the original agricultural revolution in which hunters
and gatherers made the transition to agriculture in response to population pressure forcing a change in their way of life.

Marx also includes population in his conception of the material foundation of sociocultural systems. “According to the materialist conception of history,” Marx and Engels (1962, 488) write, “the ultimately determinant element in history is the production and reproduction of real life.” Marx differs from the Malthusian view, however, in that he asserts that the reciprocal relationship between population and production was a historical rather than a natural one. “It was, of course, far more convenient, and much more in conformity with the interests of the ruling classes, whom Malthus adored like a true priest, to explain this ‘over-population’ by the eternal laws of Nature, rather than by the historical laws of capitalist production” (Marx [1867] 1915, 580n). Under capital, this relationship took on a peculiar character. Labour became a commodity to be sold on the market, its price determined by workers’ subsistence needs (food, clothing, fuel, and housing), the level of civilization in which expectations were formed, and the amount necessary for the workers to reproduce their replacements. Marx includes the cost of educating a workforce in this calculation, asserting that the cost would vary according to the complexity of the labour power required. He also points out that this cost would be exceedingly small in the case of unskilled labour—a growing part of the labour pool under industrial capitalism (191).

According to Marx, the booms and busts of capitalism are responsible for first stimulating population growth and then crushing large numbers of people under the weight of unemployment and underemployment—a view we will return to in later chapters. Not only does population pressure stimulate technological development in production and the conquest of new lands, but it also has a direct impact upon the division of labour within a society, a fact also much remarked upon by both Herbert Spencer and Émile Durkheim. In fact, all macrosociologists have incorporated population level, growth, and density as major factors in the origin, maintenance, and evolution of sociocultural systems.
That Marx’s theory is very much focused upon the mode of production is widely known. What is less clear, and is the subject of much debate, is precisely how Marx defined the mode of production. In his writings, Marx variously refers to the mode, forces, means, and relations of production, without necessarily specifying the exact scope of these terms. Many of his followers have further muddled the issue by focusing more or less exclusively on the economic structure of societies (capitalism, in the modern case), without distinguishing the relations of production from technology and other material factors. Although some sociologists have subsumed Marx’s material forces of production under the relations of production, it is likely that Marx held the two as separate entities, giving the bulk of his theoretical attention to the relations of production—that is, the economy and, in his own day, capitalist economic relationships and their impact on the rest of the sociocultural system.

Marx appears to divide the mode of production into two parts: the “forces” and the “relations” of production. The forces of production consist of production technologies and the division of labour; the relations of production are the economic relationships based on these technologies and the consequent systems whereby products and services are distributed. So, while Marx begins with the forces of production, his sociology very quickly moves to the relations based on this technology—in other words, the economic structure of a society. The economic structure, he maintains, is firmly grounded in the material forces of production. “Social relations are closely bound up with productive forces,” he writes. “In acquiring new productive forces men change their mode of production; and in changing their mode of production, in changing the way of earning their living, they change all their social relations. The hand-mill gives you society with the feudal lord; the steam-mill, society with the industrial capitalist” ([1847] 1955, 92).

True to systems form, Marx argues that while the relations of production are rooted in the material forces of production, they also interact with these forces of production, such that each transforms the other. In The Communist Manifesto, for example, he and Engels
note that as production technologies evolved, feudal relations of property became outmoded, paving the way for the rise of the bourgeoisie and, in turn, the development of industrial technologies:

The bourgeoisie, during its rule of scarce one hundred years, has created more massive and more colossal productive forces than have all preceding generations together. Subjection of Nature’s forces to man, machinery, application of chemistry to industry and agriculture, steam-navigation, railways, electric telegraphs, clearing of whole continents for cultivation, canalisation of rivers, whole populations conjured out of the ground—what earlier century had even a presentiment that such productive forces slumbered in the lap of social labor? We see then: the means of production and of exchange, on whose foundation the bourgeoisie built itself up, were generated in feudal society. At a certain stage in the development of these means of production and of exchange, the conditions under which feudal society produced and exchanged, the feudal organisation of agriculture and manufacturing industry, in one word, the feudal relations of property became no longer compatible with the already developed productive forces; they became so many fetters. (Marx and Engels [1848] 1954, 15–16)

Marvin Harris (1999, 187–88) argues that it is useful for modern theorists to separate material and behavioural phenomena from structural and cultural phenomena. I agree with Harris’s assessment and will therefore distinguish between these two types of phenomena. For purposes of this work, the forces of production within a society—whether hunting and gathering, horticulture, or industrial technologies—will be examined as a phenomenon separate from the economic system (or relations of production) of that society. The forces of production will here be confined to production technology and the division of labour, that is, to the material and behavioural forces used to extract resources from the environment and shape them to human ends; the relations of production, or the economic organization based on these material forces, will be considered as an element of social
structure. As Marx and Engels point out above, changes in the forces of production have some very real effects on economic relationships.

What types of technology should we include in the material infrastructure? In a remarkable passage much overlooked in the secondary literature, Marx ([1867] 1915, 406n) draws an analogy between the technology of production and the evolution of the organs of plant and animal life:

Darwin has interested us in the history of Nature’s Technology, i.e., in the formation of the organs of plants and animals, which organs serve as instruments of production for sustaining life. Does not the history of the productive organs of man, of organs that are the material basis of all social organisation, deserve equal attention? And would not such a history be easier to compile, since, as Vico says, human history differs from natural history in this, that we have made the former, but not the latter? Technology discloses man’s mode of dealing with Nature, the process of production by which he sustains his life, and thereby also lays bare the mode of formation of his social relations, and of the mental conceptions that flow from them.

Following Marx’s analogy (if not his imprecise terminology), the forces of production include all technology used by a society to exploit its environment. This technology consists of physical technology, such as tools and machines, and social technology, or the division of labour. This conception is consistent with Marvin Harris (1979), who includes only material and behavioural characteristics in his category of infrastructure. Harris argues that whatever Marx may have had in mind, the mode of production should include only “the technology and the practices employed for expanding or limiting basic subsistence production, especially the production of food and other forms of energy, given the restriction and opportunities provided by a specific technology interacting with a specific habitat” (52). All physical and social technologies that directly affect the production of food, the extraction of energy and raw materials, and
the fashioning of these materials into useful goods are components of the mode of production. All of these technological factors have been found to have strong effects upon not only the environment but also social structures and cultural ideas and ideologies.

Max Weber is widely seen by sociologists and anthropologists as an idealist, a theorist who posits that cultural ideas and ideologies are prime movers in society. Much of this image is due to the popularity of his *Protestant Ethic and the Spirit of Capitalism* and much to his insistence on systemic analysis. As a result, there is no clear weighting of the different parts of the system in Weber, although even a cursory reading reveals that his analyses often include such material factors as geography, natural resources, and production technology. In discussing the development of modern industrial manufacturing, for example, Weber calls on many factors, defining the modern factory as a concentration of the ownership of the workplace, means of work, power source, and raw materials in the hands of a single entrepreneur ([1923] 2003, 302).7

Weber goes on to identify industrial technique and machinery as a product of capitalism and defines industrialism as a part of the “mechanization and rationalization of work” (303). He asserts that England gained much technical knowledge of the textile industry through contact with other societies, particularly Italy’s early cotton manufacture. It is from this technological base that England developed the industry. In historical fashion, Weber then identifies the development of the cotton industry in eighteenth-century England as being the first establishment of the factory system “which determined the character of the evolution of capitalism” (302). He details the political competition between wool and cotton manufacturers, an immediate challenge to the cotton industry, and the limitations of technology on the development of the textile industry, many of which were overcome with the invention of the power loom in 1785 by Cartwright, “one of the first inventors who combined technology with science and handled the problems of the former in terms of theoretical considerations” (303–4).8
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It is at this point that Weber turns to purely material-environmental relationships to explain the evolution of modern industry. Until the eighteenth century, he writes, the primary source of fuel in England was wood.

Everywhere the destruction of the forests brought the industrial development to a standstill at a certain point. Smelting [of iron] was only released from its attachment to organic materials of the plant world by the application of coal. . . .

In the face of the further development [in the use of iron] arose two difficult problems. These were set, on the one hand, by the danger of deforestation and, on the other, by the perpetual inroads of water in the mines. . . . The solution of the [first] problem was reached through the coking of coal, which was discovered in 1735, and the use of coke in blast furnace operation, which was undertaken in 1740. . . . The threat to mining was removed by the invention of the steam engine. (304–5)

The steam engine was developed as a way of pumping water out of the mines, and by the end of the eighteenth century, coal was being produced in quantities necessary for modern industry. The switch from a resource base primarily dependent on wood for energy and raw materials to one relying on coal and iron had three significant consequences, according to Weber. First, by developing the technologies to exploit fossil fuels and iron, England freed itself from the traditional constraints of animal power and plant growth (305). Second, the need for human labour in the production process was reduced. In terms reminiscent of Marx, Weber adds: “Not altogether, it is true, for it goes without saying that labor was indispensable for the tending of machines. But the mechanizing process has always and everywhere been introduced to the definite end of releasing labor; every new invention signifies the extensive displacement of hand workers by a relatively small man power for machine supervision” (306). The third consequence, Weber notes, was the systematic application of
science to the production process, which freed production from the fetters of tradition (306).

So it is in classic materialist fashion that Weber cites the intensification of production first leading to environmental depletion (forests and easily available coal), which called forth technological solutions (the use of coke in blast furnaces and the invention of the steam engine to pump water out of mines) and changes in the division of labour, which, in turn, created the material conditions necessary for capital industrial development. Weber then goes a step further in characterizing these developments as part of the rationalization process.

In addition to the technology directly involved in the production of goods, Marx and others make a good case for including communication and transportation technologies as central to understanding sociocultural systems. For example, much like Durkheim and Spencer, Marx saw population level and density as a direct cause of the increasing division of labour. In addition, he notes that communication technology can make population density relative: a well-developed system of communication that enables a widespread population to communicate across long distances allows for an increased division of labour. Marx saw the intensification of communication and transport as a necessary part of the intensification of production. The communication and transportation technologies of traditional societies proved wholly inadequate in the transition of early manufacturing into large-scale industrial production. The revolution in production required a similar revolution in the fields of transportation and communication—the two were in an autocatalytic relationship. Production technology plays an important role in the theories of Marx, Spencer, Durkheim, and Weber, as well as in those of most modern macro theorists. Among modern theorists who place a special premium on communication technology are Elizabeth Eisenstein, C. Wright Mills, and Neil Postman. As we will see in later chapters, production and communication technologies significantly impact bureaucracy, economic systems, and the state, as well as community and culture.
DIVISION OF LABOUR

A variety of social scientists have established the intimate relationship of the division of labour both to the development of physical technology and to population level and density; indeed, division of labour is the primary social technology by which human societies adapt to their environments, and, as such, it significantly impacts social structures and cultural superstructures. The concept of the division of labour has a long history in the social sciences. The social division of labour is the breakdown of labour on the basis of sex, age, and craft specialization. All human societies make these basic distinctions and assign labour accordingly. Based largely on age and sex roles, the social division of labour entails the assignment of specific tasks to individuals and allows some minimal specialization and expertise in the performance of these tasks to be developed. Because of this development of expertise, the social division of labour is an important factor in the rate of technological development. In its initial stages, the division of labour is simple enough to allow individuals to exercise many of their mental, physical, and social capacities in their assigned tasks.

In contrast to the social division of labour, Marx writes of the manufacturing or detailed division of labour, a much more extreme phenomenon. The detailed division of labour breaks down the manufacturing of a product into simple discrete steps and then assigns each step to an individual worker. The more these steps are broken down into the simplest actions on the part of the workers, the more efficient the manufacturing process becomes. Capital, both Adam Smith and Karl Marx agree, is one of the driving forces behind the manufacturing division of labour. This was first described by Adam Smith ([1776] 1887, 5–6) in *The Wealth of Nations* in reference to the manufacture of pins:

> The greatest improvement in the productive powers of labour, and the greater part of the skill, dexterity, and judgment with which it is anywhere directed, or applied, seem to have been the effects of
the division of labor. . . . To take an example, therefore from a very trifling manufacture; but one in which the division of labour has been very often taken notice of, the trade of the pin-maker; a workman not educated to this business (which the division of labour has rendered a distinct trade), nor acquainted with the use of the machinery employed in it (to the invention of which the same division of labour has probably given occasion), could scarce, perhaps, with his utmost industry, make one pin in a day, and certainly could not make twenty. But in the way in which this business is now carried on, not only the whole work is a peculiar trade, but it is divided into a number of branches, of which the greater part are likewise peculiar trades. 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; and the important business of making a pin is, in this manner, divided into about eighteen distinct operations, which, in some manufactories, are all performed by distinct hands, though in others the same man will sometimes perform two or three of them.

An individual artisan doing all of the steps himself, Smith estimates, would be hard pressed to produce twenty pins a day. He had observed small factories in which ten men engaged in the detailed division of labour produced 48,000 pins a day. This would amount to some 4,800 pins for each man, or twenty-four times what they could produce using traditional methods.

Smith asserts that the division of labour is promoted by capitalist firms because it increases productivity through three specific characteristics. First, breaking the production up into simple discrete tasks encourages an increase of dexterity in repeatedly performing a simple operation. Second, this division of labour saves time that is lost by a worker changing from one task to another. And third, it encourages the invention of machines to assist the workers in accomplishing their tasks. Beyond these technical advantages to the
detailed division of labour, Harry Braverman ([1974] 1998, 57) points out a significant cost advantage as well: by specializing in a single task, the detail worker becomes “unskilled” labour. Far from being an artisan in the manufacture of pins, the detail worker is coming to the labour market without any distinctive skills to offer, his labour being interchangeable with a multitude of others. As unskilled labour, he has little leverage in increasing his wage, and the capitalist has little incentive to pay him more than the prevailing minimum for such labour. So not only will the ten skilled pin makers produce only a fraction of the amount of pins that will be produced by the ten unskilled labourers when the work tasks are “properly divided,” but the ten skilled workers will also have to be paid a higher wage. Breaking a task into discrete steps not only makes it easier to train a worker to perform that step, but it also makes it easier to design a machine to do the task. In addition, the detailed division of labour increases the manager’s control over the labour process. No longer will the manager be at the mercy of the work rules, specialized knowledge, or high salary demands of the skilled artisan. By dividing the work up in such detail and using machines to assist in the tasks, the manager gains direct control over the process and pace of the work. The detailed division of labour is thus carried out with no regard for human needs and capabilities.

Marx ([1867] 1915) proposes that the detailed division of labour arose in early manufacturing when capitalists began gathering together skilled artisans into a single factory under their command. “But whatever may have been its particular starting point, its final form is invariably the same—a productive mechanism whose parts are human beings” (371). Marx points out that with the development of machines, capital carried the detailed division of labour ever further: “According to Adam Smith, 10 men, in his day, made in co-operation, over 48,000 needles a-day. On the other hand, a single needle-machine makes 145,000 in a working-day of 11 hours. One woman or one girl superintends four such machines, and so produces near upon 600,000 needles in a day, and upwards of 3,000,000 in a week. A single machine, when it takes the place of co-operation or of
manufacture, may itself serve as the basis of an industry of a handi-
craft character” (502–3).

The detailed division of labour ultimately separates mind and
body. The higher mental functions of creativity and control are
assigned to the capitalist or to a paid manager; the worker is assigned
to perform an unskilled physical task or, worse, to tend a machine.
The worker loses all control and creativity over work and product.
Marx states, “Some crippling of body and mind is inseparable even
from division of labour in society as a whole. Since, however, man-
ufacture carries this social separation of branches of labour much
further, and also, by its peculiar division, attacks the individual at
the very roots of his life, it is the first to afford the materials for, and
to give a start to, industrial pathology. ‘To subdivide a man is to
execute him, if he deserves the sentence, to assassinate him if he does
not. . . . The subdivision of labour is the assassination of a people’”
(399; the last lines quote David Urquhart, *Familiar Words*, 1855). In
sum, the detailed division of labour dismembers individual workers
and is a crime against their humanity. The resulting jobs are repeti-
tious, mind numbing, low paying, and devoid of human initiative
and thought.

This detailed division of labour has directly affected social
organization in the form of bureaucratization. In chapter 5
(“Bureaucratization”), we will examine how Weber roots the devel-
opment of bureaucracy in the growth in the level and density of
population and in the growing complexity of modern production
technologies. One of his followers, C. Wright Mills ([1951] 1973,
205–6) adds the development of office machines as a force to simplify
and routinize clerical and management tasks—this before the devel-
opment of modern computer technology. The increasing division of
labour—breaking down tasks to their simplest components—leads to
increasing mechanization and less power and control by the workers.
Growing bureaucratization (and its concomitant division of labour)
are also explored in chapters 6 (“Capital”) and 7 (“The State”).

Durkheim made the division of labour the centrepiece of his soci-
ology. Consistent with Weber, Durkheim saw the division of labour
as existing within the coordinating bureaucratic organizations of corporations and states, as well as in the actual production and distribution of goods and services. As in Weber’s work, Durkheim’s theory of the increasing division of labour over time is rooted in materialism and evolutionary theory. The increasing division of labour, Durkheim maintains, does not occur merely because people are attracted to it in order to increase productivity or human happiness. Rather, its increase has material causes. Durkheim ([1893] 1997, 262) argues that the division of labour “varies in direct ratio with the volume and density of societies”; as societies grow in population, “they necessitate a greater division of labor.” Population growth and density is “its determining cause.” As population grows and becomes more concentrated, the intensity of the struggle for survival rises, and individuals begin to specialize in order to avoid directly competing with one another for subsistence. Durkheim’s theory of the increasing division of labour is thus both materialistic and explicitly evolutionary in character. We will examine the impact of this increasing division on community more fully in later chapters.

**INTENSIFICATION**

It has long been recognized by anthropologists that over the course of sociocultural evolution, societies have increased their production of goods, experienced accelerating population growth, and consumed ever greater amounts of energy and raw materials (Harris 1979, 67). Part of the reason for this growth in production and reproduction is the autocatalytic relationship described earlier, but other factors are also involved. With population, for example, there is an exponential component to growth. Malthus hypothesized that without checks, the human population has the potential to double in size every twenty-five years. Of course, he understood that with the inevitable checks on this population, actual growth is much lower, but the potential for rapid growth is always there.
The mechanics behind this exponential growth are quite apparent. When there is an increase in population, two types of babies are born: boys and girls. Over time, many of the girls born today will bear more than two children, who will also give birth three or more times. Thus, an increase today leads to further increases tomorrow unless that growth is constrained. There is a similar exponential component in the production of goods. Societies produce two types of goods: consumer and capital. Capital goods are used in the production process itself. In simple societies, capital goods include tools such as hoes, spinning wheels, and looms; in more complex societies, capital goods include machinery, factories, tractors, and power plants. “A steel mill can make the steel for another steel mill; a nuts-and-bolts factory can make nuts and bolts that hold together machines that make nuts and bolts; any business that makes a profit generates money for investment to expand the business” (Meadows, Randers, and Meadows 2004, chap. 2). Thus, an increase in goods today leads to further increases tomorrow. Neither population nor production always grow, since they are both subject to fluctuations in constraints, but both are structured to grow exponentially in the absence of constraints.

Material factors that influence the growth rates of population and production include environmental factors such as the availability of raw materials and arable land, pollution, and climate. These environmental factors can change with human activity, especially when human populations run into the billions and are armed with technology that can move mountains (or at least remove their tops), but even prehistoric societies had the potential to deplete environments. As production and population of a society intensifies, the environment depletes, causing societies to further intensify their production processes or, with extreme depletion, change the resource base upon which they rely. If they are unable to change their resource base because of limited cultural knowledge or structural obstructions, they experience population collapse.

The process of intensification can clearly be seen in sixteenth-century Western Europe’s increasing harvest of wood for use as its
primary energy and material resource, which eventually led to forest depletion and the transition to coal as an energy source. Widespread use of this new energy source necessitated numerous technological innovations (the steam engine being a prime example) and eventually led to a revolution in technology and in the division of labour as well as a concomitant increase in population (Elwell 1999, 33–37). We are undergoing a similar process today with the exploitation of oil. When this fuel source was first tapped, we exploited oil resources close to the ground and close to home. Over time, we have had to go further afield, deeper into the ground, and even under the oceans—to the point that today our technology is stretched to the breaking point. As we run up against these limits, some are advocating continued intensification in our exploitation of oil, others a switch to new energy sources. Both strategies will necessitate significant technological development as well as tremendous change in other parts of the system.

The division of labour—part of the production process itself—is also a critical factor in terms of increasing productivity. As Spencer and Durkheim pointed out, this increase in the division of labour is directly related to population growth, and, as Marx noted, the increase is also strongly related to both the growing complexity of the production process and the structure of capitalism, which spurs technological innovation as well as the detailed division of labour. Other structural factors that affect the rate of growth of population and production include the organization of the family, the military, and the government, as well as cultural beliefs and ideologies. The research strategy of the materialist is to begin the analysis with material factors; only when these have been fully explored and acknowledged, does one move on to structural and superstructural factors. This is not to say these non-material causes are always less important—as we will see, structures and superstructures have great influence in the stability and change of sociocultural systems—but such factors are part of a system and are conditional on material factors.

It is not simply the rate of growth of production and population that is significant in hyperindustrial societies; it is also the massive
levels of population and production. When exponential growth is applied to this base—even the slowing rates of growth recently experienced by industrial societies—tremendous physical growth results. One way to gauge the size of productive activities within a nation-state is through the gross domestic product, or GDP. GDP is defined as the market value of all goods and services produced within a nation-state. After slightly more than one hundred years of intensifying industrialization, the United States reached a GDP of $6.1 trillion dollars in 1983. By 2009, a mere twenty-six years later, the GDP had increased to well over $12 trillion, more than doubling in size (US Department of Commerce 2012a, Table 588; figures are in constant 2005 dollars, so inflation is not a factor). Canada has undergone even more explosive growth, going from $333.81 billion in 1983 to $1.34 trillion in 2009 (data.worldbank.org). And it is not only the sheer size and rapidity of economic growth to which a society must adjust. Other issues abound. Rapid and massive growth of the mode of production, we will see, must necessarily have massive impact on the rest of the sociocultural system.

Population level and growth show a similar pattern to GDP. Both, of course, are intimately related to economic growth. Population growth means more available workers, more consumers, and thus a growing GDP. In fact, it is estimated that population growth alone accounts for over half of all recent economic growth in the United States (Miller 2004, 202). Population growth accounts for a significant part of the growth not only in the overall GDP but in the GDP per capita as well.

Although the rate of increase in population has slowed significantly in hyperindustrial societies, the numerical increase continues to be substantial. For example, in the United States the rate of population increase peaked during the initial wave of industrialization in the 1800s, when it was growing at about 35 percent per decade; however, the much slower rate per decade today, about 13 percent, leads to much greater increases in actual numbers: over thirty-two million people were added from 2000 to 2010, more people than populated the entire United States in 1860 (Elwell 2006, 59–61).
These additional people all have to be housed, clothed, fed, socialized, loved, policed, and provided a variety of services. Again, it is not only the exponential growth rate of population that distinguishes hyperindustrial society; it is the level of real physical growth.

Along with increasing population levels and rates, population density and the percent of the population that is urban have increased dramatically over the twentieth century in Western societies; for example, more than 80 percent of all North Americans now live in urban areas. Population growth is uneven within a nation-state due to uneven economic development and resulting migration patterns: economic activity and growth are strong magnets for both internal and international migration. Both types of immigrants tend to be young and thus have higher fertility rates than those that stay behind. Thus, high migration rates lead to higher birth rates, all of which leads to further economic growth.

Hyperindustrial societies tend to have declining fertility rates. Contributing to the decline in fertility is the postponement of marriage and children, as young women attend college or enter the workforce and young couples take time to establish themselves financially in a modern economy. Such shifts mean that today’s young women have fewer years in which to have children once they start and, consequently, have fewer children over the life course. Another factor behind the decline in fertility is the rising cost of raising children. Yet another set of factors leading to fewer children is the institution of child labour laws, the decline of family farming, the movement of women into the outside labour force, the rise of consumerism, the establishment of social security and private pensions, and the ready availability of contraceptives, making it easier for women to control their fertility. Finally, other characteristics that affect both population and economic growth, as well as other parts of the sociocultural system, include the age/sex structure of the population, minority/majority population structures, marriage rates, death rates, morbidity, and reproductive practices.

An example of how the age structure affects other parts of the sociocultural system is found in the general aging of hyperindustrial
populations and its effects on governments and politics. Because of the constantly expanding number, wealth, and political clout of the elderly in these societies, governments have developed programs such as social security, medical care, and a host of other welfare programs to meet their needs. So powerful have the elderly become that politicians find it extremely difficult to back programs that run counter to their interests. Businesses have also responded to their numbers and wealth, with ever more capital devoted to long-term care, retirement communities, medical research for chronic conditions, and the creation of consumer goods specifically designed to meet their needs.

The argument of this chapter, you will recall, is that macrosociology is very materialistic in its causal ordering, and that this material infrastructure consists of interrelated production, population, and environmental variables. Furthermore, macro theorists have argued that these material variables have profound effects on other structural and superstructural components of sociocultural systems. Since material infrastructure is what a society manipulates in order to fit into its environment, it is essential for the society’s survival. Therefore, any widespread institutional structures—family, government, economic, or educational—must be consistent with this infrastructure; they must be consonant with the way people make their living. And cultural elements must also follow suit. Teachings of Christianity, for example, that are not consistent with the industrial mode of production will be abandoned or reinterpreted so as to be either neutral or supportive of the way in which people make their living. For example, prohibitions against usury and work on Sunday and the biblical parable about a rich man having as much chance of getting to heaven as a camel has of going through the eye of a needle have all been reinterpreted or redefined to better fit the needs of hyperindustrial society.13

Production and population characteristics have independent and combined effects on one another as well as on the rest of the sociocultural system. Among many other benefits, the intensification of production and population have manifest functions of providing an unparalleled material standard of living for the masses and of
promoting science, the arts, and mass education. But there are also many dysfunctions of infrastructural intensification:

1. Growth in population and production are based on a finite environment. There are limits to the amount of depletion and pollution that can be tolerated by the natural environment. While the emphasis on GDP expansion in hyperindustrial societies is gradually shifting away from manufactured goods and toward financial and service categories, the base of all economic activity is still (and must necessarily remain) resource extraction, agriculture, and the production of physical goods. The impact of infrastructural intensification on the environment was a concern of Malthus, Spencer, Marx, and, as we have seen, even Weber. It is a theme that has been carried over in modern macrosociology in the work of Gerhard Lenski, Marvin Harris, Stephen Sanderson, and, in the Marxist tradition, John Bellamy Foster.

2. The overall expansion of the economy and growth in population are among the primary causes of the growth and centralization of private and public bureaucracy. This has put inordinate economic, political, and social power and authority into the hands of a few at the top of these organizations. This centralization and concentration of power and authority has caused a growing dependence of professionals and the middle class on corporate bureaucratic organization. Growing economic concentration was, of course, a major concern of both Marx and Weber. Modern macro theorists who are especially concerned with this growing concentration include C. Wright Mills, Harry Braverman, and John Bellamy Foster. The expansion of necessary governing sectors to coordinate the increasing complexity is a phenomenon much remarked upon by Herbert Spencer and later taken up by both C. Wright Mills and Robert Nisbet.

3. The growth in the size and wealth of economic organizations combined with the uneven growth of various sectors of this
economy (such as banking, services, manufacturing, trade, arms manufacturing, and the military service sector) has tremendous impact on the power and interests of economic elites. This Marxist theme is carried forward today by John Bellamy Foster, Immanuel Wallerstein, and Stephen Sanderson.

4. The “creative destruction” of industry—the constant rise of new industries to the detriment and eventual destruction of the old—and the growth and decline of population also create disruption in the life of the community. Uneven growth is especially disruptive. Communities must expand and contract employment, schools, water and sewer lines, roads, and other community facilities to respond to the changes brought about by such a dynamic infrastructure.

5. The need for individual and family mobility because of the ever changing needs of the economy have personal costs as well. A transient population is unlikely to put down deep roots, join civic organizations, establish neighbourhood ties, or identify closely with place. Geographical mobility has also placed great stress on extended families, and the growth of dual-career families is increasing the stress on nuclear families. The disruption of community life and its consequent impact on individuals is a dominant theme in the sociology of Émile Durkheim and is emphasized today in the work of Robert K. Nisbet, David Riesman, and Stjepan Meštrović.

6. The increasingly detailed division of labour that is part of the intensification process combined with the creative destruction of many industries and the rise of new industries produces constant churning of the labour force. This has meant the disruption of lives through unemployment and the loss of skills for many individuals. This phenomenon was extensively examined by Marx and has been carried forward by Harry Braverman, among others.

7. The expansion of industrial capitalism has led to the commodification of social life. More and more of the goods and services that used to be supplied by one’s family or
community are increasingly being integrated into the market economy (or the “big bazaar” of Mills). The pervasive exposure to advertising has created a consumer culture in the West based on comfort, consumption, and instant gratification, all phenomena much commented upon by Weber, C. Wright Mills, Harry Braverman, and George Ritzer.

8. All of these structural changes—disruption of community, growth in bureaucracy, commodification, and changes in occupational structure (particularly the detailed division of labour)—have contributed to the rationalization of social life. A concept introduced to sociology by Max Weber, rationalization is a theme in the modern macrosociology of Norbert Elias (who speaks of “the civilizing effect”), C. Wright Mills (who distinguishes between rationality versus reason), and George Ritzer (who refers to “McDonaldization”).

9. Finally, one of the most important dysfunctions of the incredible economic expansion and growing population is a widening inequality both within the nation-state and between nations. Almost all macrosociologists address inequality, but the theme is especially noteworthy in the work of Harry Braverman, C. Wright Mills, and Gerhard Lenski.

In the chapters that follow, I examine both functions and dysfunctions of production and reproduction with regard to various structural and superstructural characteristics as demonstrated by a variety of classical and contemporary macrosociologists. I also detail how these structures and superstructures have reciprocal effects on the infrastructure of society. But first, we must explore the strong current of evolutionism in the discipline of macrosociology, for it is evolutionism that animates the system.