

Preface

Since its introduction approximately 200 years ago, the law of diminishing returns (LDR) has had a positive impact on economic activities. However, it has been a subject to various disputes depending on the viewpoints and preconditions adopted by researchers from different backgrounds. The development of a number of new topics, including globalization, global warming, and the low-carbon movement, has brought focus to sustainable development. Thus far, sustainable development remains a concept without a generally acceptable theory. In other words, sustainable development has not been validated as extensively as other economic theories because of the lack of evaluation criteria. An investigation of sustainable development shows that the core of sustainable development is intensive development. For example, in China, conservation of water, land, energy, and materials is generally known as a push for the development of a resource-efficient, environmentally-friendly, and sustainable society. In the meantime, “red lines” for arable land, water, and forest resources have been identified as part of a national strategy for efficient, intensive land use, all of which have brought new challenges to research aimed at addressing the balance between population expansion and resource supply.

In the past few decades, few people conducted on LDR, which, given its known flaws, still provides helpful inspirations in terms of diminishing returns, marginal costs (MC), and externalities. Thus far, a sound explanation regarding the intensive margin deduced from LDR has yet to be made.

In general, despite their diversified development models, the development of countries worldwide is a process that evolves from an extensive stage to an intensive stage. Apart from in-depth integration of the LDR with intensive development, it has been impossible to summarize or explain many of these models and to provide developing and less-developed countries (particularly those with large populations and scarce land resources) with appropriate guidance and benchmarks.

Based on a comprehensive analysis and a summary of existing research results, this book proposes Intensive variables (IVs) as a theoretical foundation and the intensification function as a basic tool. Then, it combines the LDR and the intensification theory with the intensification curve. With the support of geographic information systems (GIS), the book integrates a static discussion with a dynamic analysis and data computing with spatial optimization. The result is a unique

theoretical framework and methodology for the evaluation of land use efficiency, providing a generally accepted theory and methodology to guide intensive development practices. Currently, re-interpreting LDR and intensification issues plays a proactive role in the development of theories and practices in this particular field.

We believe that IV theory concerns research on the intensity of factors used in the development of human society, the substitution rule of these factors in a specific time and region, the conditional LDR and unconditional intensive development, the continuous function of intensification and the piecewise function of LDR, and the fact that diminishing returns is a special case of intensification. With regard to intensive land use, IVs may provide a scientific basis and decision-making support to the transformation of socioeconomic development models and to the optimization of their growth structures, and it could facilitate rational substitution and optimization of factors of production for higher values and benefits through integrated use.

This book uses a variety of diagrams to illustrate IVs and business cases in an interesting and logical structure as well as an easily understandable approach. In addition to the explanation of specific theories, the book also includes detailed descriptions of business cases for readers to use the theories and methodologies herein directly in their case studies and extended research.

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