THREE GREAT SOCIAL REVOLUTIONS: AGRICULTURAL, INDUSTRIAL, AND INFORMATIONAL

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The human race is on the threshold of a great new social revolution; the information revolution. It is an extension of, and successor to, the agricultural and industrial revolutions. The basic characteristics of the information revolution will be made clear by the introduction of the theory of societal technology and by comparing it with the agricultural and industrial revolutions.

Societal Technology as the Core of the Great Social Revolution

Mankind has so far experienced two great social revolutions — agricultural and industrial. At the base of these great social revolutions are to be found innovations in the system of societal technology. This term, as I use it here, has the following four funamental characteristics:

1. Many different technological innovations are joined together to constitute one complex system of technology.

2. These integrated systems of technology spread throughout society as a whole and gradually take root.

3. As a result, a rapid expansion of a new type of societal productive power occurs.

4. The development of this new societal productive power has an impact great enough to transform traditional society and to establish new norms and values.

Man has experienced two types of societal technology: agricultural and industrial. Agricultural technology is an integrated system concerned with the efficient exploitation of usable and edible plants and animals. As an integrated system of technology, it came into being when the production of various agricultural implements (ploughs, hoes, sickles, grinding stones, etc.) combined with the sciences of measurement, design and construction (engineering, astronomy, meteorology, geometry, etc.). This occurred with the emergence of irrigation farming technology, the first real agricultural technology, and was possible only through the co-operative social

labour of a large number of people, many more than in a primitive hunting tribe.

Industrial technology is an integrated system for changing natural resources into useful goods. For industrial technology to emerge, the tools of industrial production — various types of machinery and processed materials (fossil fuels, metal alloys, the steam engine, etc.), and the development of both basic and applied sciences (physics and chemistry, mechanical and electrical engineering, etc.) — were joined with a mass labour pool divided into many modes. A rapid advance in industrial productive power was brought about when these integrated industrial technologies spread throughout society as a whole. They began to take root and the societal transformation to industrial society took place. The basic difference between industrial technology and agricultural technology is that while agriculture stopped at effective reproduction through the application of natural phenomena, industrial technology made it possible to transform natural phenomena. In other words, man was able to produce on a mass scale various types of useful industrial products which had not existed as natural objects prior to that.

Mankind is in the process of emerging into the third societal technology — informational technology. Informational technology is an integrated system of computer and communications technology combined with interdisciplinary social sciences (information science, systems science, sociology and behavioural sciences). This has created a new scheme of societal technology which constitutes a new system that produces informational values, as against agricultural and industrial technologies, which produce material values.

The greatest contribution to human society thus far made by this informational technology has been the formation of networks of cognitive information. The information produced by the computer has rapidly increased the scale and quality of cognitive information in society because computer information is goal-oriented, logical, and action-selective. Moreover, because computer information is complex and systematised, and because it joins communications technology with data processing technology, it has led to rapidly expanded cognitive information networks.

Agricultural Revolution — Religious, Compulsory, Traditional

Agricultural productive power, which was the base on which the agricultural revolution developed, depends decisively on natural power, such as land, weather and the natural system. The universe was thought to be ruled by the will of a god or gods, whose divine rules largely determined human behaviour and the social system. The natural system, therefore, provided the values and human standards.

This led to established religion centering on Aristotelian views of the universe, and concepts that belonged to medieval and ecclesiastical thinking. Those who opposed or violated the law of the gods were classed as heathen and immoral. Man, tied to the land, was unable to escape from the conditions imposed by the seasons and the passage of time. This resulted in farming becoming centred on compulsory labour and the formation of a village-centred society.

In medieval times in Europe, feudal lords and a small class of knights ruled the peasants. The peasants were bound to the land and not permitted to leave. Heredity determined occupation. It was the peasant's mandatory duty to deliver tribute to the lord in the form of part of the harvest produced each year. The rule of the fuedal lord functioned as a single and absolute law that encompassed all political, economic and social aspects of living. This led to the formation of the paternal social status and the establishment of a permanent and traditional society.

Industrial Revolution — Scientific, Competitive, Aggressive

In the industrial revolution, man possessed the capacity to change natural phenomena by the application of natural science. This released man from the shackles of land and weather conditions. The enormous development of industrial productive power made it possible to mass-produce manufactured goods. As a result, value standards changed from nature-centred to man-centred human values. Accompanying this was a switch in value standards from a religion centring on a future life to a life of statisfaction centring on material values of this world.

In this way, man no longer existed merely to sustain life; the human behaviour principle centred more on satisfaction of sensual and emotional desires. Ethical standards changed from obedience to the law of the gods to standards that were closer to human life, such as respect for human freedom and rights and the protection of ownership. But in the change, man found himself restricted to the establishment (enterprise, factory, hospital or other facilities) and labour changed from compulsory to employment labour.

A free competitive economic system came into being on market principles and price mechanisms, which automatically brought forms of economic order into industrial society. Expressed in Adam Smith's terms, commercial transactions were guided by self-interest in the give and take relations of *homo economus,* and changes in market values were brought about by that invisible hand. New societal systems emerged, with free competition of private business, commodity markets, parliamentary democracy, and the emergence of the management class and labour unions.

However, behind this materialism and the free competitive system, there has always been a mandatory control system involving natural law. Mankind has had the temerity to disregard the supreme life force in relations with nature, substituting natural science for the rules of nature, and treating the natural environment as an inexhaustible reservoir of resources, plundering resources in order to achieve maximum material satisfaction. This has led to widespread environmental disruption and to an upset balance between man and nature in the ecological sense.

Information Revolution — Intellectual, Synergistic, Global

In the informational revolution, man consciously improves the ability of knowledge-creation by applying informational technology. Knowledge-creation has two aspects — problem solving and opportunity development, and means the creation of new intellectual values. Intellectual values will replace past materialistic values. The aim is to achieve self-actualisation and the fulfilment of goal achievement needs. Human intellectual creativity will flourish generally in place of affluent material consumption. However, mankind will have the challenge and trial of new human characteristics. Mankind must develop knowledge-creation ability up to the level of social intelligence. Intelligence means the ability to make optimum action selection by the use of information and knowledge, and by positive adaptation to the changing social environment. Among a group, personal intelligence will be combined and harmonised toward the common goal of changing the social environment. That is social intelligence.

As to the nature of social form, the principle of synergism will replace free competition. The power for production of information by computer communications technology has always been of a synergistic character. Information does not disappear with use, and no matter how many times it is transferred, it continues unchanged. Another point is that the structure of production is characterised by man-machine self-multiplication of information, and the quality of information is raised by adding new information to what has already been accumulated.

The information utility will become the symbol of the information society. And the most effective use of the information utility will be joint production and shared utilisation of information by many people. Our attitude toward the natural environment will also change: from subduing and controlling it to a synergistic co-existence with it. The rebirth of synergistic relations of man and the supreme being (the ultimate life force) will take place, something that has meaning to all people, believers or non-believers in formal religion. Mankind will live

and work in harmony with nature. Put another way, man will come closer to universal super-life, human and divine acting as one.

The ultimate form of information revolution will be a global information society. This is not merely something to be desired, but a realistic concept of the ultimate stage of the information revolution. Three powerful bases underlie this assumption.

The first is that the spirit of the times will find expression as globalism in the future information society. This thought stems from the global crises of shortage of natural resources, destruction of the natural environment, the population explosion and the serious North-South economic and cultural gap. The second is that the development of a global information network utilising communications satellites and linked computers will promote mutual exchanges of information and deepen understanding that will override national, cultural and other differing interests. The third is that the total economic value of information goods produced will exceed that of material goods, and the economic system will change from a competitive, profit-seeking system to a contributory synergistic social system.

Grand Design of the Global Information Society

A desirable and feasible grand design of the global information society can be pictured boldly as follows:

a. Establishment of a World Information Organisation (WIO). The main aims of the WIO will be to ratify an international treaty on the joint utilisation of communications satellites, to formulate a long range global information policy, and to promote the standardisation of equipment and software.

b. Formation of a global information utility. Any ordinary citizen will be able to obtain all desired information readily, at low cost, at any time and at any place. The participation of citizens in originating useful information, and formation of a data bank will be essential.

c. Development of a global education system. The level of literacy of the world population will be above 90 per cent, and a universal world language, distinct from Esperanto, will be developed.

d. Development of a global medical care system. This system would eliminate epidemic and endemic diseases, such as leprosy and malaria, and the practice of birth control will become universal.

e. Simultaneous reduction of the industrial and information gap. The simultaneous introduction of sophisticated and carefully considered industrial and information technologies will narrow this dual gap between North and South, and contribute indirectly to the emergence of a global eco-system.

f. Establishment of a global watch-dog institute. By utilising inspection satellites and a world simulation model, early warning signs or trends toward global crises affecting human life would be quickly detected, and the information passed accurately to all citizens at once.

g. Flourishing of Global Voluntary Informational Communities (GVIC). Communities that have information space functionally bound together by voluntary information networks will have an important role in the global information society. The most needed and feasible community would be non-smoking, have zero-population growth, and be against nuclear weapons.

We are moving toward the 21st century with the very great goal of building a global informational civilization, the historical monument of which will be only several chips one inch square in a small box. But the box will store a multitude of historical records, including the record of how four billion world citizens overcame the energy crisis and the population explosion; how they achieved the abolition of nuclear weapons and complete disarmament; how they conquered illiteracy, and created a rich symbiosis of man and nature.