# A point card system for public transport utilization in Korea

Yoonmo Koo [a], Misuk Lee [b], Youngsang Cho [c],*

[a] *Technology Management, Economics and Policy Program, College of Engineering, Seoul National University, 1 Gwanak-ro, Gwanak-gu, Seoul 151-742, South Korea*
[b] *Korea Environment Institute, 290 Jinheung-ro, Eunpyeong-gu, Seoul 122-706, South Korea*
[c] *Department of Information & Industrial Engineering, Yonsei University, 50 Yonsei-ro, Seodaemun-gu, Seoul 120-749, South Korea*

ABSTRACT

This study analyzes consumer preferences for a new incentive program based on a point card to promote green consumption; the study also examines the program's impact on bus utilization in South Korea. An *ex-ante* analysis was conducted to examine how consumer behavior can be modified based on varying incentive levels of the point card system. In addition, the effect of the system on consumers' public transport utilization and resulting $CO_2$ emissions reductions are analyzed. The adoption probability of the point card is forecast at about 93%, and annual $CO_2$ emissions are forecast to decrease by 610 kt $CO_2$.

© 2013 Elsevier Ltd. All rights reserved.

## 1. Introduction

Over the past decade, numerous countries have adopted "green growth" policies to promote sustainable economic growth through a wide variety of strategies.[1] As a result, some countries have announced consumer incentive programs to promote green consumption. The "Eco-Point system" in Japan is an example; its principal aims being to promote products with greater energy efficiency and support eco-housing construction and remodeling projects. The government issues eco-points to incentivize consumers; accumulated points can then be exchanged for "rewards," ranging from gift vouchers to public transportation passes. Other policy initiatives include Portugal's "Plano Nacional Acção Eficiência Energética," enacted in 2008, and the UK's "Personal Carbon Trading" initiative. The aims of such policies differ from earlier, largely production based, environmental sustainability efforts by focusing on changing consumer behavior.

In South Korea, incentive programs, such as "Carbon Points," "Carbon Cashbag," and "Green Card," are used to promote green growth. The Green Card program, for example, provides economic incentives to those who engage in environmentally friendly behaviour such as saving energy, purchasing green products, and using public transportation. In a unique feature of the program, economic incentives are provided as point rewards via a credit card. Although numerous studies, both qualitative and quantitative, have looked at green consumption behavior, there has, however, been little *ex-ante* analysis to examine the effect of an incentive program on green consumption. In this paper we look at a point card system aimed at inducing a greater share of passengers to use bus transportation.

## 2. Data description

Stated preference data were collected from a consumer survey conducted by Gallup Korea in July/August 2011 involving residents of Seoul and part of Gyeonggi Province, South Korea. One-to-one, face-to-face interviews were conducted with 501

---

* Corresponding author. Tel.: +82 221235727.
  *E-mail address:* y.cho@yonsei.ac.kr (Y. Cho).

[1] The South Korea's "Framework Act on Low Carbon, Green Growth," enacted in 2010, defines "green growth" as growth achieved by saving and using energy and resources efficiently to reduce climate change and damage to the environment, securing new growth prospects through research and development of green technology, creating new job opportunities, and achieving greater balance between the economy and environment (Ministry of Government Legislation, 2010).

**Table 1**
Attributes and levels of point card reward system to promote green consumption.

| Attributes | Description | Levels of attributes |
|---|---|---|
| Point-saving rates for public transport utilization | The point-saving percentage in proportion to the fare exchanged for using public transportation such as bus and subway | 10%<br>20%<br>30% |
| Point-saving rates for green product purchase | The point-saving percentage for purchasing green products certificated by the government in proportion to its retail price | 1%<br>5%<br>10% |
| Point-saving rates for home energy savings | The point-saving percentage for reduction of lighting and heating expenditures by comparing average energy consumption for the most recent 6 months to the past 2 years | 1%<br>5%<br>10% |
| Additional tax deduction benefit | The maximum ceiling of annual income deduction from which a person who purchases green products or uses public transportation can benefit | None<br>Maximum 1 million KRW<br>Maximum 2 million KRW<br>Maximum 3 million KRW |
| Use of points | Use range of saved points | Cash back<br>Public utility charges or tax payment<br>Public transportation fare |
| Start-up fee | Cost of issuance for point card | 10,000 KRW<br>20,000 KRW<br>30,000 KRW |

**Table 2**
Attributes and levels related to public transport utilization.

| Attributes | Description | Levels of attributes |
|---|---|---|
| Point-saving rates for public transport utilization | The point-saving percentage for using public transportation such as bus or subway | 10%<br>20%<br>30% |
| Additional tax deduction benefit(s) | The maximum ceiling of annual income deduction from which a person who purchases green products or uses public transportation can benefit | None<br>Maximum 1 million KRW<br>Maximum 2 million KRW<br>Maximum 3 million KRW |
| Public transportation fare | Basic fare for bus or subway | 1000 KRW<br>2000 KRW<br>3000 KRW |
| Travel time difference | The time difference required between public transportation and a car if it takes an hour to travel 20 km by car in Seoul | +30 min<br>+15 min<br>No difference<br>−15 min<br>−30 min |

interviewees aged between 20 and 59. Respondents were chosen using quota sampling methods based on gender, age, and region.

The conjoint survey was divided into two sections. The first section dealt with the point card reward system[2]; the second section dealt with changes in consumers' public transport utilization based on accrued point benefits. The data received from the first section were used to forecast the issuance rate of point cards according to defined attributes related to point card use. Table 1 lists the six most critical attributes that affect consumer demand for point cards.

Some terms in Table 1 need explanation. "Additional tax deduction benefit" refers to the maximum ceiling of annual income tax deductions that a person who purchases green products or uses public transportation can receive. "Use of points" refers to several options for using saved points: receiving cash back, paying for public utility fees and public transportation fares, or obtaining a reduction in tax payments. The "start-up fee" is the cost of point card issuance; it is a one-time fee.[3]

The second part of the conjoint survey was designed to analyze changes in public transport utilization based on point card benefits. Table 2 lists the attributes, and their levels, used in analyzing consumer preferences for public transportation. "Public transportation fare" refers to the basic bus or subway fare, ranging from 1000 KRW to 3000 KRW. The attribute of "travel

---

[2] The "point card reward system" refers to a new government policy to grant point rewards to consumers in proportion to the energy they save through the use of green products and public transportation.

[3] In general, a credit card is valid for 5 years. Thus, a 10,000 KRW (Korean Won) start-up card fee can be divided into a 2000 KRW annual fee over 5 years.