Waste and Recycling

Theory and empirics

Takayoshi Shinkuma and Shunsuke Managi



Routledge Studies in Ecological Economics

Waste and Recycling

As "business as usual" has become the mantra of today's world, it's unlikely to see a decrease in hazardous waste generated from greater economic growth. Written by renowned experts, the book suggests a solution, supported by theoretical arguments to this waste problem. The book discusses how main problems for waste management can be addressed through appropriate policies adopted by governments in OECD countries.

The book also raises thoughtful questions on how household waste management services should be privatized and who should pay for the disposal and recycling costs. It attempts to answer these questions. The book considers several factors hindering the first-best optimal outcome and highlights two crucial ones. It elaborates further with models and the solutions on how to overcome these obstacles.

The book covers not only traditional resource economics and waste management, but also the recent problem of electronic waste (E-waste) and illustrates, in detail, how the environments of developing countries are inevitably polluted even with the Basel Ban Amendment in place. The book proposes an alternative international trading regulation to address E-waste. This book will certainly appeal to industry decision-makers, policy-makers, and legislators.

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1 Introduction

1.1 What is waste?

When waste produced by people is not properly managed, serious environmental consequences can follow, such as human sickness and injury, pollution of the air and water resources, and destruction of amenity values. What exactly, then, is this "waste" that people have been talking about? The trading, transporting, treatment, and disposal of a thing are subject to the waste-related laws if it is identified as waste. Especially in the case of waste that is hazardous, the above activities are usually restricted to registered (or licensed) waste management firms. Because of these legal ramifications, there has been much controversy in OECD countries over the definition of waste.

There is no universally accepted definition of waste. In European Union (EU) member countries, waste is defined by the Council Directive 91/156/EEC as "any substance or object in the categories set out in Annex I which the holder discards or intends [to discard] or is required to discard." The notion of "discarding" embraces two types of operations: "disposal operations" listed in Annex IIA of the Directive and "recovery operations" listed in Annex IIB of the Directive. Recycling activities are, therefore, subject to the law. As the definition of waste given in the Basel Convention¹ also includes scrap to be recycled, the trading of waste for recycling must be controlled under the law.

Alternatively, waste can be defined as a thing whose price is negative. On the basis of this definition, a good is defined as a thing whose price is positive. This is the definition of waste that has been adopted in Japan in the Waste Disposal and Public Cleansing Law enacted in 1970. Under this definition of waste, a large number of recycling activities are not bound by the restrictions of the law, even if an improper method of recycling is adopted. For this reason the definition of waste adopted in Japan has been criticized as a serious defect in Japan's legislation.

Despite the criticisms leveled at this definition, it is the definition of waste that we have in mind throughout this book. The major reason is that the essential characteristics of the waste market stem from the negative price of waste, as we shall see below.

1.2 Economic development and waste generation

Does greater economic growth always hurt the environment? The Environmental Kuznets Curve (EKC) postulates an inverse U-shaped relationship between a specific measure of environmental pollution and per capita income levels. Income elasticity of environmental degradation turns from positive at lower levels of per capita income to negative at higher levels. Is the relationship of income and degradation linear or an inverted U-shape empirically? The answer, as so often happens, depends on pollutants (see Grossman and Krueger, 1995; Brock and Taylor, 2006; Managi, 2006; Managi et al., 2009; and Tsurumi and Managi, 2010a, 2010b for a summary and discussion of the empirical literature).² In general, the EKC relationships are more likely to hold for short-term and localimpact pollutants than for pollutants with more global, indirect, and long-term impacts. Significant EKCs exist for soil degradation, for deforestation, for local air pollutants such as CO, NOx, sulfur dioxide, and suspended particulate matter, and for urban air concentrations. They reach a peak at lower income levels than the peak for global environmental indicators or some greenhouse gases and the depletion of fossil fuels.

The volume of per capita household waste has increased substantially due to the economic growth around the world. As regards municipal waste, empirical literature supporting the EKC is scarce (Kinnaman, 2009). Using macroeconomic data from 30 OECD member countries over 20 years, Johnstone and Labonne (2004) reject the hypothesis and show that the relationships between income and municipal waste generation are positive and linear. Figure 1.1 shows the cross-section data in relation to 21 countries in 2005.

The absence or weakness of evidence for EKC in terms of waste generation implies that even a mature developed country may continue to suffer from waste disposal problems and must keep making an effort to decrease the amount of waste generated. Even though the volume of waste has been reduced by compressing, incinerating, and recycling it, the depletion of final disposal sites continues to be a serious problem due to the resistance to new landfills or incinerators in several OECD countries. Figure 1.2 and Figure 1.3 show the capacity of municipal and industrial waste disposal sites in Japan, respectively.

1.3 The waste market

Competition in a waste market leads to a different result from competition in a conventional goods market. To begin with, let us consider a goods market. Because a particular good is valuable for both sides in a market—for supply (producers) and for demand (consumers)—competition in the market raises the quality of goods and pushes down the production cost. With regard to the goods, the market has a driving force toward high quality and low price. To see this, suppose that a producer of a good lowers the quality of that good. The purchaser of that good is concerned about the quality and will almost certainly become aware of the low quality in the course of its consumption. Thus, information