A Study on Industrial Groundwater Consumption and Economic Development

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1. INTRODUCTION AND OBJECTIVES

Facing a worldwide water crisis, it is a crucial problem to decrease groundwater consumption without adverse effects for economic development. Generally speaking, groundwater is beneficial for industries to produce products because groundwater is economical and of good quality. However, excess pumping could cause land subsidence and it is also a case in Asian cities of today. Japan, which have experienced and overcome terrific land subsidence in 1960's, could provide some imprecation to a groundwater management in future in Asian countries. Previous study (Jia et al., 2006) clarified EKC in industrial flesh water consumption and discussed a relationship between industrial flesh water consumption and economics, but any study has been seen that mention relationship between industrial groundwater consumption and economics. This study aims to verify the possibility to make the directions of groundwater consumption and economic development diverges in Japanese cases.

2. METHODOROGY

At first, this study verifies the EKC relationship of industrial groundwater consumption to clarify an existence of cases that have experienced a divergence of directions between industrial groundwater and economic development. Then, this study clarifies factors of the divergence by case studies comparing with previous EKC theory. At last, this study considers an economic effect by divergence based on discussions up to here.

3. DISCUSSION AND FINDINGS

1). EKC on industrial groundwater consumption in Japan and its 27 prefectures

This study showed an existence of EKC in industrial groundwater consumption in Japan and in its 27 prefectures. But coefficient of determination (R^2) was not so good after 1980s, which is the end of period of high economic growth in Japan. This means that EKC doesn't necessary describe the relationship between industrial groundwater and economics well.

2). Main factor to decrease industrial groundwater consumption is technical effect by groundwater regulation

Previous EKC theory describes the reasons to decrease industrial flesh water consumption are "technical effect" and "industrial transition effect". This study showed that technical effect is also a decrease factor in industrial groundwater consumption and its significant opportunity is regulation. But it showed that industrial transition effect could be an increase factor by a transition from old manufactures to new manufactures.

3). Discovery of differences of economic effect by each industries and recommendation of phased groundwater regulation

In a case that a groundwater regulation makes decrease of industrial groundwater consumption, substitutability of industrial groundwater changes effects on industrial production. In a case of Fukui, this study showed that the more substitutable the industry is, the longer its growth continues, by comparing textile, paper production, and chemical industries. That is to say, this statistical analysis clarified that a low substitutable industry can be more affected by a regulation of groundwater consumption than high substitutable industries. At last, this study recommended phased groundwater regulation considering this difference.

References

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