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## Consumer willingness-to-pay for packaging and contents in Asian countries

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### ABSTRACT

This study was conducted using a hedonic pricing model to evaluate consumer preference for packaging and contents in five Asian countries: Japan, Indonesia, Singapore, Taiwan, and China. Results revealed that the marginal rate of substitution (MRS) of packaging for contents differs significantly among countries: 17.7 for Singapore, 8.58 for China, 2.71 for Taiwan, 1.65 for Japan and not significant for Indonesia.

Share of Willingness-to-pay (WTP) for packaging accounted for 52.8% of the WTP for sales unit of a representative product in Japan and 46.2% in Taiwan, which were significantly higher than the results for Singapore (32.6%) and China (18.2%). Results showed that the higher the share of packaging in the WTP for a product, the higher the relative packaging weight per unit weight of contents.

These results suggest that the relative demand for packaging to contents differs among countries. The results underscore the necessity of choosing suitable policy instruments and marketing strategies for different countries.

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### 1. Introduction

Packaging waste is a growing and important waste stream (OECD, 2011). The share of packaging waste in household waste varies among countries depending on factors such as the economic growth stage and culture. The World Packaging Organization (WPO) points out that “The progression of packaging demand is influenced by a wide variety of factors, from year to year and also factors with a much longer-term influence” (WPO, 2008). These include the increasing demand for convenience among consumers and trends toward smaller households. Packaging waste discharged from households accounts for 60% of household solid waste by volume and 24% of household solid waste by weight in Japan.<sup>1</sup> Packaging makes up about one-third of all household waste in Singapore.<sup>2</sup>

The degree of economic development is one factor influencing the generation of packaging waste in two respects: generation and removal from the waste stream. It is readily apparent that economic development induces greater consumption, and therefore results in more packaging waste. It is also widely acknowledged

that waste pickers actively pick up used packaging from waste flows in economically developing countries, but they are rare in economically developed economies (e.g. Moreno-Sanchez and Maldonado, 2006). Packaging waste has low value after use, but may become valuable or valueless goods depending on the economic conditions. In economically developing countries, materials used for packaging have market value even after product consumption. For that reason, waste pickers collect such materials. As the economy develops and national income rises, the relative value of packaging materials decreases with respect to labor. Ackerman explained the relation between economic growth and recycling activity: the material price expressed by labor dropped from about 90 min of labor required to buy the same materials (1 lb. of cotton and nails) around 1830, to well under 10 min after World War II (Ackerman, 1997).

Policies incorporating 3R (Reduce, Reuse, Recycle) are generally regarded as effective in reducing packaging waste. Various 3R policies have been adopted in many countries. These policies are especially effective for reducing the amounts of packaging used in products, which reduces waste at its origin, instead of finding effective methods for waste disposal. For example, inducing purchases of products with less packaging material is one means of reducing packaging waste, and an important means of practicing source reduction of waste (Yamaguchi and Takeuchi, 2016). EPR (Extended Producer Responsibility) may be incorporated as one of 3R policies. EPR is a policy approach under which producers

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<sup>1</sup> Japan Ministry of the Environment, [http://www.env.go.jp/recycle/yoki/c\\_2\\_research/research\\_10.html](http://www.env.go.jp/recycle/yoki/c_2_research/research_10.html). (accessed 28.03.16).

<sup>2</sup> Singapore Ministry of Environment and Water Resources. <http://www.mewr.gov.sg/topic/packaging>. (accessed 28.12.16).

are given a substantial responsibility for the treatment or disposal of waste originating in the product after consumption, not only production. Such responsibility could provide incentives for product design better suited to recycling and waste management, or reduction of packaging materials.

However, packaging has a marketing function that cannot be ignored as long as sales depend on consumer choice. Producers are confronted by the necessity to appeal to consumers through packaging. Making packages smaller entails the risk of lower sales. Therefore, it is not easy to choose smaller packaging. Packaging is a tool that provides basic product information in situations where consumers help themselves in choosing products, as they do in a supermarket. Therefore, the packaging becomes a requirement for competition. It is used as a tool in sales promotion strategies.

Many studies have revealed how the design and sales promotion function of the packaging influence the purchasing actions of consumers (e.g. Underwood and Ozanne, 1998; Rundh, 2009, 2013). For instance, Keller (2013) reported that “Marketers must choose the aesthetic and functional components of packaging correctly to achieve marketing objectives and meet consumers’ needs. Aesthetic considerations govern a package’s size and shape, material, color, text, and graphics.” How the package appeals to consumers is an important factor that affects manufacturers’ consideration in their choice of packaging.

Apparently a tradeoff exists between reduction and prevention of packaging consumption measured by mass and the marketing function, which is valued in monetary units. To establish appropriate policies for reduction and prevention of packaging waste, it is crucially important to understand the valuation of packaging in a market. Packaging is always sold jointly with contents. Therefore, no direct observation of packaging value exists in a market. One means of estimating the value of packaging apart from the product value is a hedonic model. A hedonic model is based on the assumption that goods are valued for their utility-bearing attributes or characteristics (Rosen, 1974). Hedonic theory estimates the implicit price of individual characteristics of goods from information of market prices of goods with various bundles of characteristics. The hedonic model is developed for economic analysis of differentiated products: as a price index that incorporates aspects of technological development (e.g. Griliches, 1961) or for real estate market analysis (e.g. Quigley, 1981). We applied a hedonic model for the valuation of packaging and contents in five Asian countries. By application of a hedonic method, we can derive willingness to pay (WTP) which is the maximum amount a consumer would be willing to pay, and marginal rate of substitution (MRS) which is the rate at which a consumer is ready to give up one good in exchange for another good while maintaining the same level of utility.

This research has three objectives. One is estimation of the willingness to pay (WTP) for packaging, i.e. quantification of the willingness of consumers to pay for packaging. The second is comparing WTP for packaging and that for contents to elucidate the tendency to devote more attention to content or packaging, and further to determine the marginal rate of substitution (MRS) of packaging and contents. Our third objective is to compare these internationally. Through these analyses, we expect to be able to propose a means of reducing packaging waste at its source. For example, especially in countries with high WTP for packaging, active policies and strategies to achieve a lower WTP for packaging and higher WTP for content are fundamentally important.

Several earlier studies of consumer preferences for packaging (Joutsela et al., 2016; Klaiman, 2015; Yamaguchi and Takeuchi, 2016) include some studies of the WTP for packaging functions within a single country. Yamaguchi and Takeuchi (2016) estimated WTP for less packaging, Klaiman (2015) studied WTP for packaging recyclability for different materials, and Vecchino and Annunziata

(2015) evaluated WTP for eco-labeled products. Joutsela et al. (2016) examined consumer WTP changes when measured before and after opening and when interacting with new packaging. The study applied a questionnaire method in a laboratory environment in which approximately 30 participants were examined for each packaged product. Results demonstrated that interaction with packaging can influence the consumer WTP for the product. However, information on WTP for packaging observed in an actual market is scarce. None of these studies specifically undertook an international comparison of WTP for packaging. By comparing WTP for packaging and contents across multiple countries, we were able to shed new light on the packaging waste problem.

## 2. Data

### 2.1. Survey design

For international comparison, we chose chocolate as the subject good because it is eaten as a food worldwide, is sold in supermarkets, and is free from religious prohibition. Moreover, the packaging design of chocolate is diverse, including paper boxes and/or plastic bags with or without trays or individual packaging. Individual packaging denotes packaging in which small unit portions of content are wrapped, and a certain quantity of these are wrapped together and are sold as one product.

We chose general merchandise stores (GMS) of a middle price range located near their respective city centers. The stores did not specialize either in high-quality products or in discount products. We purchased all brands and types of chocolates on the shelves and weighed the packaging by components and materials. The content weight values listed on the labeling were used as contents weight. The prices were converted into Purchasing Power Parity (PPP) using the International Monetary Fund, World Economic Outlook Database, April 2012.

## 3. Theory

A hedonic approach was applied to evaluate WTPs for packaging and contents separately. In a hedonic approach, a product is regarded as a bundle of attributes. We specifically examined the preferences of consumers for the contents and packaging of chocolate. A representative consumer and manufacturer were assumed for each country.

This paper focuses on contents weight, packaging weight, use of individual packaging, and use of packaging material as attributes of the packaging and type of chocolate: with nuts or fruits, with rice or corn, and cookie as attributes of contents. Among these variables, the packaging weight and contents weight were set as quantitative variables; other variables were categorical variables. We did not take into account the other packaging characteristics such as aesthetic value, easy openness, safety, or recyclability because none of these characteristics can be valued objectively. Consumers and manufacturers recognize these attributes and prices and choose an appropriate amount of the goods as price takers. For simplification, we assume the contents weight and packaging weight as continuous variables that can be chosen at will. The hedonic price function, which is continuously differentiable, is assumed to be an increasing function of both variables.

These simplifications set limitations on this study; we cannot capture the influences of packaging attributes that do not correlate with weight such as easy-open packaging or aesthetic design. The influences of these attributes are included in random term if the distributions of the attribute are the same among five countries, if not, they are included in the country dummy.

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