Chapter 12

Some General Regularities of Techno-Economic Evolution*

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12.1 Introduction

One of the most exciting phenomena of the modern world is the fundamentally homogeneous direction of the overall techno-economic development trajectory in practically all regions of the world. The existing economic systems in different countries are collapsing one after another under the pressure of an expanding *industrial culture* and are becoming drawn into the international division of labor. Simultaneously, their economic development is influenced by the general regularities of the world techno-economic system, the rhythm of which is set by the industrially developed countries. These general regularities of long-term techno-economic development, invariant under different sociopolitical systems, are the subject of this chapter.

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12.2 Regularities of Technological Change

The key factor that directs the overall techno-economic development trajectory is technological change. During the last few decades the problems of technological change have been the focus of interest in economics. A new concept has evolved which views economic dynamics as an uneven and uncertain process of evolutionary development (Dosi *et al.*, 1988). From this point of view technological change is a complex interaction of various technological alternatives, carried on by competing and collaborating economic agents in similar institutional environments. The selection of techno-economic development alternatives and their implementation in technological shifts and structural changes take place as a result of learning processes (which are determined by various nonlinear feedbacks – positive and negative) that influence the dynamics of the interaction of technological and social change.

The concept of economic growth as a complex, nonlinear and uncertain process involving permanent changes, allows us to develop a new approach in studying the regularities in long-term techno-economic development and the management of technological change. Feedbacks stipulate the interaction of various elements in the socioeconomic system in the course of technological shifts and determine the directions and rates of evolution of the economy. The modeling of these feedbacks becomes a priority task of economics.

This new approach predetermines a new vision of economic structure. It is important to select a view of the economic system that can ensure the stability of its components and of interrelations between them in the process of technological change. Such a vision of economic structure assumes a corresponding choice of its primary *element.* This element should not only preserve integrity in the process of technological change, but it should be a carrier of corresponding innovations, i.e., it need not necessarily be disaggregated to describe and measure them.

The changing driving forces of the form and direction or of the overall techno-economic development trajectory have recently been summarized by Freeman and Perez (1988). In a Schumpeterian tradition, they distinguish four successive modes of growth (or *techno-economic paradigms*) since the onset of the industrial revolution. These modes of techno-economic development are driven by the growth of *leading branches* and growth sectors which involves a synergetic aggregate of key factor industries, technologies, and infrastructures.