Preface

We can be but partially acquainted even with events which actually influence our course through life, and our final destiny. There are innumerable other events, if such they may be called, which come close upon us, yet pass away without actual results, or even betraying their near approach, by the reflection of any light or shadow across our minds. Could we know all the vicissitudes of our fortunes, life would be too full of hope and fear, exultation or disappointment, to afford us a single hour of true serenity. (Nathaniel Hawthorne (2001), *Twice-Told Tales*, p. 139)

Linear thought is usually in front of us even if we fail to recognize it. We move and act and, indeed, believe, supposing that the event that happened yesterday will do so again tomorrow. An event that has continued for several years, however, will not always continue indefinitely. Although events in society are often governed by nonlinear factors, we cannot escape from linear thinking and thus often we make mistakes and suffer from the unanticipated consequences of our actions. We can, however, grasp the nonlinear aspects through careful examination. This book is a first step towards elucidating such nonlinear aspects.

This book analyzes the nature of innovation in detail, clarifies its dynamism, and describes its concrete features as a trajectory. Through exploration of the dynamism of innovation, the causal relationship between innovation and economic development is elucidated. This is a comprehensive study designed to interpret the developmental scenario of a modern industrial society.

Schumpeter expressed with deep insight the dynamic economics of technological change by using a metaphor he called the ‘gale of creative destruction’. This indicates a dynamic system of economy in which innovations break down the old customs and equilibrium of an economy to jump up to a more advanced economic system with higher value-added. This is a challenge to conventional economics, which presupposes a balanced economy that is continually in equilibrium. Since then, neo-Schumpeterians have developed an economics of technological change and have built up the present economics on the basis of empirical analyses.

Now, many economists have moved into evolutionary economics. This is a metaphor for the evolutionary theory of life applied to economics. It seems to inherit Schumpeterian thought in terms of the notion of a dynamic

system with uncertainty. Evolutionary economics skillfully describes economic change in the age of innovation and is certainly a challenge to the analysis of innovative competition focusing on firm behaviors. Evolutionary economics, however, is apart from Schumpeterian analysis in that it is governed by the Darwinian approach based on gradualism, while Schumpeter's evolution takes place by an invasion of innovations with sigmoid functionality, which rather belongs to Gouldian 'punctuated evolutionary theory'. Further, evolutionary economics is based on deductive thinking while Schumpeter's is inductive.

This book analyzes the entire scheme of innovation and its correlation with economic development. It also clarifies the relation between the original Schumpeterian approach and evolutionary economics. Returning to the original approach by Schumpeter, the present study is carried out through inductive analysis of innovation and economic development on the basis of fact-finding. It is important to step into the field of technology development, which has been treated as the black box in economics, using a scientific approach to obtain a comprehensive picture of innovation.

This book is a substantial first step in clarifying the entity of innovation itself, beyond the domain of economics. It is an attempt to describe the abstract phenomenon of the development of innovation by using a concrete trajectory. It proposes a method for analyzing the process of knowledge transfer in the human community. In that sense, it is a kind of 'theory of field'. Furthermore, knowledge transfer from person to person is a discrete phenomenon in a complex system, and innovation is interpreted as a nonlinear complex system with fractals. The innovation is a phenomenon with maturation within a definite time span. Based on this nonlinear analysis, various interesting features of innovation are clarified and economic development is described from a new angle.

The author hopes that this approach will contribute to the development of a new branch of science and economics.

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