

Message of Director-General

Technical Policy for Synergistic Application of Innovation to Stock

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Review the way we came and determine the way we should go

As a result of the progress in development of infrastructure in individual fields, a large amount of stock have been formed and have been serving as utility for citizens. Meanwhile, Japan is faced with the issues of sharp decrease in productive population and declining birthrate and aging population, and these issues have given rise to a concern that they may interrupt the full-scale recovery from slow economic growth and the maintenance / development of local vitality. It is also urgently required to prepare for the constraints concerning reduction of greenhouse gas emissions, massive earthquakes including the one occurring directly beneath the Tokyo Metropolitan Area and the Nankai Trough earthquake, and intensification of the storm and flood hazards due to the effect of climate change.

Such situations, all the more, encourage us to choose the way to more substantial and comprehensive countermeasures instead of taking makeshift measures. Such choice overlaps with our hope and determination that we could achieve new development based on the characteristics specific to Japan if we can take such difficulties as an opportunity, challenge for solution ahead of the world, and achieve practical countermeasures.

As materialization of this concept, the "Productivity Revolution" was launched by the MLIT in 2016 and 20 leading projects¹⁾ thereof were planned. In the meeting of the MLIT's Productivity Revolution Division in November 2016, the Minister Ishii gave directions for specification of 20 projects, reflection of the concept of "Productivity Revolution" in the policies of land and infrastructure management, and designation of the year 2017 as "Year of progress."

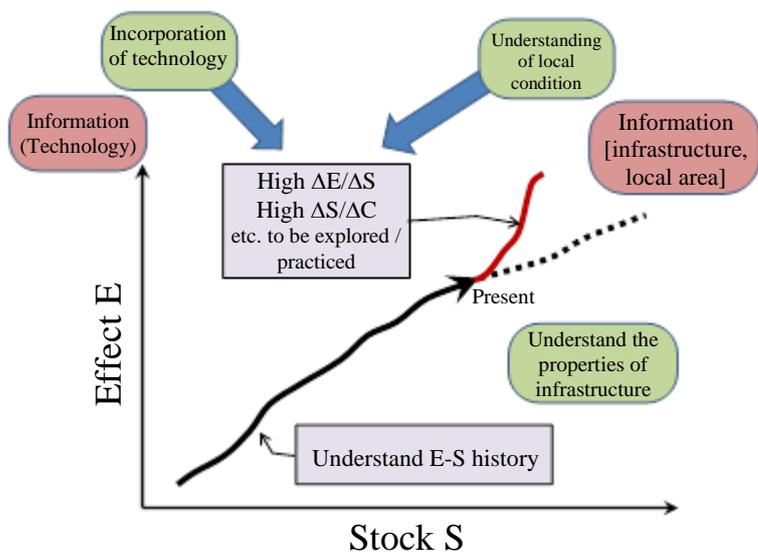
Then, how should the study on technical policies be to support the practice of this productivity revolution? As response to this

question, the concept as illustrated on the right Figure is considered. The base of this Figure is the relationship between stock "S" and effect "E" demonstrated by the stock. The black arrow line up to the position of "Present" is the way we came. Then, how about the way we should go henceforth?

Incorporate innovation in the extension of stock effect

According to the purpose of "Productivity Revolution," it will be important not only to extend the effect of stock at the same pace as before (black dot line on the Figure) but to pursue actively and variously the E-S line (red line on the Figure) that brings higher $\Delta E/\Delta S$ and greatly deviates upward. Pursuit of "high $\Delta E/\Delta S$ " means to strive to find a technique to achieve more effect increase with smaller accumulation of stock. Such technique includes development of new ΔE , which had never been considered.

"High $\Delta S/\Delta C$ " on the Figure means to obtain more increase in stock with input of the same labor (ΔC). This pursuit does not mean to reduce monetary cost



Consider the future vision of study on technical policy from the relationship diagram of stock "S" and effect "E."

but to create a condition of producing greater ΔS or even ΔE with the same labor or resource, i.e., to create the way of work producing higher added value. Improvement of construction productivity using ICT etc. will lead this pursuit.

If innovation is defined to mean "to change the aspect creatively and acquire new driving power to break through blockade in the situation where solution is difficult on the conventional track," the red line track greatly deviating upward is comparable to "synergy of stock effect extension and innovation." It is essential to aim to achieve this in planning and advancing study. Then, what is important to conduct such a study?

Evolution of study on technical policy required now

See the left Figure again. Innovation of land infrastructure management is impossible without stock accumulation. Accordingly, it is essential for achievement of innovation to have a deep understanding / insight anew concerning the way along which S and E have proceeded, mechanism of effect demonstration, and the properties of infrastructure that supports them.

Moreover, "utilization of technologies" and "construction based on the understanding of local condition" serve as a trigger or catalyst for development of the aforementioned "upward deviating track." For the former, new technologies have been provided successively from the fields other than infrastructure, including IoT, AI, sensing technology, and high resolution weather forecast as well as ICT, and fruit from utilization of such technologies is greatly expected. However, it would be naive to think that new technologies will immediately lead to solution. It would be better to expect a scenario that new technologies will demonstrate effect when combined with existing technologies, results are accumulation, and system and organization for application are improved. In such case, process²⁾ of assimilating new technology into the infrastructure technology system is very important.

For the latter, starting from the understanding of local condition will be increasingly important in order to find out ΔE truly sought by local area (site) and potential ΔS that brings it. As a background for this, in the circumstances where many issues are becoming complex / various and their locality is increasing, effectiveness of the method is rising that looks straightly at the whole picture of local issues without passing through the filter of technical field and uses all the possible tools available for solution. This can be likened to the innovation that is based on customers, not on technical application. This

approach will inevitably make us head for comprehensive study with specified exit. To advance the study so far described, information and data serve as foundation. As represented on the left Figure, some of such information etc. are concerned with local communities and their various activities, including technology with remarkable development and infrastructure serving as source of demonstration of stock effect. Skillful utilization of such technologies etc. is becoming increasingly important.

Take the initiative to provide a style of evolution

As discussed, study on technical policies to achieve synergy of stock and innovation requires evolution in the way of study and work. NILIM is actively working for this purpose. In fact, this report includes various elements that are required for evolution. In reading this report, I appreciate your attention, for example, to the following, in addition to the content of each section. ΔE to be developed / acquired; $\Delta E/\Delta S$ to aim at and the degree of leap from E-S relationship; Characteristics / functions of infrastructure, etc. serving as foundation of leap; New technologies to achieve $\Delta E/\Delta S$; Course to assimilate such technologies into stock; Trial of the study method based on the understanding of local area; Method of constructing / organizing information and data to utilize them effectively. While working on studies to solve important issues across many fields, we will pursue our studies as a general research institute with a bird's eye viewpoint and provide a new style of study on land and infrastructure management. Aiming to become such a guide, NILIM intends to continue its activities.

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- 1) MLIT Productivity Revolution Project
<http://www.mlit.go.jp/common/001158222.pdf>
 - 2) FUJITA Koichi: Importance of understanding "Assimilation process" --- a new technology for social infrastructure, "Bridge and Foundation Engineering", January 2017 issue, p.1