Analyses of citizens' awareness, attitudes, and behaviors and the promotion of eco-policies in environmental model cities: The case of Toyota City

（環境モデル都市における環境政策に関する

市民の意識、態度、行動の分析と促進：豊田市のケース）

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Summary

This dissertation intends to identify and address issues that Toyota City faces in promoting its eco-policy. The city has been designated as an environmental model city by the Japanese government in 2009. The purposes of this dissertation are twofold: 1) to analyze citizens' eco-awareness and eco-behavior levels regarding the city's eco-policy, and 2) to explore how to promote citizens' eco-behaviors, given the ultimate objective of eco-policy being the enhancement of citizens' eco-friendly behaviors. In this context, along with some social marketing approaches, this dissertation relies on a theoretical framework called the knowledge-attitudes-behaviors (KAB) model that environmental behavioral changes are brought by increasing environmental knowledge via environmental attitudes. Given that few studies about promoting Toyota City's eco-policy have been conducted, the current research attempts to fulfill this gap.

To begin with exploring how to promote eco-policy, this dissertation first describes environmental model cities, the KAB model, social marketing, and Toyota City's eco-policy, and then examines citizens' level of recognition of the city's eco-policy through questionnaires. This part of the dissertation contributes to our understanding of the eco-awareness-raising activities of Toyota City by examining how citizens' awareness of eco-policy changed between 2012 and 2015, several years after

the governmental designation of Toyota City as an environmental model city in 2009. Data collected from questionnaires were analyzed by year and residency, focusing on (1) how Toyota citizens' and non-citizens' awareness of eco-policy changed during the research period and (2) how awareness differed between Toyota citizens and those from elsewhere. Findings suggest some evidence that the city's activities may have been effective in increasing awareness of its eco-policy among its citizens. Awareness of the city's eco-policy was significantly higher among Toyota citizens in 2015 than in 2012 and among those from elsewhere in either period.

To explore how to raise public awareness of eco-policies, this dissertation next analyzes associations between socio-demographic factors (i.e., age, sex, education, and household income) and environmental awareness related to eco-policy in Toyota City. Whereas previous research has revealed that citizens' environmental awareness improved significantly after the city's designation as an environmental model city, such research has not considered socio-demographic factors, which can cause a considerable amount of variance in environmental awareness and help the city government identify and approach the population segment that are comparatively unaware of the eco-policy. The findings suggest that education and household income are significantly associated with environmental awareness. That is, citizens with higher education and middle or high household incomes tended to know more about the city's eco-policy.

This dissertation then turns to look at underlying gaps between environmental knowledge and behaviors and possible reasons why citizens act or do not act on eco-items comprising eco-policy while they are aware of them. After two pilot studies

(one being a focus group with members of a largest environmental NPO based in Toyota and the other being interviews with Toyota citizens), a questionnaire study was conducted with Toyota citizens to extend the previous studies and continues to further explore reasons why citizens do or do not take actions on eco-items. The findings suggest that the reasons for acting or not acting on eco-items are economic, environmental, and others, but the majority of respondents act or do not act on eco-items for economic reasons. For instance, those who drive eco-cars find them energy- and cost-effective, while those who do not drive eco-cars find them expensive.

This dissertation finally moves onto the issue of promoting Toyota City's eco-policy. Previous studies illustrate that while the city has been successful overall to communicate its eco-policy to citizens, it has failed to do so with regard to some eco-themes such as industry or forests and also failed to transform citizens' behaviors into pro-environmental. That is, despite some improvement in awareness/knowledge, promoting the city's eco-policy, in particular pro-environmental behaviors, remains a challenge. This also indicates the limitation of the KAB model (the gap between awareness/knowledge and behaviors). Therefore, this part of the dissertation analyzes Toyota City's eco-policy by using strategic marketing approaches that may be relevant to promoting eco-policy in Toyota City to help elaborate on effective eco-policy making and promotion. This study then moves on to promote one of the eco-items comprising the eco-policy, the eco-family card/Toyota eco-points, as it is unique to Toyota City's eco-policy. Along with the literature review, the author conducted individual and group interviews and questionnaires with relevant stakeholders (e.g., the city personnel,

directors of environmental organizations, and citizens) to elaborate on how to promote the eco-family card/Toyota eco-points. Based on findings from the current research as well as existing literature, this dissertation ends with some theoretical (i.e., development of the KAB model into the BAKAB model comprising surface behaviors, awareness, knowledge, attitudes, and deep behaviors) and practical (distribution of the eco-family card to as many as possible, for instance, at the City Hall, real estate agencies, schools, and events at Starbucks) suggestions to further promote Toyota City's eco-policy.

1. Introduction

1.1. Background

As a way to address its international carbon reduction commitments, the Japanese government has designated 23 cities as environmental model cities. Environmental model cities are intended to reduce carbon emissions in pursuit of a low-carbon society and sustainability (Cabinet of Japan, 2011). One of these cities is Toyota City, in Aichi Prefecture, Japan, which was designated as an environmental model city in 2009 (Toyota City, 2009). Toyota City is well known internationally, as the headquarters of the Toyota Motor Corporation, and the city has ambitions to feature as an international exemplar of an eco-city, having hosted international environmental conferences and forums. These issues make it an interesting subject for study, as it is not clear whether its actions and success level warrant this international interest.

Toyota City has long addressed environmental issues, working with local companies, including the Toyota Motor Corporation. In the mid-1990s, for example, the city created action plans to improve environmental protection and further developed these plans in the 2000s, as described in the next section. Despite the city's high dependence on cars and industry, it has been able to reduce carbon emissions by 8% per person since 1990, the benchmark year that it set (Toyota City, 2014a). Along with other countries around the world, the Japanese government has committed itself to reducing carbon emissions and finding sustainable models of development with a low-carbon context. One key action was to designate environmental model cities.

In particular, this study focuses on promoting the eco-family card/Toyota eco-points, an eco-item comprising the eco-policy. Given that few studies about promoting Toyota City's eco-policy have been conducted, this dissertation attempts to fulfill this research gap.

1.2. Research objective

This dissertation intends to identify and address issues that Toyota City faces in promoting its eco-policy. The purposes of this dissertation are twofold: 1) to analyze citizens' eco-awareness and eco-behavior levels regarding the city's eco-policy, and 2) to explore how to promote citizens' eco-behaviors, given a general consensus that the ultimate objective of eco-policy is to enhance citizens' eco-friendly behaviors (Steg and Vlek, 2009; Stern, 2000). In this context, this dissertation relies on a theoretical framework called the knowledge-attitudes-behaviors (KAB) model that environmental behavioral changes are brought by increasing environmental knowledge via environmental attitudes. To further extend and apply this theoretical framework and promote citizens' environmental behaviors related to the eco-policy, this dissertation employs some social marketing approaches with strategic analytical tools. According to Da Silva and Mazzon (2016), social marketing campaigns are consisted of three different levels of actions: 1) diagnosing the social problem; 2) influencing the social change to the target population; and 3) setting the social marketing mix. Whereas this dissertation touches on the issue of the social marketing mix, it mainly discusses the first two by analyzing citizens' awareness/knowledge and behaviors regarding the

eco-policy, and explores how to promote eco-policy in Toyota City using social marketing elements.

1.3. Environmental model cities

Joss, Cowley, and Tomozeiu (2013) note that there are many possible definitions of a contemporary eco-city, each of which has implications. For instance, Register (2002) defines an eco-city as a city in which resources and waste output are economized. Wong and Yuen's (2011) definition was a city that functions as an eco-system in harmony with the natural environment. Kenworthy (2006) suggests that compact and sustainable urban form and superior public transport systems are crucial for cities to be considered eco-cities. The World Bank's definition of an eco-city has two elements: economic and ecological sustainability. Such cities are called 'Eco2 cities' (World Bank, 2010). Dunn and Jamieson (2011) echo the World Bank, stating that most definitions of an eco-city underscore not only ecological integrity but also economic security and quality of life. Joss, Cowley, and Tomozeiu (2013) also suggest that eco- cities are likely to be developed in the context of green economic growth through international knowledge transfer and carbon emission reduction based on technology. They express concern, however, that the ecological footprints of contemporary eco- cities are far from sustainable and often skewed toward economic development. Rapoport (2014) concludes that 'eco-city' is an umbrella term, "a collection of proposals both normative and procedural, about how to create more sustainable areas" (p. 139).

Japan's particular take on the eco-city is underscored by an overall aim of allowing urban and rural areas to coexist in harmony and improve the living conditions of their citizens ecologically and economically (Low, 2013). All environmental model cities have certain key characteristics in common:

- They have been redeveloped into compact cities (e.g., walkable communities without the need for transportation).
- They have improved transportation infrastructure (e.g., public transport such as light rail transit and electric vehicles).
- There has been a change in residential styles (e.g., houses are built to last 200 years, energy-saving houses are more common, and fuel cells are fitted as standard).
- They have focused on conservation and utilization of forests (e.g., carbon offsetting and local production for local consumption) (Cabinet of Japan, 2015).

Beyond these broad characteristics, each environmental model city has been free to establish its own initiatives to reduce its carbon dependence. For instance, the city of Kyoto developed pedestrian-centered urban planning, with expanded sidewalks and priority given to public transportation (Kyoto City, 2015). Yokohama aims to promote a zero-carbon lifestyle to its citizens, with shared knowledge, greater choices, and active involvement, for example, in increasing the use of renewable energy tenfold by 2025 and provision of subsidies for energy-saving houses (Yokohama City, 2015).

1.4. Knowledge-attitudes-behaviors (KAB) model

Given that the ultimate objective of eco-policy is to enhance citizens' eco-friendly behaviors, this dissertation overly relies on a theoretical framework called the knowledge-attitudes-behaviors (KAB) model, which is used by a number of environmental researchers (Arcury, 1990; Esa, 2010; Levine and Strube, 2012; Meinhold and Malkus, 2005; Haron, Paim, and Yahaya, 2005; Hines, Hungerford, and Tomera, 1987; Laroche, Toffoli, Kim, and Muller, 1996; Polonsky, Vocino, Grau, Garma, and Ferdous, 2012). The KAB approach assumes that behavioral changes are brought about by increasing public knowledge (or awareness/recognition) about an issue via positive attitudes toward the environment (McKenzie-Mohr, 2012). The linear KAB model that environmental knowledge leads to pro-environmental behaviors has been criticized because the reality is not likely to be that simple. The knowledge-attitude-behavior gap, for example, has been consistently reported (Darton et al., 2016; Davari and Strutton, 2014; Gregory-Smith, Smith, and Winklhofer, 2013; Lewin, Strutton, and Paswan, 2011; Redondo and Puelles, 2017; Sapp, 2002; Young et al., 2010). According to Bamberg and Moser (2007), there is also an intention-behavior gap; intentions account for only 27% of the variance in self-reported pro-environmental behavior.

As Kollmuss and Agyeman (2002) state, however, most environmental actors still base their environmental campaigns and strategies on this assumption. For instance, Robelia and Murphy (2012) and Gifford and Nilsson (2014) argue that discussion on environmental issues may not be addressed if one does not know about them. Therefore,

environmental knowledge should be one of the preconditions toward pro-environmental behaviors (Jensen, 2002).

1.5. Social marketing

Given that eco-policy is part of public policy, its promotion may involve public marketing as well as green and sustainable marketing. All of them are kinds of social marketing (Butler et al., 2007; Kotler and Keller, 2011; Rettie et al., 2012). Applying social marketing is appropriate in promoting eco-policy because both social marketing and eco-policy pursue changing citizens' behaviors through informing them of and educating them about eco-policy. Social marketing is defined as "the use of marketing principles and techniques to influence a target audience to voluntarily accept, reject, modify, or abandon behavior for the benefit of individuals, groups or society as a whole" (Helmig and Thaler, 2010, p. 264-265). Similarly, social marketing seeks to influence social behaviors to benefit the target audience and the general society (Andreasen and Kotler, 2007). Social marketing interventions are designed to be focused specifically on behavior and applicable to encouraging pro-environmental behaviors (Gregory-Smith et al., 2015).

According to Da Silva and Mazzon (2016), social marketing campaigns are consisted of three different levels of actions: 1) diagnosing the social problem; 2) influencing the social change to the target population; and 3) setting the social marketing mix. The social change processes just occur when the target audience identifies and recognize the benefits of the change. Therefore, social marketers take

time to learn about what the target audience currently knows, believes, and does to fulfill the audience's needs and desires (Da Silva and Mazzon, 2016). This diagnosis of the social problems (eco-related issues in Toyota City) and citizens' current knowledge and behaviors about the eco-policy is what this dissertation will be done in Chapter 2, 3, and 4, and helping promote them will be done in Chapter 6. Although "social marketing has emerged as a popular and straightforward approach to promote environmental behaviors" (Takahashi, 2009, p. 135), we hardly find literature "adopting a public marketing perspective or particularly focusing on green public services targeted to external stakeholder entities" (Boenigk and Möhlmann, 2016, p. 87).

1.6. Structure and methodologies of this dissertation

The structure and methodologies of this dissertation are as follows: This dissertation first describes Toyota City's eco-policy, and then examines citizens' level of recognition of the city's eco-policy. This part of the dissertation contributes to our understanding of the eco-awareness-raising activities of Toyota City and analyzes how citizens' awareness of eco-policy changed between 2012 and 2015. Questionnaires were conducted via convenience sampling on the street, in a shopping mall, in a public building, and in other facilities around Toyota City Station in 2012 and 2015 respectively. Data were collected analyzed using Stata software (Version 14.0) by year and residency, focusing on (1) how Toyota citizens' and non-citizens' awareness of eco-policy changed during the research period and (2) how awareness differed between Toyota citizens and those from elsewhere.

To further explore how to raise public awareness of eco-policies, this dissertation next analyzes associations between socio-demographic factors (i.e., age, sex, education, and household income) and environmental awareness related to eco-policy in Toyota City. Whereas previous research has revealed that citizens' environmental awareness improved significantly after the city's designation as an environmental model city, such research has not considered socio-demographic factors, which can cause a considerable amount of variance in environmental awareness and help the city government identify and approach the population segments that are comparatively unaware of the eco-policy. Data were collected from face-to-face questionnaires on the street, in a shopping mall, in a public building, and in other facilities around Toyota City Station in June 2016. The collected data were analyzed using Stata software (Version 14.0) to test which socio-demographic factors had statistically significant associations with eco-policy items.

This dissertation then turns to look at underlying gaps between environmental knowledge and behaviors and possible reasons why citizens act or do not act on eco-items comprising eco-policy while they are aware of them. After two pilot studies (one being a focus group with members of a largest environmental NPO based in Toyota City and the other being interviews with Toyota citizens), a questionnaire study was conducted with Toyota citizens to extend the previous studies and continues to further explore reasons why citizens do or do not take actions on eco-items.

This dissertation finally moves onto the issue of promoting Toyota City's eco-policy. Previous studies illustrate that while the city has been successful overall to

communicate its eco-policy to citizens, it has failed to do so with regard to some eco-themes such as industry or forests, and also failed to improve citizens' environmental behaviors. That is, despite some improvement in eco-awareness/knowledge, promoting the city's eco-policy, in particular citizens' pro-environmental behaviors, still remains a challenge. This also suggests the limitation of the KAB model: the gap between awareness/knowledge and behaviors. This dissertation analyzes Toyota City's eco-policy by using strategic marketing approaches that may be relevant to promoting eco-policy in Toyota City to help elaborate on promoting eco-policy. This study then focuses on promoting one of the eco-items comprising the eco-policy, the eco-family card/Toyota eco-points, because it is unique to Toyota City's eco-policy. Along with the literature review, individual and focus group interviews and questionnaires with relevant stakeholders were conducted to elaborate on how to promote the eco-family card/Toyota eco-points. This dissertation ends with some theoretical and pracitical suggestions to further promote Toyota City's eco-policy.

2. Raising awareness of Toyota City's eco-policy

This chapter examines how citizens' awareness of eco-policy changed between 2012 and 2015. Data collected from questionnaires were analyzed by year and residency, focusing on (1) how Toyota citizens' and non-citizens' awareness of eco-policy changed during the research period and (2) how awareness differed between Toyota citizens and those from elsewhere.

2.1. Background

The city of Toyota has made considerable efforts to raise the eco-awareness of its citizens. Although excessive carbon emissions do not result specifically from citizens being unaware of eco-policy, they have a key role in transforming eco-policy into practice. Several studies have suggested that citizens' awareness of policies is related to changes in behaviors. Kollmuss and Agyeman (2002) explain that although pro-environmental behaviors may not be directly linked to environmental knowledge and awareness, citizens need "to have a basic knowledge about environmental issues . . . to act pro-environmentally in a conscious way" (p. 250). Jensen (2002) also notes that "knowledge should still be acknowledged as one—among many—important preconditions for the development of competence leading to action and behavioral adjustments in relation to the environment" (p. 329). Masuura (2010) contends that to reduce carbon emissions, citizens must first be aware of eco-policies and then change their individual behaviors to become more environmentally friendly. Sennes et al. (2012) also emphasize the importance of citizens' awareness of eco-policies and

subsequent behavioral changes for sustainable development because such changes have a "direct contribution to ecological impacts and influence on local socio-economic actors" (p. 186). The authors go on to say that citizens' "commitment to their local environment may be highly dependent on local town planning and urban development policies" (p. 194). Therefore, Toyota City's eco-policy plays a crucial role in influencing citizens' environmental knowledge, attitudes, and behaviors.

2.2. Toyota City's eco-policy

Toyota City has developed its eco-policy around five themes: transportation, forests, the urban center, industry, and public welfare and livelihood. The action plans for these initiatives were begun in 2009, when Toyota City was designated as an environmental model city. These themes were targeted for the following reasons. Transportation, industry, and public welfare and livelihood were the three largest sources of carbon emissions in the city of Toyota. Forests absorb carbon dioxide, though the amount is limited (approximately 1.5% of the total carbon emissions). The urban center theme is designed to inform citizens about eco-related issues in urban areas (e.g., the heat island effect) and also to promote eco-policies domestically and internationally (Toyota City, 2014a).

2.2.1. Transportation

The city of Toyota has established an eco-friendly public transportation system called the Intelligent Transportation System (ITS). For smooth transfer between modes

of transportation, ITS uses information and communication technology to enhance the use of vehicles, roads, traffic lights, and other infrastructure (Ezell, 2010). Within ITS, an urban transport support system called the Harmonious Mobility Network (Ha:mo) has been built in high-visibility spots such as Toyota City Station and Como Square (a shopping mall in the city center). Ha:mo consists of NAVI, an information system that supports low-carbon, seamless mobility, and RIDE, a car-sharing system that uses compact electric vehicles (EVs) for urban short-distance transportation. Coms and i-Road are examples of EVs used in Ha:mo's RIDE system. These EVs have batteries that are rechargeable at home as well as battery charging stations, and these vehicles do not emit CO_2. Despite the development of EVs, establishing an infrastructure network of electric battery charging stations has been an issue throughout Japan. The city of Toyota has 3.72 battery charging stations per 10,000 citizens, or one every 10 km^2, the highest installation rate per capita in Japan (Aichi Prefecture, 2015).

2.2.2. Forests

Forests account for about 70% of the city's landmass (Toyota City, 2013). Millions of dollars, mainly funded by the Toyota Motor Corporation, have been spent on *kanbatsu* (periodic thinning that removes trees from dense stands to make room for other trees) to maximize CO_2 absorption and sustain a high-quality timber supply (Lowell, Dykstra, and Monserud, 2012). However, a sustainable supply of lumber from these thinned forests is difficult to maintain because of high delivery costs compared with other lumber supplies (Nikkei Ecology, 2001). Toyota City has encouraged the use

of wood from thinned trees in public buildings to expand the demands for such trees (Toyota City, 2015b). Hogaraka, a popular restaurant in Ecoful Town (a pavilion showcasing eco-living), is an example of a building made from thinned trees.

2.2.3. The urban center

Temperatures in urban areas tend to be higher than in rural areas because of the heat island effect (Kleeprekoper, van Esch, and Salcedo, 2012). This temperature difference can increase air pollution and deteriorate soil quality. Creating urban green spaces is important to mitigate these heat island effects (Karuppannan et al., 2014), because plants absorb CO_2 and heat, helping to stabilize temperatures. The city of Toyota has greened the urban center by 14.2% since 2009 and aims to reach 20% through measures such as rooftop and wall greening and installing water-retentive pavements. Since 2009, the city has subsidized individuals who wish to 'green' their urban properties. If citizens wish to green a wall, for example, the city provides a subsidy of 30,000 yen (approximately 300 USD) per square meter. Ecoful Town was established in the city center and contributes to the urban center theme (Toyota City, 2012).

2.2.4. Industry

The city of Toyota encourages companies based in the city to establish sustainable plants (i.e., factories with systems for creating, storing, and improving energy and environ- mental performance) through renewable energy use (e.g., biomass,

solar and wind energy) (Toyota Motor Corporation, 2013). This encouragement includes financial support, but many small- and medium-sized companies have remained unable to develop sustainable plants because their resources are too limited even with support from the city. Together with such companies, the city has organized a working group to study environmental business and promote research and development of eco-products such as next generation cars (NGCs) and smart houses (Toyota City, 2015b).

2.2.5. Public welfare and livelihood

The smart house, showcased in Ecoful Town, plays a key role in Toyota City's public welfare and livelihood eco-policy. Robles and Kim (2010) define a smart house as "the integration of technology and services through home networking for a better quality of living" (p. 37). A smart house typically generates energy through solar panels installed on the roof and walls and can store the energy in a home storage battery or in EVs. An EV battery can store up to a few days of electric energy for home use (Young et al., 2013). With a home energy management system (HEMS) that uses information technology to control and monitor energy use, a smart house can control and monitor energy production and consumption (e.g., electricity, gas, and water) effectively at home (Gross, 1998). Head and Lam (2011) note that improving energy efficiency is "one of the cheapest and easiest ways to conserve energy sources" and "smart energy monitoring in buildings and homes can reduce the need for excess energy" (p. 25).

There are several barriers to successful implementation of eco-policies, including lack of political will and other institutional issues (Kostka, 2014). A number of studies, however, have suggested that eco-awareness is a necessary pre-condition for any behavioral change linked to environmental activities (Kemp, Rotmans, and Loorbach, 2007; Kollmuss and Agyeman, 2002; Masuura, 2010; Sennes et al., 2012; United Nations University, 2012; Williams, 2010). Toyota City has made significant efforts to improve its citizens' awareness of the city's eco-policy and to raise awareness of its initiatives internationally.

Few empirical studies, however, have been undertaken to assess public awareness of Toyota City's eco-policy. This study therefore aims to fill that gap. In 2012 and 2015, questionnaires were used to gauge awareness of Toyota City's eco-policy among both citizens and non-citizens of Toyota City and changes in such awareness in the intervening period. The next chapter explains eco-awareness raising activities in Toyota City and analyzes the collected data by year (2012 and 2015) and residency (citizens of Toyota City and those from elsewhere). In particular, it examines (1) how awareness of eco-policy changed among both Toyota citizens and those from elsewhere during the research period and (2) how awareness differed between Toyota citizens and non-citizens. These dates were chosen because the city's designation as an environmental model city dates from 2009, and 3 years was thought sufficient to have raised awareness and to see changes from ongoing activity.

2.3. Awareness raising among citizens of Toyota City

Toyota City's efforts to promote its eco-policy include free pamphlets and concept books for children about the eco-policy, which were distributed via mail or during civic events. The city has also created a Facebook account that lists eco-related events (A. Nakagaki, personal communication, December 8, 2013). In 2012, the city opened Ecoful Town, a pavilion that demonstrates how the city addresses environmental issues through thematic strategies on transportation, forests, the urban center, industry, and public welfare and livelihood. Citizens can visit Ecoful Town to find out more about the benefits of becoming a low-carbon society and explore the latest environmental technologies (Toyota City, 2014b). Involvement and personal experience are important factors that positively affect behavioral changes (Griffin and O'Cass, 2004). Visitors to Ecoful Town include primary school pupils and secondary-level students studying science and sustainable development, as well as adults and senior public officials from other cities seeking to improve eco-policies in their own jurisdiction (T. Shimizu, personal communication, July 28, 2014). By July 2015, Ecoful Town had received over 150,000 visitors (Toyota City, 2015c).

2.4. Raising environmental awareness internationally

Japanese eco-cities have often been characterized by their international orientation (Low, 2013), focusing on international knowledge transfer and raising awareness of carbon reduction, drawing on 'green-smart' technological solutions (Joss, Cowley, and Tomozeiu, 2013). Toyota City is no exception and has made clear that it

wishes to be seen as an eco-model city in Asia, where motorization is accelerating (Toyota City, 2014a). Toyota City was already well-known internationally before its designation as an environmental model city. The Japanese government has also seen the potential for its use in marketing national eco-policy to the international community.

The city of Toyota hosted the Toyota World Environment Week 2015 in mid-January 2015. This included events such as the Junior United Nations Eco-Forum, in which secondary students from Japan and elsewhere discussed a sustainable future, the Sixth Toyota Business Fair, in which national and international institutions exhibited the latest environment-friendly technologies, and the High-Level Symposium on Sustainable Cities, which was co-hosted by the city of Toyota and the United Nations Department of Economic and Social Affairs. This symposium attracted over 250 participants, including government officials from 23 countries and representatives from seven international organizations (Toyota City, 2015a). Therefore, Toyota City is a good example of a city that has attempted to implement environmental policies with a parallel emphasis on raising the awareness of these policies. This makes Toyota City a potentially interesting case for investigations on the significance of awareness raising.

2.5. Methodology

We used a comparative survey to examine how Toyota and non-Toyota citizens' aware- ness of the city's eco-policy changed between 2012 and 2015. The following sections explain how data were collected and analyzed.

2.5.1. Sample

Questionnaires were conducted via convenience sampling on the street, in a shopping mall, in a public building, and in other facilities around Toyota City Station. These locations were selected and organized in consultation with personnel from Toyota City Hall. Participants were approached by one of the authors or one of their students, who explained that they were researching awareness of the city's eco-policy. Verbal consent was given by all the participants. One of the authors collected the data at the end and transcribed them using Excel. The data were later analyzed by the other author using Stata software. In the 2012 survey, 229 individuals completed questionnaires, 167 of whom lived in the city of Toyota (Ito, 2014). Using the same method as in 2012, the 2015 research involved 684 individuals, 445 of whom lived in the city. We selected 2012 as the baseline for comparison with 2015 because it was only in 2012 that all environmental model city initiatives such as Ecoful Town had been initiated, 3 years after the city's initial designation as an environmental model city. The study is therefore not a pure 'pre- and post-' comparison because awareness was expected to be reasonably well established in 2012. Instead, the study examines changes in perceptions over time to assess long-term sustainability of awareness.

Table 2.1 Questionnaire items

Eco-theme	Survey Questions
General	Q1. Do you know that Toyota City is an Environmental Model City (EMC)?
Transportation	Q2. Do you know that battery charging stations are located every $10km^2$?
	Q3. Do you know about the Intelligent Transportation System?
Forests	Q4. Do you know about *kanbatsu* and its effectiveness for CO_2 reduction?
Urban Center	Q5. Do you know about the heat island phenomenon?
	Q6. Do you know about the Ecoful Town?
Industry	Q7. Do you know that small/medium size-companies are working on establishing sustainable plants?
Public Welfare and Livelihood	Q8. Do you know about the Smart House?
	Q9. Do you know about the Home Energy Management System?

2.5.2. Questionnaires

As this was a comparative survey, we used the same questionnaires in 2015 as in 2012. The questionnaires consisted of nine items classified into three categories: personal, general, and specific. Participants were first asked to provide personal information (i.e., age, sex, and city of residence to identify citizens of Toyota City) and then whether they knew that Toyota City had been selected as an EMC. They were then asked questions about the five specific eco-themes in the policy (i.e., transportation, forests, the urban center, industry, and public welfare and livelihood) (see Table 2.1). Participants were asked whether they knew about:

- the ITS and the installation of battery charging stations for EVs, to assess aware- ness of transportation policies;
- *kanbatsu* and its effectiveness in reducing carbon emissions, to assess awareness of forest policy;

- the smart house and HEMS, to assess knowledge of the public welfare and livelihood aspects;
- small- and medium-sized companies in Toyota City being engaged in projects to create and develop sustainable plants, to cover the industry theme; and
- the heat island effect and Ecoful Town, to cover the urban center theme.

2.5.3. Data analysis

The collected data were first assessed using descriptive statistics (Tables 2 and 3). To analyze whether there were differences in the awareness of Toyota City's eco-policy by city of residence and year, we used Fisher's exact test, and logistic or Poisson regression, adjusted by age and sex. The count data were categorized as either 0, 1, or 2, where 0 meant a negative response (i.e., no) to both questions, 1 meant a positive response (i.e., yes) to one of the two questions, and 2 meant positive responses to both questions. The odds ratio (OR) was used to determine the years in which statistically significant differences were present, that is, whether those in the 2015 research were likely to be significantly more (OR > 1) or less (OR < 1) aware of particular items than in 2012. Incidence rate ratio (IRR) is a relative difference measure comparing incidence rates of events occurring at any given point in time. An IRR > 1 means that in 2015, participants were more aware than in 2012, and vice versa. These analyses enabled us to assess Toyota citizens' and non-citizens' awareness of eco-policy in both years (Table 4), differences in awareness between citizens and non-citizens in 2012 and 2015 (Table 5), and overall awareness of themes in 2015 (Table 6).

2.5.4. Limitations of research

As the research examines differences in awareness between citizens and non-citizens of Toyota City, it might have been better to draw the non-local sample from locations other than Toyota City. The non-citizens surveyed in the city of Toyota may be more likely to be aware of the city's eco-policy because they may visit the city frequently and thus be more familiar with the city. However, we suggest that this is not a fundamental flaw because the results showed significantly higher awareness among Toyota citizens than non-citizens.

It also remains unclear whether the sample is representative of the wider population. Approximately 90% of Toyota City's population is concentrated in the city center (Toyota City, 2016), and the study was conducted around Toyota City Station, also in the city center. We therefore suggest that the sample is likely to be reasonably representative of the city's population, but we did not test this assumption.

2.6. Results

Table 2.2 below shows the respondents' demographic information, followed by comparison of awareness of Toyota City's eco-policy by year and residence (Table 2.3-2.6).

Table 2.2. Participant demographic information

	Toyota citizens			Non-Toyota citizens		
n (%)	2012	2015	*p*-value	2012	2015	*p*-value
Age						
<19	42 (31.3)	140 (31.8)	0.027**	7 (17.5)	40 (18.0)	0.591
20-29	11 (8.2)	79 (18.0)		10 (25.0)	82 (36.0)	
30-39	21 (15.7)	54 (12.3)		8 (20.0)	38 (16.7)	
40-49	15 (11.2)	58 (13.2)		8 (20.0)	30 (13.2)	
>50	45 (33.6)	109 (24.8)		7 (17.5)	37 (16.2)	
Sex						
Male	72 (53.7)	217 (48.4)	0.324	24 (60.0)	118 (51.8)	0.392
Female	62 (46.3)	226 (51.6)		16 (40.0)	110 (48.2)	
Analyzed	134	440		40	228	
Respondents	167	445		61	239	
Missing values	33	5		21	11	

** $p<0.05$

In 2015, slightly more Toyota citizens surveyed knew that their city had been selected as an environmental model city by the Japanese government than in 2012. However, this increase was statistically insignificant. Non-citizens of Toyota Citywere significantly less aware of the city's designation as an eco-city in 2015 than in 2012.

The only statistically significant increase in awareness of the individual items covered in the survey was of Ecoful Town, for both citizens and non-citizens. Toyota citizens' awareness of the ITS, *kanbatsu*, and development of sustainable plants was significantly lower in 2015. Non-citizens' awareness was also significantly lower for EMC, ITS, and sustainable plant development. The impact of Ecoful Town among Toyota citizens seemed sufficient to generate an increase in overall awareness of eco-policies.

Table 2.3. Public awareness of Toyota City's eco-policy

	Toyota citizens			Non-citizens of Toyota		
	2012	2015	p-value	2012	2015	p-value
Q1: EMC status						
Yes	49 (37.4)	173 (39.4)	0.760	14 (35.0)	44 (19.5)	0.037**
No	82 (62.6)	266 (60.6)		26 (65.0)	182 (80.5)	
Unanswered	3	1		0	2	
Transportation						
Q2: Awareness of battery charging stations						
Yes	32 (24.1)	114 (26.0)	0.734	7 (18.0)	44 (19.6)	1.000
No	101 (75.9)	324 (74.0)		51 (82.1)	180 (80.4)	
Unanswered	1	2		1	4	
Q3: ITS awareness						
Yes	41 (30.6)	76 (17.4)	0.001***	12 (30.0)	28 (12.4)	0.008***
No	93 (69.4)	362 (82.6)		28 (70.0)	198 (87.6)	
Unanswered	0	2		0	2	
Forests						
Q4: Kanbatsu awareness						
Yes	64 (49.2)	163 (37.1)	0.015**	18 (45.0%)	90 (39.7)	0.601
No	66 (50.8)	276 (62.9)		22 (55.0)	137 (60.4)	
Unanswered	4	1		0	1	
Urban center						
Q5: Heat island awareness						
Yes	63 (47.0)	197 (46.0)	0.843	19 (52.5)	100 (45.9)	0.865
No	71 (53.0)	231 (54.0)		21 (47.5)	118 (54.1)	
Unanswered	0	12		0	10	
Q6: Ecoful Town						
Yes	44 (34.9)	285 (65.2)	0.000***	7 (18.0)	87 (38.7)	0.012**
No	82 (65.0)	152 (34.8)		32 (82.1)	138 (61.3)	
Unanswered	8	3		1	3	
Industry						
Q7: Sustainable factories						
Yes	59 (44.7)	103 (23.6)	0.000***	15 (39.5)	52 (23.1)	0.043**
No	73 (55.3)	333 (76.4)		23 (60.5)	173 (76.9)	
Unanswered	2	4		2	3	
Public welfare and livelihood						
Q8: Smart house						
Yes	70 (52.2)	227 (51.6)	0.922	22 (55.0)	105 (46.3)	0.391
No	64 (47.8)	213 (48.4)		18 (45.0)	122 (53.8)	
Unanswered	0	0		0	1	
Q9: HEMS						
Yes	19 (14.2)	73 (16.6)	0.591	9 (22.5)	44 (19.3)	0.668
No	115 (85.8)	367 (83.4)		31 (77.5)	184 (80.7)	
Unanswered	0	0		0	0	

2-sided Fisher's exact test
* $p<0.1$, ** $p<0.05$, *** $p<0.01$

Table 2.4. Comparison of awareness between 2012 and 2015

Eco-theme	Eco-item	N	OR	IRR	p-value
Toyota citizens					
General	Q1: EMC	570	1.24		0.328
	Q2: Battery charging stations	571	1.29		0.295
	Q3: ITS	572	0.52		0.005***
Forests	Q4: *kanbatsu*/CO2 reduction	569	0.67		0.061*
	Q5: Heat island phenomenon	562	1.05		0.808
	Q6: Ecoful Town	563	3.96		0.000***
Industry	Q7: Sustainable plants	568	0.39		0.000***
	Q8: Smart House	574	1.10		0.645
	Q9: HEMS	574	1.35		0.302
Transportation	Q2+Q3	538		0.85	0.242
Urban center	Q5+Q6	538		1.40	0.002***
Public welfare and livelihood	Q8+Q9	538		1.04	0.733
Total		538		1.03	0.653
Non-citizens					
General	Q1: EMC	266	0.48		0.058*
	Q2: Battery charging stations	263	1.30		0.582
	Q3: ITS	266	0.35		0.012**
Forests	Q4: *kanbatsu*/CO_2 reduction	267	0.87		0.691
	Q5: Heat island phenomenon	258	1.03		0.935
	Q6: Ecoful Town	264	3.05		0.012**
Industry	Q7: Sustainable plants	263	0.50		0.077*
	Q8: Smart House	267	0.72		0.347
	Q9: HEMS	268	0.82		0.654
Transportation	Q2+Q3	242		0.84	0.537
Urban center	Q5+Q6	242		1.45	0.101
Public welfare and livelihood	Q8+Q9	242		0.95	0.799
Total		242		0.95	0.606

An outcome of each question is an answer: Yes = 1, No = 0 for logistic regression analysis
Outcomes of a group of questions are numbers answering "Yes" for Poisson regression analysis
A main explanatory variable is the year, 2015 = 1, 2012 = 0
OR = odds ratio, and IRR = incidence rate ratio
Total indicates sum of answers to all questions
* $p<0.1$, ** $p<0.05$, *** $p<0.01$

Table 4 shows how awareness of eco-policy changed between 2012 and 2015. Toyota citizens had statistically significant differences for ITS, *kanbatsu*, Ecoful Town, and sustainable plant development. Although the difference for the heat island effect was not statistically significant, when combined with Ecoful Town (the other urban center

item), the difference over time was statistically significant. Of the statistically significant items, the OR was less than 1 for ITS, *kanbatsu*, and more than 1 for Ecoful Town and the urban center items (the heat island effect combined with Ecoful Town). This means that in 2012, Toyota citizens were more likely to know about ITS, *kanbatsu*, and sustainable plant development. In 2015, however, they were more aware of the urban center items than other areas of eco-policy. It is therefore reasonable to conclude that Toyota citizens' recognition of the forest and industry themes declined between 2012 and 2015, although it improved for the urban center theme, and particularly Ecoful Town.

Table 2.5. Comparison of awareness of citizens and non-citizens in 2012 and 2015

Eco-theme	Eco-item	N	OR	IRR	p-value
2012					
General	Q1: EMC	171	1.08		0.860
	Q2: Battery charging stations	172	1.29		0.614
	Q3: ITS	174	1.05		0.915
Forests	Q4: *kanbatsu*/CO_2 reduction	170	1.38		0.418
	Q5: Heat island phenomenon	174	1.07		0.860
	Q6: Ecoful Town	165	2.36		0.079*
Industry	Q7: Sustainable plants	170	1.28		0.541
	Q8: Smart House	174	0.97		0.937
	Q9: HEMS	174	0.72		0.497
Transportation	Q2+Q3	156		1.34	0.310
Urban center	Q5+Q6	156		1.26	0.352
Public welfare and livelihood	Q8+Q9	156		1.02	0.940
Total		156		1.15	0.215
2015					
General	Q1: EMC	665	2.73		0.000***
	Q2: Battery charging stations	662	1.38		0.130
	Q3: ITS	664	1.05		0.915
Forests	Q4: *kanbatsu*/CO_2 reduction	666	0.82		0.273
	Q5: Heat island phenomenon	646	1.07		0.860
	Q6: Ecoful Town	662	2.98		0.000***
Industry	Q7: Sustainable plants	661	1.28		0.541
	Q8: Smart House	667	1.26		0.176
	Q9: HEMS	668	0.94		0.776
Transportation	Q2+Q3	624		1.43	0.017*
Urban center	Q5+Q6	624		1.31	0.003***
Public welfare and livelihood	Q8+Q9	624		1.06	0.583
Total		624		1.24	0.000***

Table 2.6. Comparing awareness of Toyota City's eco-policy between 2012 and 2015

	Eco-item	N	OR	IRR	p-value
General	Q1: EMC	836	1.86		0.000***
	Q2: Battery charging stations	834	1.33		0.090*
	Q3: ITS	838	0.85		0.369
Forests	Q4: *kanbatsu*/CO_2 reduction	836	0.77		0.074*
	Q5: Heat island phenomenon	820	1.02		0.869
	Q6: Ecoful Town	827	3.53		0.000***
Industry	Q7: Sustainable plants	831	0.66		0.011**
	Q8: Smart House	841	1.14		0344
	Q9: HEMS	842	1.02		0.933
Transportation	Q2+Q3	780		1.43	0.364
Urban center	Q5+Q6	780		1.38	0.000***
Public welfare and livelihood	Q8+Q9	780		1.04	0.642
Total	Total	780		1.15	0.001***

We next examined how awareness changed among non-citizens of Toyota City between the two periods (Table 4, lower half). Their recognition of the EMC status, ITS, and sustainable plant development declined, but knowledge of Ecoful Town increased significantly. There were no significant changes in any overall themes among this group over time.

If we compare awareness of the city's eco-policy between citizens and non-citizens in 2012, the picture is different from 2015. In 2012, there were no statistically significant differences in any item except Ecoful Town. As the overall difference was not statistically significant, we conclude that overall awareness of the city's eco-policy among Toyota citizens was not significantly different from non-Toyota citizens in 2012.

By the 2015 survey, however, Toyota citizens were significantly more aware of the EMC status and Ecoful Town. There were no significant differences for the battery charging stations, ITS, and the heat island effect. However, if the battery charging stations and the ITS are combined, then they become statistically significant. Likewise, if the heat island effect is combined with Ecoful Town, they become statistically significant. That is, citizens were significantly more aware of the general eco-policy, and the transportation and urban center themes.

Table 6 shows awareness among citizens in 2015 compared with all other categories (citizens in 2012 and non-citizens in both periods). The figures indicate that 2015 Toyota citizens were significantly more likely to know about the city's EMC

status, battery charging stations, Ecoful Town, the urban center items (the heat island effect combined with Ecoful Town), and all items combined. However, when battery charging stations were combined with the ITS to form a transportation theme, the difference was not statistically significant. It may be that the city's activities, and particularly the urban center demonstrators, have made a measurable impression on awareness in general (Q1), and of the urban center theme (Q5+Q6), which in turn have affected the value for all items combined.

2.7. Discussion

This study shows that Toyota citizens in 2015 were significantly more aware of the city's eco-policy than non-citizens (Table 5) and all other groups (Table 6). These findings suggest that the city's promotion of its eco-policy to its citizens was probably effective. The most significant change among individual items was for Ecoful Town, followed by the city's EMC status. The establishment of Ecoful Town was arguably a driving force in communicating the eco-policy to Toyota citizens. We did not ask how respondents had become aware of different elements of the eco-policy, for example, by seeing a demonstrator project such as Ecoful Town, reading a promotional leaflet, or hearing about the work from other people. It may therefore be the case that most awareness had arisen from seeing Ecoful Town. Future studies may wish to examine how participants became aware of each theme or element, to identify which activities are most effective in raising awareness and help to focus any promotional work more effectively.

The “other” citizens, including those of Toyota City in 2012, significantly exceeded 2015 Toyota citizens in knowledge of forest- (*kanbatsu*) and industry-related (sustainable plants) policies, implying that Toyota citizens did not appreciate that these activities had continued between 2012 and 2015. There were no statistically significant differences in the transportation (battery charging stations and ITS) or public welfare and livelihood (smart house and HEMS) themes. This suggests that Toyota City’s activities have focused on the urban center theme, and particularly Ecoful Town, and that there has been little activity relating to the other themes.

One possible explanation for the reduction of citizens’ awareness is the passage of time. The 2005 World Exposition, which was partly based in Toyota City and attracted 22 million visitors, focused on the protection and utilization of forests (Japan Association for the Promotion of Creative Events, 2005). Both official characters and the pavilion park included the word *mori* or forest in their names. In 2009, when Toyota City was designated as an environmental model city, the Democratic Party of Japan, which took over government from the Liberal Democratic Party, emphasized the green economy and industry (Democratic Party of Japan, 2009). These events raised awareness of terms such as *kanbatsu* and sustainable plants. The Liberal Democratic Party regained office in 2012 after the 2011 Great East Japan Earthquake, and this changed the national eco-policy largely because of the impact of the earthquake on nuclear power generation, an essential pillar in achieving green economic growth. The eco-city movement therefore lost momentum (Takeuchi, 2016). With diminishing government support, the priority given to eco-themes such as forests and industry was

reduced, arguably because these themes require more 'public sphere' environmentalism, such as action taken by government or companies. Other themes such as transportation and public welfare and livelihood depend more on private and individual actions, such as changes to commuting habits, or use of eco-friendly vehicles. Ecoful Town confirms this, with its focus on eco-cars and smart houses. Although industrial emissions account for over 60% of Toyota City's CO_2, the impact of industry may be invisible to citizens, unlike industrial air and water pollution in the 1960s and 1970s. Without a personal sense of competence or responsibility, citizens are less likely to be engaged in environmental activism in these areas (Chawla and Cushing, 2007). Achieving a low-carbon society, however, requires both private and public sphere environmentalism.

Toyota City Hall has recognized the importance of these issues and taken some actions to address them. For example, a new area of Ecoful Town dealing with forests was completed in 2014. This is expected to help citizens learn about the importance of forest management. In contrast, Ecoful Town does not have a substantial section to raise awareness of the development of sustainable plants. Personnel from Toyota City Hall informed one of the authors that although industry is one of the pillars in the city's eco-policy, they do not focus on promoting citizens' awareness of this theme because industry, including the development of sustainable plants, is not a main element of citizens' daily lives. Private companies based in the city, such as the Toyota Motor Corporation, are the main proponents of this theme and have their own initiatives to inform citizens of their sustainable development efforts.

One possible reason why awareness was not significantly higher among Toyota citizens than non-citizens of the transportation and public welfare and livelihood themes may be that the items used for these themes, such as smart house and ITS, have been promoted nationwide, whereas Ecoful Town is unique to Toyota City.

There may be scope for Toyota City to take advantage of the large increase in awareness of Ecoful Town and promote other themes, notably industry, by establishing substantial sections within Ecoful Town covering these alternative themes. The Toyota Motor Corporation provides tours of its sustainable plants, but many non-citizens of Toyota City also visit, which makes it difficult for Toyota City to differentiate itself from other cities in terms of awareness.

Although this is a case study, which cannot necessarily be generalized, there are nevertheless some lessons about awareness raising that may be drawn from Toyota City's experience. These are, in particular, as follows:

- Awareness tends to be higher of projects that are more relevant to citizens, such as those that affect their everyday lives, and where they feel they can make a difference. This was clearly shown by the lower awareness of the industry and forest themes.
- Awareness is also likely to be higher of projects that can be demonstrated physically (e.g., via demonstrators like Ecoful Town or a 'smart house').
- Ongoing activity, including regular updates of news and progress, may be important in retaining levels of awareness.

2.8. Conclusion

This study analyzed how awareness of Toyota City's eco-policy changed over time (between 2012 and 2015) and citizenship (Toyota citizens and non-citizens). Although this is a case study, it also provides some useful lessons for other eco- cities or projects in other spheres relying on community awareness. Findings suggest that the city's activities in support of its eco-policy have been successful in increasing its citizens' awareness overall. Toyota citizens' awareness of the city's eco-policy in 2015 was significantly greater than in 2012 as well as over non-citizens' awareness in both years. This success arguably depended on a single initiative, the establishment of Ecoful Town, and may therefore be unsustainable. There remain issues to address to raise awareness, especially of the themes of forests and industry. Toyota City intends to increase its citizens' awareness of forests by establishing a section covering the theme within Ecoful Town. The city government, however, appears to leave the promotion of industrial efforts to the private sector, focusing on the other four eco- themes. The local government alone will be unable to realize these ideas or its ambition to establish an eco-city. This requires the collaboration of all stakeholders, including enterprises, civil society, and citizens, and without their desire to change, it will be impossible to transform eco-policy into practice.

For future research, similar studies should be conducted in future to examine longitudinal trends (e.g., over 5- or 10-year periods) in citizens' awareness of Toyota City's eco-policy and to improve awareness. Some studies have suggested that

face-to-face questionnaire research may actively help educate respondents (Cohen, Manion, and Morrison, 2011).

Semi-structured interviews with citizens about the city's eco-policy could help us understand more about why citizens know about certain aspects of the policy and how it could be better promoted. Such interviews could also help construct future survey questions (Schensul, Schensul, and LeCompte, 1999).

This study focused on analyzing awareness of eco-policy. We did not, however, examine how citizens had learned about each aspect of the eco-policy. Future research could examine methods of sharing information and spreading awareness, to improve effectiveness of promotional activities. Additionally, knowing about the policy does not necessarily mean that citizens engage in sustainable behaviors (McKenzie-Mohr, 2012) or make any effort to reduce the need for energy (Head and Lam, 2011). Goel and Sivam (2015) make clear that urban sustainability is dependent at least partially on individual behaviors (e.g., using mass transit systems and water efficient toilets and purchasing environment-friendly products) (McKenzie-Mohr, 2012). Future research should include data collection and analysis of behavioral change in response to eco-policies as well as awareness. It may also be helpful to look at other barriers to implementation of eco- policies, such as financial support and government commitment (Kostka, 2014).

This study focused on the city of Toyota as an example of a typical eco-city in Japan with international ambitions. Comparative studies between Toyota City and other national and international eco-cities with similar goals would be helpful to identify best

practice in both developing effective eco-policy and raising awareness. The city of Toyama, in Japan, for example, has been effective in raising awareness of its eco-policy, particularly internationally. In 2015, the city was named as one of the five model cities of the District Energy in Cities Initiative by the UN SE4ALL (Sustainable Energy for All) initiative. An international comparative study of eco-policy between Toyota City and Neiva, Colombia, has already been published (Ito and Tafur, 2014). Similar studies could inform and promote eco-policy in Toyota City and elsewhere, and it is important to examine a wide range of such cities to increase learning (Low, 2013).

3. Associations between Socio-demographic Factors and Environmental Awareness

This chapter analyzes relationships between socio-demographic factors (i.e., age, sex, education, and household income) and environmental awareness related to the eco-policy in Toyota City, Japan. Previous research has shown that citizens' environmental awareness improved significantly after the city was designated as an environmental model city by the Japanese government in 2009. However, this research did not consider socio-demographic factors, which may be linked to variations in environmental awareness. Using a questionnaire survey, this study addresses this research gap. The findings suggest that education and household income are significantly associated with environmental awareness. Some recommendations for promoting eco-policy are discussed.

3.1. Background

Toyota City has long been a pioneer in addressing environmental issues, mostly because of the industrial activities of the Toyota Motor Corporation and its affiliated companies. Often in collaboration with the Toyota Motor Corporation and other stakeholders, the city government developed and implemented action plans to improve the environment throughout the 1990s and 2000s. In 2009, Toyota City was designated by the Japanese government as an environmental model city to act as an exemplar of the

move towards a low-carbon society and reducing carbon dioxide emissions (Toyota City, 2009).

Toyota City deserves attention in the study of eco-policy and eco-cities because it is internationally well-known, not least as the location of the headquarters of the Toyota Motor Corporation. The Toyota Motor Corporation has been supportive of Toyota City's eco-policy, especially in the area of transportation and industry, by producing vehicles with low CO_2 emissions, and operating a car-sharing system for the city, the Harmonious Mobility Network (Ha:mo). The city aims to become an international exemplar of an eco-city, particularly in Asia, where industrialization is accelerating (Ito and Kawazoe, 2016).

A previous study on Toyota City's eco-policy found that citizens' awareness significantly improved between 2012 and 2015 (Ito and Kawazoe, 2016). However, this study did not consider that socio-demographic factors may account for considerable variance in environmental awareness, knowledge, attitudes, and behaviors (Newman and Fernandes, 2016; Poortinga, Steg and Vlek, 2004). Understanding the relationships between socio-demographic factors and environmental awareness is therefore important to promote eco-policies, as it enables city governments to identify particular segments of the population that may be unaware of environmental issues (Mmojieje, 2015). No study has examined the associations between socio-demographic factors and environmental awareness in Toyota City. This study therefore analyzes the relationship between environmental awareness, measured as awareness of items in the city's

eco-policy, and several socio-demographic factors, including age, sex, education, and household income.

3.2. Environmental awareness, knowledge, attitudes, and behaviors

Environmental awareness is defined as "the attention, concern (mindful or heedful), and sensitivity of the respondents to environmental problems" (Sudarmadi et al., 2001, p. 172). Increasing environmental awareness is where social groups or individuals acquire a greater awareness of and sensitivity to the environment and related problems (UNESCO-UNEP, 1977), and is an important component of environmental knowledge and attitudes (Kollmuss and Agyeman, 2002). To have a positive attitude towards the environment, it is necessary to be first aware and then knowledgeable about it (Olufemi, Mji, and Mukhola, 2016). Awareness helps to enhance knowledge and attitudes, and in principle, these then influence pro-environmental behaviors (Levy, Orion, and Leshem, 2016).

According to Polonsky, Vocino, Grau, Garma, and Ferdous (2012), "environmental knowledge has been found to be a precondition to one's environmental attitudes, while attitudes toward the environment have been commonly found to be an antecedent to pro-environmental behavior" (p. 242). This linear knowledge–attitudes–behaviors (KAB) model has been criticized, however, because knowledge does not necessarily directly influence behaviors. Robelia and Murphy (2012) argued that the model "has conceptual limitations as it oversimplifies components, and neglects the interactions of factors that may govern behavior" (p. 300). Other scholars have

suggested that environmental awareness and knowledge may be necessary but not sufficient conditions for pro-environmental behaviors (Jensen, 2002). Gifford and Nilsson (2014) noted that individuals would not be concerned about the environment or act pro-environmentally "if one knows nothing about the problem or potential positive actions" (p. 142). Kollmuss and Agyeman (2002) concluded that internal factors, including awareness and knowledge, and external factors, such as political and economic issues, "influence each other and, ultimately, pro-environmental behavior…The biggest positive influence on pro-environmental behavior…is achieved when internal and external factors act synergistically" (p. 257).

In this study, we use the term 'environmental awareness' to mean awareness of the individual elements in Toyota City's eco-policy (or 'eco-policy items'), across three themes, transportation, the urban center, and public welfare and livelihood. It is therefore eco-policy awareness, rather than wider environmental awareness. It is assumed that at least some awareness and knowledge of eco-policy items is necessary for individuals to act on them and demonstrate environmental behaviors that work toward achieving the eco-policy's goals.

3.3. Eco-policy in Toyota City

This study focuses on the three main themes of Toyota City's eco-policy: transportation, the urban center, and public welfare and livelihood. Transportation items include next-generation cars (NGCs) and Ha:mo. The urban center items are awareness

of the heat island effect and Ecoful Town, a pavilion showcasing eco-living. Public welfare and livelihood items are the smart house and eco-points.

3.3.1. NGCs (Transportation 1)

NGCs include electric vehicles, hybrid electric vehicles, and plug-in hybrid vehicles. These vehicles have substantial economic and environmental benefits because they are energy- and cost-efficient. In Toyota City, plug-in hybrid vehicles such as the Toyota Motor Corporation's Prius and Aqua are popular. The market for NGCs is expected to grow rapidly because they produce fewer CO_2 emissions and are increasingly subsidized by many governments (Woodcock, 2012), including Toyota City.

3.3.2. Ha:mo (Transportation 2)

Ha:mo is a car-sharing system using compact electric vehicles for urban short-distance transportation. The scheme is supported by the Toyota Motor Corporation as part of its corporate social responsibility policy. It has been established in high-visibility spots such as Toyota City Station and Como Square (a shopping mall in the city center). Users can pick up and drop off a vehicle at any Ha:mo station. They register online and pay to use Ha:mo with a credit card on a pay-as-you-go basis.

3.3.3. Ecoful Town (Urban center 1)

To promote the eco-policy and improve awareness of it among citizens, Ecoful Town was established in 2012. Ecoful Town shows how Toyota City tackles

environmental challenges and showcases low-carbon eco-strategies. Visitors to Ecoful Town can have hands-on experiences such as riding in an NGC and visiting a smart house. This experiential eco-learning may enable individuals to actively participate in a particular, first-hand solution that is directly related to real-world environmental problems (Blair, 2009; Schelly, Cross, Franzen, Hall and Reeve, 2012; Stern, Powell, and Hill, 2014).

3.3.4. Heat island effect (Urban center 2)

The heat island effect is a phenomenon where temperatures in urban areas are higher than in suburban and rural areas. This is caused by excess population, developed industries, car use, congested and tall buildings, asphalt roads, and cement squares (Gao, Xu, Li and Wang, 2015). Greening (creating urban green spaces) is a measure taken to mitigate this effect (Karuppannan, Baharuddin, Sivam, and Daniels, 2014) because plants absorb CO_2 and heat, helping to stabilize temperatures. Toyota City has greened its urban center by 14.2% since 2009 and aims to reach 20% through measures such as rooftop and wall greening and the installation of water-retentive pavements (Ito and Kawazoe, 2016).

3.3.5. Smart house (Public welfare and livelihood 1)

A smart house is a residential building designed to reduce CO_2 emissions and save energy through the use of renewable energy sources and monitoring of energy consumption (Kim et al., 2015). Its primary objectives are to increase home automation,

facilitate energy management, and reduce CO_2 gas emissions (Al-Sumaiti, Ahmed, and Salama, 2014). The smart house in Toyota City has a home energy management system that can monitor energy generation and consumption.

3.3.6. Eco-points (Public welfare and livelihood 2)

To popularize its eco-policy among its citizens, Toyota City uses the Eco-Family Card and "eco-points". When registered citizens purchase an ecological product using an Eco-Family Card at an affiliated store or recycle something at a designated place, they receive points. These can be exchanged for certain goods, such as stationery, bus tickets, or gift certificates. Toyota City has worked to increase the number of affiliated stores, and therefore the use of eco-points (Ito, 2014).

3.4. Socio-demographic factors

Socio-demographic factors and environmental awareness may be correlated. Age, sex, education, and income have all been found to be related to environmental awareness, knowledge, attitudes, and behaviors (see, for example, Kurisu, 2015).

3.4.1. Age

Previous studies have not found a consistent pattern in the relationship between age and environmental knowledge. Cheung et al's (2015) study in Hong Kong indicated that older people have lower environmental knowledge. However, Robelia and Murphy's

(2012) research in the U.S. suggested that adults aged 35–65 were more knowledgeable than younger people. A study by Aoyagi-Usui, Vinken, and Kuribayashi (2003) in Japan also suggested that eco-awareness increased with age, and Shen and Saijo (2008) found that the older generation in Shanghai was more concerned about the environment than younger people.

3.4.2. Sex

Previous research also indicates no consistent pattern for the relationship between sex and environmental knowledge. For instance, studies in the U.S. (Robelia and Murphy, 2012), Sao Paulo (Bortoleto, Kurisu, and Hanaki, 2012), Hong Kong (Cheung et al., 2015), and Israel (Levy, Orion, and Leshem, 2016) found that males were more knowledgeable about environmental issues. However, studies in Turkey (Tayci and Uysal, 2012), Pakistan (Awan and Abbasi, 2013), and Japan (Aoyagi-Usui, Vinken, and Kuribayashi, 2003) suggested that women knew more than men.

Studying environmental concerns and behaviors in the U.S., Newman and Fernandes (2016) found that females were more likely "to be more concerned about the environment yet know less about the causes and solutions to environmental issues [than males]" (p. 169). Kollmuss and Agyeman (2002) also found that females were less knowledgeable than males but expressed more concern about environmental issues.

3.4.3. Education

The relationship between educational levels and environmental knowledge and behaviors is more consistent. In one study across 40 countries, individuals with undergraduate degrees were more likely to be actively involved in environmental protection (Duroy, 2005). Robelia and Murphy (2012) noted that undergraduate students in the U.S. tended to gain more environmental knowledge as a result of their college education. A study in Shanghai also indicated that those with college degrees or higher were more environmentally concerned than those without (Shen and Saijo, 2008).

3.4.4. Income

Income level may be associated with environmental awareness, knowledge, attitudes, and behaviors. Studies in Indonesia (Junaedi, 2012), Japan (Bortoleto, Kurisu, and Hanaki, 2012), and the U.S. (Newman and Fernandes, 2016; Stevenson et al., 2014) suggested that income has a statistically significant relationship with environmental knowledge and behaviors. Parental income was also significantly related to environmental attitudes in India (Hassan and Ratnakar, 2012), the U.S. (Newman and Fernandes, 2016), Japan (Aoyagi 2001; Aoyagi-Usui, Vinken, and Kuribayashi, 2003), and China (Shen and Saijo, 2008). Duroy (2005), however, found little evidence of a direct relationship between economic affluence and either environmental awareness or behaviors. Ferreira and Moro (2013) also suggested that increased affluence was not associated with improved environmental knowledge, attitudes, or behaviors.

There are, therefore, inconsistent results about the relationship between socio-demographic factors and environmental knowledge, attitudes, and behaviors. This inconsistency may be associated with place of residence and cultural context (Xiao and McCright, 2007). Examining the effects of socio-demographic factors on environmental knowledge may indicate that particular population segments know about certain items in Toyota City's eco-policy, and therefore help the city government to improve the targeting of its eco-policy promotion.

3.5. Methodology

3.5.1.Questionnaire

A face-to-face street questionnaire was administered for this study (see Table 3.1). The questionnaire was based on literature reviews and previous, related studies (Ito, 2014; Ito and Kawazoe, 2016).

Table 3.1. Questionnaire items

Eco-theme	Survey Questions
Transportation	Q1. Do you know about NGCs?
	Q2. Do you know about Ha:mo?
Urban Center	Q3. Do you know about the heat island effect?
	Q4. Do you know about the Ecoful Town?
Public Welfare and Livelihood	Q5. Do you know about the smart house?
	Q6. Do you know about eco-points?

We calculated each respondent's total 'Yes' responses for the survey questions asking about awareness of an individual eco-policy item. This gave the overall

eco-policy awareness and we regressed this to possible explanatory variables using a Poisson regression.

3.5.2. Sample

In total, 464 individuals agreed to participate, 271 of whom had no missing data. Of these, 145 were residents of Toyota City, and formed the final sample analyzed in this study. The questionnaires were administered in and around Toyota City Station in June, 2016. The location was selected because approximately 90% of Toyota City residents live in the city center, where the station is located (Toyota City, 2016). The sample can therefore be considered reasonably representative of the city's population, although we did not test this assumption. Respondents were approached by one of the authors or a student, who explained that they were researching awareness of the city's eco-policy. Verbal consent was provided by all respondents. One of the authors later consolidated and transcribed the data using Excel.

3.5.3. Data analysis

The collected data were analyzed using Stata software (Version 14.0) to test which socio-demographic factors had statistically significant associations with eco-policy items. We used a logistic or Poisson regression, adjusted by age, sex, education, and household income. We calculated odds ratios (OR) to compare the likelihood of two events occurring and incidence rate ratios (IRR) to compare the incidence rates of events.

3.6. Results

Below is the table showing respondents socio-demographic factors (Table 3.2), followed by associations between socio-demographic factors and environmental awareness (Table 3.3).

Table 3.2. Socio-demographic factors

		n (%)
Age		
	20-29	57 (39.31)
	30-39	27 (18.62)
	40-49	16 (11.03)
	50<	45 (31.03)
Sex		
	Female	75 (51.72)
	Male	70 (48.28)
Education		
	High school diploma or equivalent	86 (59.31)
	University/Graduate degrees	59 (40.69)
Household income		
	Low income (up to 20,000 USD)	29 (20.00)
	Lower middle income (20,000-50,000 USD)	83 (57.24)
	Upper middle income (50,000-80,000 USD)	23 (15.86)
	High income household (8,000,000 USD plus)	10 (6.90)

Table 3.3. Socio-demographic factors and environmental awareness

Explanatory variable	NGCs OR (95% CI)	Ha:mo OR (95% CI)	Ecoful Town OR (95% CI)	Heat Island OR (95% CI)	Smart House OR (95% CI)	Eco-points OR (95% CI)	Overall[a] IRR[b] (95% CI)
Sex (Ref=women)							
Men	1.19 (0.58-2.43)	0.57 (0.28-1.16)	0.21** (0.10-0.47)	0.56 (0.27-1.15)	1.38 (0.67-2.83)	1.15 (0.56-2.34)	0.86 (0.71-1.04)
Age (Ref=20s)							
30s	1.16 (0.43-3.14)	1.51 (0.55-4.14)	2.08 (0.68-6.42)	1.06 (0.37-3.06)	1.87 (0.68-5.15)	1.36 (0.50-3.73)	1.19 (0.90-1.57)
40s	0.35 (0.09-1.39)	0.86 (0.24-3.11)	2.18 (0.53-8.95)	2.15 (0.59-7.85)	0.56 (0.15-2.09)	1.32 (0.37-4.70)	0.98 (0.67-1.44)
50 or over	2.33 (0.92-5.91)	1.27 (0.51-3.19)	2.24 (0.80-6.31)	2.36 (0.90-6.18)	2.53 (0.99-6.46)	2.30 (0.90-5.86)	1.38* (1.08-1.78)
Education (Ref=school)							
University	1.18 (0.52-2.68)	1.72 (0.77-3.87)	2.92* (1.14-7.44)	2.40* (1.03-5.59)	1.08 (0.47-2.48)	1.38 (0.60-3.16)	1.25* (1.00-1.56)
Income (Ref=low)							
Lower middle	3.30** (1.24-8.75)	2.85 (1.09-7.49)	3.17* (1.15-8.55)	1.58 (0.62-4.03)	4.23** (1.54-11.63)	3.13* (1.16-8.47)	1.79* (1.32-2.44)
Upper middle	4.59** (1.27-16.60)	1.68 (0.49-5.79)	4.02 (1.00-15.72)	0.58 (0.16-2.07)	3.28 (0.91-11.83)	6.23** (1.69-23.01)	1.72* (1.19-2.49)
High	2.50 (0.53-11.86)	3.11 (0.65-14.84)	1.85 (0.36-9.45)	13.1* (1.38-126.02)	4.82 (0.96-24.16)	2.82 (0.59-13.57)	1.90**(1.23-2.94)

n=145 for each of six eco-items and sum of yes

OR: Odds ration of logistic regression CI: confidence interval

[a] Sum of the number of an answer "Yes" to each of the survey questions listed in Table 1. The sum was regressed to the explanatory variables based on Poison regression.

[b] IRR: Incidence rate ratio of Poison regression.

* $p<0.05$, ** $p<0.01$

Higher household income and education levels were both linked to awareness of Toyota City's eco-policy. Those from higher-income households and with university or higher degrees were more likely to be aware of the eco-policy than those with low household incomes and school education.

Several socio-demographic factors, particularly income and education level, were correlated with awareness of specific items (see Table 3.2. and 3.3). For example, those in households with lower-middle incomes were more likely than low income households to be aware of NGCs, Ecoful Town, the smart house, Ha:mo, and eco-points. Those from high income households were more likely to be aware of the heat island effect. Those with university or higher degrees were more likely to be aware of Ecoful Town and the heat island effect. Women were more likely than men to be aware of Ecoful Town, although their overall awareness was not significantly different. Those aged 50 or over were more likely to know about the eco-policy overall than younger people, but there were no significant age differences on individual items.

Our findings suggest that education level and household income are most strongly linked to awareness of Toyota City's eco-policy. Sex and age were also associated, but not to the same extent.

3.7. Discussion

Citizens with higher education levels and middle or high household incomes tended to know more about the city's eco-policy. The city government should therefore focus its eco-awareness promotion activity on citizens without university degrees and

with low household incomes. Environmental education (EE) is often suggested as a way to improve environmental awareness and knowledge (Ernst, Blood, and Beery, 2017; de Carvalho and Leite, 2016; Gifford and Nilsson, 2014; Hungerford and Volk, 1990; Varela-Losada, Vega-Marcote, Perez-Rodriguez, and Alvarez-Lires, 2016). Toyota City residents without university degrees tended to know less about the city's eco-policy, so the city government should target EE *at the basic level* (from primary to secondary schooling). This approach should raise eco-awareness in citizens from an early age, and they would retain this awareness into adulthood regardless of their career choices (Williams and Chawla, 2016). Although this would be a long-term approach to raising awareness, short-term improvements might also be gained if children shared their increased awareness with other family members (Riemer, Lynes, and Hickman, 2014).

Several studies have suggested that experiential learning may be an effective way to increase environmental awareness (Griffin and O'Cass, 2004; Schelly et al., 2012; Stern, Powell, and Hill, 2014). It provides students with unique and valuable opportunities by connecting socio-cultural and natural components (Dunkley, 2016). Some commentators have suggested that to increase motivation to address environmental issues, individuals need to be involved in tackling real-world environmental issues (Wals, 1996). Experiential EE contributes to increasing the practical environmental literacy of students (Corscadden and Kevany, 2017).

Toyota City has already implemented experiential EE programs in many schools. The guidelines for EE set out by the city government include a visit to Ecoful Town, and each school is encouraged to implement its own initiatives and programs. For

example, *Tsuchihashi* elementary school transformed its building into a "smart house" with solar panels (Eco News, 2014). Citing Orr (1994), Schelly et al. (2012) argued that school building design and maintenance are hidden aspects of curricula that teach sustainability effectively. To help students understand and address the heat island effect, *Nishihirose* elementary school takes its students on four day-long field trips per year to examine a particular habitat (Aichi Prefecture, 2015). This type of garden-based pedagogy is commonly used for experiential EE (Corscadden and Kevany, 2017). Experiential learning like this is effective in engaging students in addressing environmental issues partly because it provides a sense of self-efficacy and/or locus of control (Ampuero, Miranda, and Goyen, 2015; de Vreede, Warner, and Pitter, 2014; Ernst, Blood, and Beery, 2017; Higgs and McMillan 2006; Schelly et al., 2012; Skinner et al., 2001). Formal schooling cannot, however, directly improve awareness among citizens over the age of 18 years. To reach a wider population, Toyota City has established Eco-T, a nonprofit institute, where environmental literacy trainers, or "interpreters", organize more than 20 programs such as "designing smart houses" and "running Eco Town" plus study tours of forests and the city center for adults and children. These activities enable participants to familiarize themselves with particular aspects of the city's eco-policy, supported by the interpreters. Ecoful Town is another option for experiential learning.

Although Eco-T and Ecoful Town may help to promote the city's eco-policy by providing non-formal EE, adults will only visit them if they are aware of their existence (unlike children who go there as part of their formal schooling). The city government

should try to reach citizens with low household incomes, as they are less aware of the eco-policy. The use of social networking sites (SNS) for outreach is one way in which this may be achieved (Camay, Brown, and Makoid, 2012; Cheung et al., 2015; Grossberndt, van den Hazel and Bartonova, 2012). One of the crucial factors influencing environmental behaviors is information acquired through social interactions (Levy, Orion, and Leshem, 2016). SNS, particularly Facebook, are now increasingly the platform for these interactions (Lilleker, 2015). In Japan, lower-income groups are more likely to use Facebook (DODA, 2013), as are those in their 20s to 40s (Statista, 2016), who make up 76% of Facebook users (Ministry of Internal Affairs and Communications, 2014). Using Facebook may therefore be an effective way to promote Toyota City's eco-policy because it can reach the population segments that are less knowledgeable about the eco-policy and those no longer in formal education. The majority of Japanese Facebook users are also male (Ministry of Internal Affairs and Communications, 2014), another target group for improved awareness. Toyota City has already created a Facebook account, mainly to publicize events linked to the eco-policy. The mayor and city government staff, together with other relevant stakeholders, post information and comments to keep the account active.

This study had some limitations. In particular, it used self-reported awareness, and participants were not asked to provide a definition of any item to explore their level of knowledge. The study is, therefore, susceptible to social desirability bias in responses. Without costly and intrusive measures, however, it is not feasible to obtain much more

detail of the individual environmental awareness and understanding of research participants using a face-to-face, on-street questionnaire.

3.8. Conclusion

This study has confirmed some findings from previous studies, including that those from low-income households and/or without university degrees tend to be less knowledgeable about areas of eco-policy. Awareness of the eco-policy was defined in this study as knowing about individual items across three themes in Toyota City's eco-policy, transportation, the urban center, and public welfare and livelihood. To improve awareness, Toyota City has implemented formal and non-formal EE and uses Facebook for outreach. We suggest that Facebook should also be used as part of environmental experiential education to enhance learning and promote the city's eco-policy. The impact of Toyota City's efforts to promote its eco-policy on the behavior of its citizens is still largely unclear. Awareness-raising is a time-consuming process, but we argue that it is a necessary pre-condition of behavioral change. It is therefore important to continue to monitor eco-policy awareness, and any behavioral change that may result either directly or indirectly, through future studies.

4. Underlying Gaps between Environmental Knowledge and Behaviors

This chapter analyzes underlying gaps between environmental knowledge and behaviors in the city of Toyota. A previous study suggested that citizens' environmental knowledge of some eco-items comprising the city's eco-policy significantly improved since it was designated as an environmental model city by the Japanese government in 2009 (Ito and Kawazoe, 2016). However, other studies suggested that citizens do not seem to act on these eco-items (Ito, 2017a; 2017b). Through a questionnaire with 133 Toyota citizens, this study explores possible reasons why citizens do not take actions while knowing these eco-items.

4.1. Background

Toyota City has been making considerable efforts to promote its eco-policy. The city has long been facing and addressing environmental issues in large part because of industrial activities by the Toyota Motor Corporation and its affiliated companies. The city government elaborated on and implemented action plans to improve the environment in the 1990s and 2000s. Toyota City was then designated by the Japanese government in 2009 as one of the environmental model cities (Toyota City, 2009).

A previous study on citizens' eco-awareness of the eco-policy between 2012 and 2015 showed that although many respondents recognized some eco-items comprising the city's eco-policy, such as Ha:mo and the smart house, they do not act on them: they do not use Ha:mo or live in a smart house (Ito and Kawazoe, 2016).

Subsequently, a pilot research project was launched to explore possible reasons for this lack of action (Ito, 2017a). Through a focus group with members of the largest, environmental NPO based in Toyota City, this study suggested that citizens do not act on eco-items not solely because of ecological or economic reasons, but a mixture of both ecological and economic as well as other reasons (e.g., safety and convenience). Also, whereas citizens do not seem fully engaged in the 'eco-items' defined by the city's eco-policy, a more careful examination about their actions suggested that they actually take actions in ways that approximate the eco-items. For instance, few citizens own smart houses, but some renovate their houses to make them more environmentally friendly. Installment of solar panels is a prime example. The study concluded that Toyota City perhaps would need to broaden the ways that citizens can reasonably act on the eco-items. Although the pilot study was useful as a first step to explore reasons why citizens do not act on eco-items, the study involved several limitations: the number of participants was limited, as a focus group interview was employed, and the participants were from a single environmental organization in Toyota City.

In this context, the second pilot research project was conducted to further examine reasons why citizens take or do not take actions on eco-items while they are aware of them (Ito, 2017b). This study used semi-structured interviews with 29 Toyota citizens who participated in an eco-event called *Inaka to machi no bunkasai* (Cultural festival of rural and urban areas) in Toyota City in November 2016. This study confirmed the findings of the previous study. For example, citizens do not buy new generation cars (NGCs) due to their high costs (i.e., NGCs are expensive) and safety

concerns (i.e., *Kei,* light gas fuel cars, are easier to drive); citizens do not go to Ecoful Town because it is located far from their places and they lack information about Ecoful Town; citizens do not live in smart houses because they have recently built houses or live in apartments/mansions, as well as smart houses are expensive; citizens do not use Ha:mo due to reasons of inconvenience (i.e., no Ha:mo stations are closer to their homes) or troublesome registration process; citizens do not have the Eco-Family Card because the card has a 'one card per family' policy (if a family member has the Eco-Family Card, the other members in the same family do not); citizens do not take any countermeasures against the heat island effect because they do not know what they can do. The current study also provided some new insights into the subject: citizens go to Ecoful Town because they can try Mirai (a Toyota Motor Corporation's NGC) and also receive eco-points. Given the research methodology, the small sample size, and characteristics of respondents, this study was still exploratory in nature and did not intend to generalize the environmental knowledge and behaviors of all Toyota citizens. Instead, its main purpose was to help construct survey questions for a generalizable study at a larger scale in the future. The current research is the questionnaire research based on the pilot study, a step forward to the generalizable study.

This study focuses on the following eco-themes: transportation, the urban center, and public welfare and livelihood because they are the most familiar eco-themes to citizens (Ito and Kawazoe, 2016). Transportation variables consist of knowledge of NGCs and Ha:mo. NGCs include electric vehicles (EVs), hybrid electric vehicles (HEVs), and plug-in hybrid vehicles (PHVs).

Ha:mo is a car sharing system that uses compact EVs for urban short-distance transportation. The urban center variables consist of knowledge of Ecoful Town and the heat island effect. Ecoful Town is a pavilion showcasing eco-living that demonstrates how Toyota City tackles challenges and elaborates on eco-strategies. As in any other urban areas, the heat island effect is an issue in Toyota City because it causes air pollution and deteriorates soil quality (Toyota City, 2016). Public welfare and livelihood variables consist of the smart house and eco-points/eco-family cards. The smart house is a residential building that emits reduced CO_2 gas emission and saves energy through the use of renewable energy sources and monitoring of energy consumption (Kim et al., 2015). Eco-points can be accumulated when the eco-family card is presented at certain places such as Ecoful Town and greenly affiliated stores. These points can be exchanged for certain goods, such as stationery, bus tickets, or gift vouchers.

4.2. Environmental knowledge, attitudes, and behaviors (KAB) model

The knowledge-attitudes-behaviors (KAB) approach assumes that behavioral changes are brought about by increasing public knowledge about an issue via positive attitudes toward the environment (McKenzie-Mohr, 2012). That is, environmental knowledge influences environmental attitudes, which in turn influence environmental behaviors (Haron, Paim, and Yahaya, 2005; Laroche et al., 1996; Polonsky et al., 2012). De Haan and Kuckartz (1996), for example, describe causal relationships between these dimensions: 1) Environmental knowledge produces positive environmental attitudes; 2)

Environmental attitudes influence environmental behaviors; and 3) Environmental knowledge directly influences environmental behaviors. The linear KAB model that environmental knowledge leads to pro-environmental behaviors has been criticized because the reality is not likely to be that simple. Indeed, some studies suggest a weak relationship between environmental attitudes and behaviors (Gregory-Smith et al., 2017). For instance, Carmi, Arnon, and Orion (2015) point out that those "who are more knowledgeable of environmental issues will be more inclined to behave in an environmentally-responsible manner *only if* that they have stronger environmental emotions" (p. 188). Nonetheless, according to Kollmuss and Agyeman (2002), most environmental actors such as governments and NGOs "still base their communication campaigns and strategies on this assumption" (p. 246).

Robelia and Murphy (2012) argue that discussing how to mitigate the greenhouse effect, for example, 'may not be meaningful if one has not encountered the term' (p. 301). Gifford and Nilsson (2014) also state that "making informed pro-environmental choices is difficult if one has incorrect or no knowledge" (p. 142). Sapp (2002) further affirms that lack of knowledge can create attitudes-behaviors inconsistency as a result of an inability to act rationally on given attitudes and intentions. Therefore, knowledge should be one of the preconditions toward pro-environmental behaviors (Howard, 1980; Jensen, 2002; Levine and Strube, 2012).

4.2.1. Environmental Knowledge

Environmental knowledge is defined as "a general knowledge of facts, concepts,

and relationships concerning the natural environment and its major ecosystems" (Fryxell and Lo 2003, p. 45) or "ability to recognize environmental problems, the causes and consequences of such problems including facts and concepts necessary for explanation" (Haron, Paim, and Yahaya, 2005). Cheung et al. (2015) define environmental knowledge as the recognition of issues related to the environment and note that it is the source from which environmental attitudes are cultivated. They continue to state that "Individuals with a high level of EK [environmental knowledge] would be expected to know what should be done to resolve environmental problems and understand the benefits of responsible behaviors as it relates to the environment" (Cheung et al., 2015, p. 508).

Environmental knowledge involves what people know about the environment, key relationships leading to environmental aspects or impacts, an appreciation of "whole systems," and collective responsibilities necessary for sustainable development (Mostafa, 2007).

To be more detailed, environmental knowledge includes understanding 1) the ecological principles and processes basic to comprehending the effect of humans on natural systems, 2) the interrelationship between social systems and natural systems and the environmental issues arising from these complex interactions, and 3) strategies of environmental action, including the ability to identify and critically evaluate alternatives for remediation (Pe'er, Goldman, and Yavetz, 2007).

4.2.2. Environmental Attitudes

Boenigk and Möhlmann (2016) regard attitudes as a major predictor of behavioral intention. According to Panth, Verma, and Gupta (2015), environmental attitudes are the collective beliefs, affect, and behavioral intentions a person holds regarding environmentally related activities or issues. Environmental attitudes involve the psychological tendency, with cognitive, affective, and behavioral elements, to favor or disfavor some environmental behaviors (Martinez et al., 2015). Environmental attitudes consist of environmental awareness and concern (Kollmuss and Agyeman, 2002).

Environmental awareness is defined as a measure of one's ability to understand the nature of environmental processes and problems, his or her degree of concern for environmental quality, and the extent to which one is committed to environmental behaviors in daily life (Yeung, 1998). Environmental concern refers to personal values and perceptions regarding the environment (Wonneberger, 2017) or "the degree to which people are aware of problems regarding the environment and support efforts to solve them and/or indicate a willingness to contribute personally to their solution" (Dunlap and Jones 2002, p. 485). Individuals with strong pro-environmental attitudes are more likely to engage in pro-environmental behaviors (Kollmuss and Agyeman 2002). For instance, individuals with higher levels of environmental concern are more likely to recycle consumer products (Thogersen and Olander, 2006) and those who hold pro-environmental attitudes will pay more for green products (Laroche, Bergeron, and Barbaro-Forleo, 2001). It may be because as Olsson, Gericke, and Rundgren (2016) note, attitudes include behavioral as well as affective aspects. Environmental attitudes

play a bridging role between knowledge and behavior: highly environmentally concerned individuals were more interested in obtaining information about, for example, green products (knowledge), and they indicate greater intentions to use the information they obtain (behavior) (Bamberg, 2003).

4.2.3. Environmental behaviors

Pro-environmental behaviors are environmentally friendly behaviors that are focused on protecting the natural environment (Cleveland, Lalamas, and Laroche, 2005) or "behaviors that can contribute to reduction of current environmental burdens" (Kurisu 2015, p. 1). In addition to reducing negative impacts on environment, some argue that pro-environmental behaviors imply behaviors or actions that intend to improve the environment. Steg and Vlek (2009) define pro-environmental behavior as a "behavior that harms the environment as little as possible, or even benefits the environment" (p. 309). Sawitri, Hadiyanto, and Hadi (2015) also note that pro-environmental behavior is "conscious actions performed by an individual so as to lessen the negative impact of human activities on the environment and to enhance the quality of the environment" (p. 28). The ultimate purpose of eco-policies is thus to enable citizens to acquire pro-environmental behaviors.

In the context of Toyota City and this study, environmental knowledge refers to the knowledge of eco-items comprising the city's eco-policy—namely, eco-policy knowledge. According to Phillips, Bonney, and Shirk (2012), only those behaviors that are relevant to project activities (eco-policy related activities) should be measured. It is

assumed that at least some awareness and knowledge of these eco-items are necessary for individuals to act on them and demonstrate environmental behaviors that work toward achieving the eco-policy's goals. Issues related to environmental behaviors will be detailed in Chapter 6 where promoting eco-policy (i.e., pro-environmental behaviors) will be explored.

4.3. Methodology

4.3.1. Questionnaire

A face-to-face street questionnaire was administered for this study. Questionnaires are one of the available methods for obtaining reliable information on the current awareness and behaviors of citizens regarding eco-activities. The questionnaire was constructed based on relevant literature reviews and previous, related studies (Ito, 2014; Ito and Kawazoe, 2016; Ito, 2017a; Ito, 2017b). The questions included in the questionnaire are later listed in Table 4.2.

4.3.2. Sample

In this study, 212 individuals completed the questionnaires, 133 of whom were Toyota citizens, which was the final sample analyzed in this study. The questionnaires were administered in and around Toyota City Station in June, 2017. The location was selected because approximately 90% of Toyota citizens reside in the city center where the station is located. Respondents were approached by one of the authors or one of their students, who explained that they were researching knowledge of the city's

eco-policy. Verbal consent was provided by all respondents. One of the authors later consolidated the data and transcribed using Excel.

4.4. Results

Below are the tables describing socio-demographic factors (Table 4.1.) and responses to the questions regarding the eco-items comprising the city's eco-policy, followed by the descriptions of the results.

Table 4.1. Socio-demographic factors

Age	*N (%)*
<19	59 (44.4%)
20-29	15 (11.3%)
30-39	17 (12.8%)
40-49	12 (9.0%)
>50	30 (22.6%)
Unidentified	3
Gender	
Male	68 (53.1%)
Female	60 (46.9%)
Unidentified	5
Total	133

Table 4.2. Responses to eco-items comprising the eco-policy

	N (%)
Q 1. Do you consider buying an NGC?	
Yes	41 (30.8%)
No	92 (69.2%)
Reasons for Yes	
NGCs are cost effective and economical	28 (68.3%)
NGCs are environmentally friendly	13 (31.7%)
Other(s)	0 (0%)
Reasons for No	
NGCs are expensive	24 (27.0%)
Normal cars are easier to drive than NGCs	12 (13.5%)
Not interested in environmental protection	8 (9.0%)
Other(s)	45 (50.6%)
Q2. Do you know Ha:mo?	
I know but do not use it	44 (33.9%)
I do not know it	85 (65.4%)
I use it	1 (0.7%)
Unanswered	3
Reasons for not using Ha:mo while knowing it	
Ha:mo stations are far from home and workplace	2 (5.9%)
I already have a car	18 (52.9%)
I do not know how to register	6 (17.7%)
The registration process is troublesome	4 (11.8%)
Others	4 (11.8%)
Q3. Do you know the heat island effect?	
I know but do not take measures	64 (48.1%)
No	54 (40.6%)
I take measures	15 (11.3%)
Unanswered	0
Reasons for knowing but not taking measures	
I am not interested in taking measures	4 (6.5%)
I don't know what I can do	51 (82.6%)
Others	7 (11.3%)
Types of measures being taken	
Greening such as placing planters	6 (33.3%)
Planting trees	1 (5.6%)
Watering	8 (44.4%)
Others	3 (16.7%)
Q4. Do you know Ecoful Town?	
I know it but have not been there	37 (27.8%)
I do not know it	63 (47.4%)
I have been there	33 (24.8%)
Reasons for not going while knowing	
I am not interested in	9 (21.4%)
I do not know what is there	21 (50.0%)
Others	12 (28.6%)

Reasons for going there	
I can try driving an NGC	2 (7.1%)
I can receive eco-points	5 (17.9%)
There is a restaurant *Hogaraka* there	6 (21.4%)
Somehow for no reasons	10 (35.7%)
Others	5 (17.9%)
Q5. Do you know the smart house?	
I know it but not living in it	44 (31.7%)
I do not know it	85 (63.9%)
I am living in it	4 (3.0%)
Reasons for not living in while knowing it	
The smart house is expensive	10 (22.2%)
I live in an apartment or mansion	14 (31.1%)
I have recently purchased a house	10 (23.9%)
Others	11 (24.4%
Q6. Do you know the eco-family card?	
I know it but do not use it	30 (22.6%)
I do not know it	80 (60.1%)
I am using it	23 (17.3%)
Unanswered	0
Reasons for not using while knowing it	
The registration process is troublesome	12 (37.5%)
I do not know how to register	5 (15.6%)
Someone in my family has it	4 (12.5%)
I do not know how to use eco-points	4 (12.5%)
Others	7 (21.9%)
Reasons for using the eco-family card	
I can exchange points for goods	16 (72.7%)
It contributes to the environment	3 (13.6%)
Others	3 (13.6%)

4.4.1. NGCs

Approximately 30% of respondents reported that they would buy or already have NGCs. Among them, almost 70% claimed that they would buy or have NGCs for being economical while the rest 30% would do so for being environmentally friendly. 27% of those who would not consider buying NGCs said that NGCs are too expensive, and 13.5% said that ordinary cars, especially *kei*, are easier and safer to drive. There are some other reasons that respondents would not consider buying NGCs. For example, 7 respondents mentioned that they do not like the design of NGCs. A few respondents also mentioned that they would not like NGCs because they are too quiet when driven.

4.4.2. Ha:mo

More than a third of respondents reported that they knew Ha:mo but only one respondent reported that he used it. Among those who knew but do not use Ha:mo, more than half claimed that it is because they already have cars. The registration issues (e.g., not knowing the registration process or finding it troublesome) come in total to almost 30% of the reasons why respondents do not use Ha:mo. Few respondents said the long distance between Ha:mo stations and their home or workplace. One mentioned that he does not use Ha:mo because he does not have a smart phone, which facilitates the registration process.

4.4.3. Heat island Effect

Of the total respondents, 48.1% knew about but did not take any measures and 11.3% took measures against the heat island effect. Among those who knew the heat island effect but do not take any measure, over 80% said that it is because they do not know what to do. Some other reasons that they do not take measures are that they already live in an greenly affluent areas and do not find necessary to take measures. Among those who take measures, some make the use of rain water for plants, bath water for toilet, and save electricity by using it as little as possible.

4.4.4. Ecoful Town

More than half of respondents reported that they knew about Ecoful Town and a quarter of the total respondents actually have been to Ecoful Town. Half of those who

reported that they knew about Ecoful Town but have not been there said that it is because they do not know what is there or what they can do there. Also one fifth of those who reported that they knew about Ecoful Town but have not been there said that they are not really interested in it. Other respondents who said that they have not been there are that they have no time to go, or they do not know the location.

Among those who have been there, 35.7% reported that they have been there for no particular reasons. Over one fifth of those who have been there said that it is because they went to *Hogaraka*, a restaurant inside Ecoful Town. Those who have been there went there for school activities and work activities.

4.4.5. Smart House

Approximately one third of respondents reported that they knew the smart house. Four respondents (3% of the total respondents) actually live in smart houses. Reasons why respondents knew but do not live in smart houses are the high costs of smart houses or they simply do not know enough about the benefits of living in smart houses. About one third of respondents (31.7%) said that they do not live in smart houses because they live in an apartment/mansion. Some respondents also said: "I recently bought a house" (23.9%) and "the smart house is expensive" (22.2%).

4.4.6. Eco-family Cards (Eco-points)

Around 40% of the total respondents, including those using, knew eco-family cards, but only 17.3 % actually use them. Among those who knew but do not use

eco-family cards, 37.5% of them said that they found the registration process troublesome, and 15.6% said that they did not know the registration process. 12.5% said that someone in their family members already has eco-family cards (the city government set a "one family one card" rule), and also 12.5% said that they do not know how to use eco-points. 72.7% reported that they use eco-family cards because they can exchange eco-points for some goods. 13.6% said that with eco-family cards, they feel they can contribute to the environment.

4.5. Discussion

The previous research and existing literature indicated that the reasons for not acting on eco-items are economic, environmental, and others. The current study suggested that the majority of respondents act or do no act on eco-items for economic reasons (68.3% for driving and 27% for not driving). For those who drive NGCs, they are energy- and cost-effective. For those who do not drive NGCs, they are expensive. Given that seven respondents (15.5% of those who chose other reasons for not driving NGC) reported that they do not like the design of NGCs, car companies developing NGCs might want to work on the issue. Although more than one third of respondents knew about Ha:mo, only one respondent actually used it. The largest obstacle for promoting Ha:mo is the very fact that majority of Toyota citizens have cars in part because many work for the Toyota Motor Corporation. This is a difficult issue to deal with. This study indicates that increasing the number of Ha:mo stations would not be a solution because few respondents reported that they did not use Ha:mo for the long

distance between home and workplace.

Regarding the heat island effect, barely 10% of respondents took measures, though 60% of respondents (including those who act on it) knew the heat island effect. The biggest reason why they knew but do not act on it is that they do not know what they can do. The city government should inform citizens of measures that they can take such as greening (e.g., placing planters), planting trees, and watering.

Similarly, the biggest reason why citizens knew but have not visited Ecoful Town is that they do not know what is there or what they can do there. The city government should inform citizens of the activities in Ecoful Town, such as driving an NGC, receiving eco-points, or eating at a restaurant Hogaraka.

The top three reasons why citizens knew but do not live in the smart house are: they live in an apartment or mansion, they have recently purchased a house, and the smart house is expensive. Like the case of Ha:mo that the majority of citizens have their own cars, it is infeasible to encourage those who have their own houses or rent apartments/mansions to purchase smart houses. It would be more reasonable for the city government, as suggested by previous studies, to count some renovation for energy saving and energy generating systems, such as installment of solar panels, as smart houses. Many respondents find the registration process of eco-family cards troublesome or they simply do not know the registration process. While informing citizens of the registration process, the city government should facilitate the registration process. All citizens should be able to receive eco-family cards at the City Hall or any affiliated store after filling out a simple form because many citizens arguably do not find or do not seek

information about the eco-family card.

The current research also indicates the limitation of the KAB model on which this dissertation has relied: the gap between awareness/knowledge and behaviors. That is, despite some improvements in citizens' awareness/knowledge of the eco-policy, enhancing pro-environmental behaviors remain a challenge. This issue will be addressed in the context of promoting the eco-family card/Toyota eco-points in Chapter 6.

4.7. Conclusion

This study suggested that the majority of respondents act or do not act on eco-items for economic reasons. For instance, buying an NGC or a smart house is costly. Encouraging citizens to live in the smart house is particularly difficult because many already have houses. Likewise, encouraging citizens to use Ha:mo is difficult because many already have cars. However, the city center themes of eco-policy such as the heat island effect and Ecoful Town are relatively easy to deal with. Perhaps the city government should first focus on addressing the issues of Ecoful Town the heat island effect, and then move on to others.

So far, we have analyzed citizens' environmental knowledge, attitudes, and behaviors and confirmed that while their environmental knowledge improved to some extent, their environmental behaviors rarely changed. This gap between environmental awareness/knowledge and behaviors suggests the limitation of the KAB model, which may need to be modified and/or developed. This issue will be addressed in the context

of promoting the eco-family card/Toyota eco-points in Chapter 6. In the following chapter, to help establish a theoretical framework of considering how to promote the eco-policy, I will examine Toyota City's eco-policy by using strategic analytical tools and elaborate on effective policy-making and promotion within the concept of social marketing.

One of the limitations of this study is the confusing structure of the questionnaire. We asked respondents whether they knew an eco-item or not as well as they act on it or not in the same question. For instance, we asked respondents whether they know Ha:mo or not and use it or not, and then asked them why not using them while knowing them. For future research, we should first simply ask whether they act on the eco-items and then ask why they do or do not act on them. Some may respond that they do not act on them because they simply do not know about the items. Another possible limitation is that the questionnaire survey was conducted around Toyota City station: the sample may not represent the general population. However, 90% of Toyota citizens live in the city center where the station is located, and thus the sample arguably represents the general population of Toyota City.

5. Marketing Toyota City's eco-policy

This chapter explores how to promote Toyota City's eco-policy using social marketing approaches with strategic tools. The ultimate goal of eco-policy is to promote citizens' pro-environmental behaviors through enhancing environmental knowledge and attitudes. The concept of social marketing is relevant here, as it includes the promotion of public policies, including eco-policies. Social marketing also may help understand why some cities succeed to promote their eco-policies while others fail to do so and elaborate on an effective policy-making and promotion.

5.1. Background

Toyota City has long been facing and addressing environmental issues in part because of industrial activities by the Toyota Motor Corporation and its affiliated companies. In collaboration with these companies and other stakeholders (e.g., civil society and citizens), the city government has implemented action plans to improve the environment (Toyota City, 2009). In 2009, Toyota City was designated by the Japanese government as one of the eco-model cities. These environmental model cities pursue low carbon societies to reduce greenhouse gases, while enhancing sustainable socioeconomic development. Since then, Toyota City has accelerated efforts to promote its eco-policy, including the establishment of Ecoful Town (a pavilion showcasing Toyota's eco-policy), provision of free pamphlets and books for children, creation of a Facebook account that lists eco-related events, and implementation of environmental education in public schools within the city (Ito and Kawazoe, 2017).

A previous study regarding Toyota City's eco-policy examined changes in citizens' environmental awareness and found that, overall, their awareness of the city's eco-policy significantly improved between 2012 and 2015 (Ito and Kawazoe, 2016). However, whereas Toyota City has been successful in promoting some eco-themes, such as transportation, the urban center, and public welfare and livelihood, it has failed to promote other eco-themes, such as forests and industry. The transportation theme is comprised of the following eco-items: next generation cars (NGCs) such as electric vehicles (EVs) and plug-in hybrid vehicles (PHVs) and Ha:mo (a car-sharing system using compact EVs for urban transportation). The urban center theme is comprised of: Ecoful Town and the heat island effect. The public welfare and livelihood theme is comprised of: the smart house and the home energy management system (HEMS) that utilizes information technology to control energy consumption. The forests theme refers to *kanbatsu* (periodic thinning that removes trees from dense stands to make room for other trees). The industry theme refers to development of sustainable plants (factories with systems that create, store, and economize energy).

Previous studies examined citizens' environmental behaviors and found that few citizens actually take actions on these eco-items (Ito, 2017a; Ito, 2017b; Ito, 2017c). Given the logic of KAB model described in the previous chapter, it may require more time and efforts for environmental knowledge, recognition, and awareness to be transformed into behaviors via attitudes (Takagi and Hirose, 2008).

Since the 2009 designation of Toyota City as an environmental model city, the most significant change among these eco-items is the 2012 establishment of Ecoful

Town, which was arguably a driving force in communicating the city's eco-policy to citizens, especially the urban center theme. Whereas citizens' recognition about transportation theme items, such as NGCs, and the public welfare and livelihood theme items such as the smart house improved, citizens' recognition about forest- (*kanbatsu*) and industry- (sustainable plants) related policies did not, implying that Toyota citizens were not aware of these activities during the research period.

The purpose of this chapter is to analyze Toyota City's eco-policy as a whole by using strategic marketing approaches and strategic analytical tools to help elaborate on effective eco-policy promotion. This chapter is structured as follows: I will first describe different kinds of marketing approaches that could be applied to promoting eco-policy. I will then employ several strategic tools (i.e., marketing mix and strategic purposes for internal factors, PEST and strategic groups for external factors, and SWOT for both) to analyze Toyota City's eco-policy. This chapter ends with some discussions about how to promote Toyota's eco-policy.

5.2. Marketing concepts applicable in promoting eco-policy

Given that eco-policy is part of public policy, its promotion may involve public sector marketing as well as green and sustainable marketing, all of which are kinds of social marketing (Butler et al., 2007; Kotler and Keller, 2011; Rettie et al., 2012). Employing social marketing is appropriate in promoting eco-policy because both social marketing and eco-policy pursue changing citizens' behaviors through informing them of and educating them about eco-policy. In the following sections section, I will elaborate on these different marketing approaches and connect them to Toyota City's eco-policy.

5.2.1. Social Marketing

Social marketing is defined as "the use of marketing principles and techniques to influence a target audience to voluntarily accept, reject, modify, or abandon behavior for the benefit of individuals, groups or society as a whole" (Helmig and Thaler, 2010, p. 264-265). Similarly, social marketing seeks to influence social behaviors to benefit the target audience and the general society (Andreasen and Kotler, 2007). Social marketing interventions are designed to be focused specifically on behavior and applicable to encouraging pro-environmental behaviors (Gregory-Smith et al., 2015).

Social marketing was originally defined as selling of ideas by Kotler and Zaltman in their 1971 article. Their conceptualization of social marketing as "the selling of ideas shifted over time to focus on voluntary individual behavior change" (Wood, 2016, p. 108). Today, "social marketing is widely recognized as a credible behavior change discipline with governments across the globe" (Rundle-Thiele, 2015, p. 128). This statement indicates that social marketing, including public sector marketing as well as green, sustainable, and environmental marketing, is applicable to promote Toyota City's eco-policy.

There are three particular elements that distinguish the social marketing approach from others: 1) Citizen-centric approach: Social marketing is distinguished by its focus on and orientation around the citizen (Lee and Kotler, 2011). This could be a citizen as an individual or a citizen as part of a collective. Citizen orientation is a perspective that can be used to gain a deep understanding of the everyday real-life influences that impact

how a policy, program or other activity is received and how it translates to behavior change; 2) Behavior focus: social marketing is clearly focused on behavior change. It seeks to support people to maintain an existing behavior or encouraging positive behavior change. It can also be used to inform interventions that seek to change the environments that play a critical role in influencing an individual's decision; and 3) Value exchange: a social marketing approach acknowledges that something of worth needs to be offered and exchanged with the target audience in order to make the uptake of the desired behavior more likely (French and Gordon, 2015).

According to Da Silva and Mazzon (2016), social marketing campaigns are consisted of three different levels of actions: 1) diagnosing the social problem; 2) influencing the social change to the target population; and 3) setting the social marketing mix. Although marketing involves (value) exchange between stakeholders (e.g., buyers and sellers) (Smith and Brower, 2012), the concept of exchange in social marketing is more complex than commercial marketing because it involves intangible products such as well-being by improving the environment, and the benefits are not immediate. Actually, the complexity lies on social change, specifically, the behavior and value. The concept of exchange is feasible if the social marketers seek to know through the social market, the yearnings of the target audience (Da Silva and Mazzon, 2016). The social change processes just occur when the target audience identifies and recognizes the benefits of the change. Therefore, social marketers take time to learn about what the target audience currently knows, believes, and does. Every decision is made related to audience's perspective. The problem is designed to fulfill the audience's

needs and desires (Da Silva and Mazzon, 2016). This diagnosis of the social problems (eco-related issues in Toyota City) and citizens' current knowledge and behaviors about the eco-policy is what this dissertation has so far done in the previous chapters. This dissertation will explore how to promote the eco-policy hereafter with social marketing approaches.

Although "social marketing has emerged as a popular and straightforward approach to promote environmental behaviors" (Takahashi, 2009, p. 135), we hardly find literature "adopting a public marketing perspective or particularly focusing on green public services targeted to external stakeholder entities" (Boenigk and Möhlmann, 2016, p. 87). Indeed, public sector marketing receives limited attention (Aspara and Tikkanen, 2016) as public sector organizations often find that marketing has little relevance to their activities (Scrivens, 1991).

Social marketing has been with criticisms about its links with commercialism and consumption, which may result in negative social impacts (Wymer and Polonsky, 2015). Social marketing has also been criticized in relation to sustainability that it focuses on small-scale actions that are insufficient to address large-scale environmental issues (Brennan and Binney, 2008; Haq, Cambridge, and Owen, 2013). Brennan and Binney, for example, note that it is understandably quite difficult for social marketers to understand and create strategies around satisfying individual needs while satisfying the societal needs at the same time.

5.2.2. Public Sector Marketing

In recent decades, public services have increasingly been subjected to the application of market principles (Osborne and Gaebler, 1992). The introduction of competition is believed to foster not only efficiency but also citizen focus, achieved through the adoption of market-oriented management approaches (Molander et al., 2018) as market orientation—the organization-wide generation of market intelligence pertaining to current and future customer needs, dissemination of the intelligence across departments and organizationwide responsiveness to it (Kohli and Jaworski, 1990, p. 6)—improves the performance of both private and public organizations. This debate has shifted to managerial issues regarding which marketing approaches and tools are appropriate, and how to adapt them (Chew and Vinestock, 2012).

In the public sector, market orientation has been shown to enhance customer satisfaction with public services (Walker, Brewer, Boyne, and Avellaneda, 2011). However, there has been criticism of the market orientation concept's focus on performance, with claims that the government's marketization of public services has a negative impact on public trust (Taylor-Gooby and Wallace, 2009), as the market's emphasis on entrepreneurialism and satisfying the individual's self-interest is incompatible with demographic accountability, citizenship, and an emphasis on collective action in public (Denhardt and Denhardt, 2015). That is, social marketing might come to be a significant tool in government behavior-change programs (Madill and Abele, 2007). However, in application of social marketing by governmental organizations, social marketing suffers from high complexity, low compatibility with

government practices, few opportunities to observe social marketing in action in like organizations for like purposes as well as few opportunities to try it out in one's organization (Madill and Abele, 2007). It has also been shown that social marketing may not be well understood by senior managers in government organizations (Madill and Abele, 2007).

Marketing and the public sector are often considered incompatible (Graham, 1994; Graham, 1995; Walsh, 1991) because marketing is associated with "advertising and selling products or services to a susceptible public, an action which seems unnecessary when demand for services in the public sector often exceeds supply" (Burton, 1999, p. 374).

Likewise, in the public sector, marketing is often considered non-productive and resource consuming (Parker et al., 2007) because the general purpose of marketing (i.e., making profits) (Laing and McKee, 2001) seems contradictory to the mission of the public sector (i.e., serving the general interest of society dealing with non-rival public goods, including environments) (Butler and Collins, 1995). Walsh (1991) argues that marketing approaches are unlikely to be either helpful or appropriate in the distribution of basic social goods. Therefore, marketing is often considered linked to business activities and irrelevant to the public sector.

Several scholars argue that policy-makers tend to consider marketing to support corporate interests, industry associations, or lobby groups. This suspicion by policy makers' may greatly hinder the utilization of marketing research in the public sector (Aspara and Tikkanen, 2016). French and Russell-Bunnett (2015) also state that

“government agencies…do not fully understand how social marketing relates to, contributes to and challenges other approaches to social policy delivery” (p. 143). However, the public sector often finds it difficult to communicate policies to citizens and the use of and application of marketing concepts and techniques may be useful to do so (Kaplan and Haenlein, 2009).

While these is a concern about the public sector being too receptive to “marketization” (Molander et al., 2018, p. 77). Nonetheless, concepts such as contestable markets, increased citizen orientation, and the systematic use of information in public organizations (Walker et al., 2011) that has the potential to enhance public service delivery. Therefore, the potential exists for marketing concepts to make a significant contribution to the effective management of public services in contemporary society (Wright, Moynihan, and Pandey, 2012).

Public organizations are providers of social goods and services. Public service provision increasingly takes place in the context of markets and quasi-markets and is more and more organized and coordinated by market forces. As market agents, public organizations are therefore necessarily engaged in marketing (Butler et al., 2007). Indeed, social behavioral change is the anticipated long-term effect of many public marketing models (Helmig and Thaler, 2010; Laing, 2003; McMahon, 2002). In the context of changing environmental behaviors, the public sector strives to implement marketing strategies to foster green attitudes of citizens (Boenigk and Möhlmann, 2016). This kind of marketing, with emphasis on changing environmental behaviors through marketing approaches may be called green marketing and/or sustainable marketing.

5.2.3. Green/Sustainability/environmental marketing

Green, sustainable, or environmental marketing is a marketing of products and/or services that are environmentally friendly. Its concept has emerged from social marketing (Kotler and Keller, 2011; Smith and Brower, 2012). Green marketing refers to the marketing of products and services that are presumed to be environmentally preferable to others and to stimulate and maintain one's environmental attitudes and behaviors (Jain and Kaur, 2004). It is also defined as "holistic management for identifying, anticipating and satisfying the requirements of customers and society, in a profitable and sustainable way" (Peattie, 1995, p. 28). It is a broad-based approach that puts equal importance on environmental, social equity and economic/financial concerns when developing strategies. This has resulted in many organizations worldwide increasingly developing internal and external strategies that are green or environmentally sustainable (D'Souza et al., 2018).

According to Polonsky (1994), green marketing is defined as "all activities designed to generate and facilitate any exchange intended to satisfy human needs, with minimal detrimental impact on the natural environment" (p. 2). Peattie (2001) defines green marketing as "marketing activities which attempt to reduce the negative social and environmental impact of existing products and production systems" (p. 129). Green marketing also refers to the analysis of how marketing activities impact on the environment and how the environmental variable can be incorporated into the various decisions of corporate marketing (Chamorro, Rubio, and Miranda, 2009; Wymer and Polonsky, 2015).

Similar to green marketing, sustainability marketing is "the planning, coordination, implementation and controlling of all market transactions in such a way that a sustained satisfaction of the needs of current and potential customers toward the achievement of corporate objectives is granted" as well as "contributing toward reducing ecological and social impacts and restoring social and ecological health" (Kirchgeorge and Winn, 2006, p. 176). Sustainability marketing is defined by Martin and Schouten, 2014) that "the process of creating, communicating, and delivering value to customers in such a way that both natural and human capital are preserved or enhanced throughout" (p. 18). Rettie et al. (2012) explain that sustainability marketing includes both commercial marketing of green products and services and social marketing of pro-environmental behaviors.

As described later, sustainability marketing can be used to support and drive processes of social normalization and denormalization: sustainability marketing can encourage consumer adoption of sustainable activities by repositioning them as mainstream and normal, and unsustainable activities as abnormal and not normal. This provides guidance for the targeting of social normalization marketing strategies on the basis of demographic groups (Rettie, Burchell, and Riley, 2012).

Overall, promoting a city's eco-policy may involve these marketing approaches to inform citizens of eco-policy in an attempt to enhance their eco-behaviors.

5.3. Analyses of Toyota City's eco-policy

In this section, I analyze Toyota City's eco-policy using marketing strategic tools, such as marketing mix and strategic purposes for internal analyses, and PEST (i.e., political, economic, social, and technological factors) and strategic groups for external analyses, followed by SWOT (i.e., strengths, weaknesses, opportunities, and threats). Both marketing mix and strategic purposes are pivotal for any organization to identify its *raison d'etre* as well as strengths and weaknesses (e.g., what do they want to achieve, what do they do to do so, what do they do well or do not do well). PEST and strategic groups are important to understand opportunities and threats (e.g., environmental factors and competition). SWOT serves as a synthesis of internal and external factors. Collins, Tapp, and Pressley (2010) state that these strategic and diagnostic tools provide the kind of analytical power for social marketers. Understanding these factors helps Toyota City identify which strengths to be more strengthened to become competitive advantages and which weaknesses should be overcome, in relation to other eco-cities and eco-policies as well as socio-economic and environmental situations.

5.3.1. Internal analyses

5.3.1.1. Marketing mix

The marketing mix often refers to the 4Ps (i.e., Product, Price, Place, and Promotion). Despite limited empirical evidence on the exact role and contribution of the marketing mix, it is the widely 'trusted conceptual platform of practitioners dealing with tactical/operational marketing issues' (Constantinides, 2006, p. 408). Although the 4Ps

were originally derived from business marketing, they can be applied to social marketing as well. Madill and Abele (2007), for example, note that the use of 4Ps is one of the characteristics of social marketing programs. Peattie and Peattie (2003) describe the social marketing mix, including the public sector marketing mix, as follows:

Product: Social marketing is about offering propositions such as 'exercise is beneficial' or 'drinking and driving ruins lives' and desired social behaviors are sometimes seen as the end product of social marketing (Peattie and Peattie, 2003). In the context of Toyota City's eco-policy, the proposition is toward normalizing eco-life in the future (or to make eco-life normal in the future) by promoting pro-environmental behaviors (Toyota City, 2017). Product in social marketing is generally intangible as it is an idea, behavior, action, orientation, prevention, or treatment, and arises from social problem analysis by external environments, but intangible products can be followed by tangible ones e.g, eco-family cards/eco-points (Da Silva and Mazzon, 2016).

Price: Given the absence of a monetary price in most social marketing contexts, price is usually interpreted as the costs of behavior change (e.g., monetary ones such as purchase of more expensive eco-friendly products as well as non-monetary ones such as physical, time, social, and psychological). The price of promoting Toyota City's eco-policy is also considered the direct monetary cost of change toward pro-environmental behaviors. For instance, the cost for the city government is to provide eco-related information through brochures or events and subsidize citizens to buy eco-products.

Place: In social marketing, place refers to accessibility and the locations involved

in the intended behavior change or the campaigns aimed at influencing behaviors. When it comes to accessibility issues in the location of social marketing interventions, 'this is an area where social marketers often seem to be particularly creative in ways that distinguish their campaigns from the conventional social education approach' (Peattie and Peattie 2003, p. 374). In the case of Toyota City, Ecoful Town and Ha:mo stations are the main places of intervention, but schools, households, shops and restaurants, and even the streets can also be the places of intervention (Ito and Kawazoe 2016; Ito and Kawazoe, 2017).

Promotion: promotion often is equated to communication both in commercial marketing (van Waterschoot and van den Bulte, 1992) and social marketing (Nagahama, 2014). Promotion bridges commercial and social marketing campaigns: commercial marketing theories and practices are seen as entirely applicable to social marketing contexts (Peattie and Peattie, 2003). Communication is important to persuade the target audience and explain how the social marketing campaign will support them (Da Silva and Mazzon, 2016). Thus, promotion requires understanding the target audience as well as their media habits in order to define the content of messages, communication, and media to achieve the individuals' mind in seeking two results: positioning the campaign benefits; and ensuring a sustainable and healthy relationship between social marketers and target audience (Da Silva and Mazzon, 2016). In the context of Toyota City's eco-policy, the provision of leaflets, concept books, the Facebook account, subsidies for NGCs and the smart house, and Ecoful Town can be considered elements of promotion.

Sargeant (2009) explains that, 6Ps—the 4Ps plus Partnerships and Policies—are

appropriate for nonprofit and public sector marketing. In establishing partnerships, many nonprofit and public organizations seek collaborations with other stakeholders, possibly with similar goals. As already mentioned, the Toyota Motor Corporation is a notable collaborator for Toyota City. Toyota City has not collaborated with any other specific city, but, for example, Kyoto City and Yokohama City, which pursue low carbon societies as environmental model cities, could be potential partners. Toyama City and Amagasaki City, other environmental model cities, are also potential partners (as well as candidates for comparative study of eco-policies) in terms of similarities in city population sizes.

Policies often involve legal enforcement (e.g., punishment) to compel citizens toward behavioral change. In Toyota City, instead of punishing citizens without taking actions, it encourages them to buy eco-products such as NGCs and the smart house through subsidies. In partnerships with the Toyota Motor Corporation and its affiliated companies, the Japanese government, and others, the city could expand on the range of eco-products to be subsidized.

5.3.1.2. Strategic purposes

Strategic purposes (i.e., mission, vision, and objectives/goals) help organizations articulate why they exist and what they should do to justify their existence. Lankard and McLaughlin (2003) argue that it is important to look at "antecedent factors when developing a promotion strategy or campaign. Thus, before an organization can develop its messages, it must look at its overall corporate mission, philosophy and goals" (p.

417). Johnson et al. (2011) state that strategic purposes are influenced by governance structure, social responsibility, and stakeholder expectations. They emphasize the concept of stakeholders and the purpose of the organization to be understood by stakeholders. Similarly, Da Silva and Mazzon (2016) note that the mission of the social marketing plan must meet the interest of individual in the campaign; specify the needs that the campaign focuses on; incorporate the values of sponsor organizations; describe and identify the benefits of the campaign; introduce the real purposes and goals of campaigns in the long term; and define what the organization expects in the long term (i.e., normalizing eco-life or becoming a low carbon society in the context of Toyota City's eco-policy).

An organization's mission aims to provide stakeholders with a clear purpose of the organization. A mission statement is an important strategic tool with an emphasis on effective communication and associated with improved performance for functions (Pandey, Kim, and Pandey, 2017). The mission of Toyota City's eco-policy is to make it an economically and environmentally friendly city and to build a low carbon society with a comfortable lifestyle for the future by improving citizens' environmental knowledge, attitudes, and behaviors.

An organization's vision is an action plan to achieve the mission concerned with the desired future state of the organization. Toyota City's vision is concentrated on promoting the five eco-themes (i.e., transportation, forests, the urban center, industry, and public welfare and livelihood) through a smart transportation system and NGCs, forests that benefit citizens, eco-friendly industry with sustainable plants, a green urban

center, and smart houses with solar panels, and citizens who act pro-environmentally (Toyota City, 2009).

An organization's objectives are statements of specific and often quantified outcomes that help achieve the mission and vision. For instance, Toyota City has been working on reducing carbon emissions by cutting CO_2 by 30% by the year 2030. Making 20% of the urban area green, as part of countermeasures against the heat island effect, is another example of Toyota City's objectives. Since 1990, CO_2 has been cut by 8% and green spaces increased by 14.2% (Toyota City, 2012). The former objective is unlikely to be achieved at this pace.

5.3.2. External Analyses

5.3.2.1. PEST

In diagnosis of social problems such as environmental ones, as Da Silva and Mazzon (2016) note, the social marketing environments are important factors to be taken into account. The PEST framework categorizes the external macro-environmental influences into four main factors: political (the role of local, national, and international governments), economic (macro-economic factors), social (cultural and demographic factors), and technological (innovations) (Johnson et al., 2011; Bovaird, 2003). PEST can be used to review a strategy or position, direction of an organization or a marketing proposition (Halík, 2012). This analysis tool can be applied to Toyota City's eco-policy to help the city identify its position and direction toward promoting eco-policy.

PEST-Political

The Japanese government is supportive of eco-policies in general and Toyota City has been designated by the government as an environmental model city. Therefore, the political atmosphere toward eco-policy, including that of Toyota City, has been positive. Also, the international community has increasingly been adopting eco-friendly policies and campaigns (See Table 1 of the SWOT analysis in a later section). This provides a great opportunity for Toyota City to show itself as an international exemplar of an eco-city as well as to learn from other eco-cities inside and outside Japan about promotion of their eco-policies.

PEST-Economic

Eco-friendly products, such as NGCs and the smart house, are generally more expensive than ordinary products, and initial investments to install eco-facilities, such as solar panels, are costly. For instance, EVs on average cost 30,000 USD, almost doubled in price compared to similar fuel engine cars. However, the use of these eco-items may allow citizens to spend less energy and thus energy costs and the purchase of eco-products, such as NGCs and the smart house, is subsidized by the Japanese government and Toyota City, and HEMS can also help an efficient use of energy by monitoring energy consumption. For instance, the national government subsidizes up to 400,000 yen (or 3670 USD) and city government subsidizes up to 250,000 yen (or approximately 23,000 USD) to individuals who buy EVs and PHVs, or up to 80,000 yen (or approximately 734 USD) to those who install solar panels and HEMS (Toyota

City, 2018b). The issue may be that many citizens do not seem to be entirely convinced to purchase these eco-products.

PEST-Social

According to Blery, Katseli, and Tsara (2010), if "[t]he mentality of people changes, they understand the problems and they become more sensitive with the protection of the environment" (p. 63). Whereas citizens are increasingly searching for green and healthy lifestyle choices (Ministry of the Environment, 2012), the city government needs to consider the fact that the population is aging rapidly and focus attention on the well-being of the elderly in the context of eco-policy. For instance, while promoting NGCs remains important, it is urgent for Toyota City to promote public transportation (or to a lesser extent, a car sharing system like Ha:mo) because it has been the main means of transportation for the elderly.

PEST-Technological

Some of the eco-technologies relevant to Toyota City's eco-policy, such as NGCs and the smart house with solar panels and HEMS, have already been adopted in Toyota City. However, NGCs, especially EVs (Lebeau et al., 2013) and smart houses (Jahromi, Rajabzadeh, and Manashty, 2011) are expensive. Also, the lithium battery's life span still remains limited around 10 years (Masih-Tehrani et al., 2013). While adapting to changing technology is a matter of urgency, the city's capacity to do so is quite limited and has to rely on the private sector for advancement.

Macro-environmental factors analyzed by PEST seem positive for Toyota City's eco-policy. Politically, the Japanese government and the international community are supportive of environmental initiatives, including those of environmental model cities. Economically, the purchase of eco-products has also been financially supported through subsidies by the Japanese government as well as the city government of Toyota City. Socially, citizens are more aware of environmental issues (though priority seems to be given to other social issues). The aging of population means that Toyota City can encourage the concentration of living along public transportation routes and create commercial facilities toward the establishment of a compact city for the efficient use of energy and/or resources. Technologically, eco-technologies have been advancing, but some issues (e.g., higher costs of eco-products and NGC's short lithium battery life span) remain unsolved.

5.3.2.2. Strategic groups

Pegels and Sekar (1989) note that strategic groups are essentially subgroups within an industry. Each subgroup is considerably different from other subgroups, but each subgroup they exhibits considerable homogeneity and similarity. Thomas and Pruett (1995) explain that the concept of strategic groups directs attention to those groups of firms in an industry, which may compete with each other. Marlin, Ketchen, and Lamont (2007), citing Porter (1979), define strategic groups as clusters or sets of firms that pursue similar competitive approaches within an industry. Although environmental model cities are not competitors with each other, they have common

objectives and features as well as different strategies that distinguish one from another. Therefore, the concept of strategic groups may help identify the positioning of Toyota City's eco-policy in relation to other environmental model cities.

Promoting eco-policy mainly involves two strategic aspects: 1) visibility calculated based on the number of many official recognitions awarded such as environmental model cities, environmental future cities, SE4ALL, and Rockefeller RCs as well as OECD, and 2) functionality estimated based on a) progress in eco-initiatives, b) greenhouse gas absorption, c) creation of regional vitality, d) regional originality, and e) promotion and development of eco-initiatives, with each from one to five points (25 points in total) (Cabinet of Japan, 2012). Visibility is important because if the eco-policy is not well recognized by stakeholders, it will fail to attract support and resources. Functionality is also important because unless actions are taken to achieve a mission and vision, its *raison d'etre* will be in question and it will likely lose support and resources eventually (Figure 5.1).

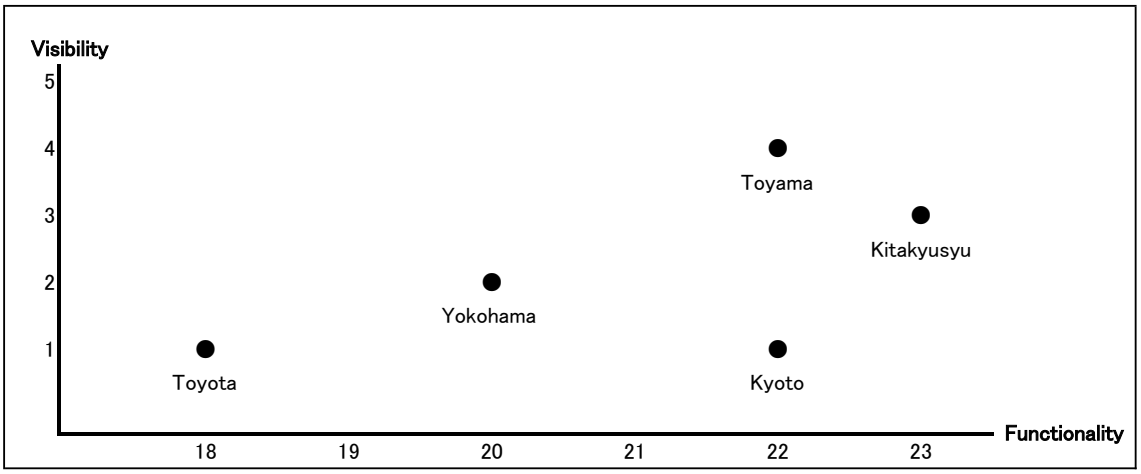

Figure 5.1 Positioning of major model cities in terms of visibility and functionality based on the assessment of environmental model cities by Cabinet of Japan (2012)

These environmental model cities are selected for the following reasons. For instance, Kyoto City developed pedestrian-centered urban planning, with expanded sidewalks and priority given to public transportation (Kyoto City, 2015). Kyoto City has one point in visibility because it has been designated only as an environmental model city and 22 points in functionality based on the aforesaid five criteria. Yokohama City aims to promote a zero-carbon lifestyle to its citizens, with shared knowledge, greater choices, and active involvement, for example, in increasing the use of renewable energy tenfold by 2025 and provision of subsidies for energy-saving houses (Yokohama City, 2015). The city has two points in visibility because it has also been designated as an eco-future city (EFC) by the Japanese government. Like environmental model cities, EFC is an eco-initiative launched in 2011. This initiative aims at solving the challenges of the environment, aging, economic growth, international diffusion, and local revitalization (Future City Initiative, 2018). The city has 20 points in functionality. Regarding Kitakyusyu City and Toyama City, albeit smaller in the population size than the above-stated cities, their eco-policies have been quite successful in grabbing recognition nationally and internationally. Kitakyusyu City has also been designated as an EFC by the Japanese government and its green growth trends, challenges, and opportunities were spotted, reported, and published by OECD (2013). Kitakyusyu City has introduced renewable energy such as solar- and wind- power generation systems as well as EVs, rooftop gardens, and LED lightning. The city has three points in visibility because, in addition to EMC and EFC, it has been reported by an eco-model city by OECD. The city has 23 points in functionality. The Toyama's eco-policy may be even

more noteworthy. Toyama City has been addressing these issues by what is called the compact city strategy. Toyama's compact city policy is to revitalize public transportation, to concentrate city functions in the city center and along the transportation lines, and to promote energy efficiency and alternative energy sources (Toyama City, 2018a). The city has four points in visibility. Aside from becoming an environmental model city in 2008 and EFC in 2011, the city was targeted for an assessment case study for OECD's compact city policies, and designated as a model city of the Sustainable Energy for All Initiative by the United Nations (UNSE4ALL) in 2014 (Toyota City, 2015) and of the 100 Resilient Cities Initiative by the Rockefeller Foundation in 2014 (100 Resilient Cities). The city has 22 points in functionality. Compared to the above-stated environmental model cities, Toyota City's eco-policy may still leave a lot of room for improvement in terms of visibility (one point) and functionality (18 points).

5.3.3. SWOT

According to Da Silva and Mazzon (2016), the last important step in diagnosis of social problems is "to understand and organize in two category: opportunities and threats from the outside environment…and thereafter, understand the inside environment, which is called strengths and weaknesses" (p. 580). SWOT can be used to summarize and develop the analyses of internal and external factors that can positively or negatively affect Toyota City's eco-policy. SWOT is a commonly used tool to examine the internal strengths and weaknesses of an organization and the external

opportunities and threats that an organization should be aware of (Hill and Westbrook, 1997). SWOT may help identify major strengths and translate them into competitive advantages (Coman and Ronen, 2009).

Identifying one's SWOT is critical in making strategic choices that encourage the successful achievement of an organization's strategic purposes and plans for the future (Poister, 2003). SWOT is not without criticism. For instance, Kanno (2014) argues that SWOT cannot solve real world problems because they are much more complicated than what SWOT analyzes. However, there is a general agreement that SWOT serves as a comprehensive analysis tool of the micro- and macro environments of organizations, including public entities. SWOT thus serves to analyze and promote Toyota City's eco-city (Table 5.1).

Table 5.1. SWOT analysis of Toyota City in promoting eco-policy

	Positive factors	Negative Factors
Internal attributes	Strengths: Toyota City is relatively affluent and internationally known mainly due to the Toyota Motor Corporation. These companies financially and technologically support Toyota City in eco-related themes and eco-events, including the 2015 High-Level Symposium on Sustainable Cities (Toyota City, 2015). The city is also able to subsidize citizens with the purchase of eco-products such as NGCs and smart houses. Toyota City Hall also has a specific department responsible for promoting eco-policy, apart from the department in charge of environment policy.	Weaknesses: Toyota City is not a major city in size, with a population of 423,000. The city's eco-policy's recognition and impact therefore may be limited, as it is the capital city of the Aichi Prefecture compared to major cities' eco-policies, such as those of Kyoto City and Yokohama City. For instance, major broadcasting companies are located in capital cities of Prefecture. Also, Toyota City is a car dominant society because of the Toyota Motor Corporation's presence. The full implementation of a car-sharing system like Ha:mo or the development of public transportation like LRT are difficult because the majority own cars (Ito, 2017c).
External attributes	Opportunities: The environment and sustainability have been hot global issues. Various international conferences on these issues have been held, such as the 1992 UN Conference on Environment and Development in Rio de Janeiro, the 2002 World Summit on Sustainable Development in Johannesburg, and the 2012 UN Conference on Sustainable Development Rio+20. Conferences of the Parties (COPs), an international convention where all world states discuss environment and sustainability issues, also take place every year. The UN Sustainable Development Goals set to be achieved by 2030, consist of addressing many issues regarding the environment and sustainability (United Nations, 2015).	Threats: Environmental issues do not seem to be a major concern for Japanese citizens, compared to other issues such as health care, social welfare, education, community development, culture, art, and sports. (Pekkanen, 2006). According to Nagasaka (2007), the number of memberships in Japan's environment-related organizations is smaller than other countries, such as the US, UK and Germany. For instance, the US National Wildlife Federation, the UK National Trust, and the Nature Conservation Society of Germany have at least a few million members respectively. In contrast, Japan's largest environment-related organization is the Wild Bird Society of Japan with 50,000 members followed by WWF with 40,000 and the Nature Conservation Society of Japan with 10,000.

*Constructed by the author

To summarize, Toyota City is a relatively known and affluent city with the financial and technological support mainly from the Toyota Motor Corporation. Yet, the city is not large in population size and its eco-policy is difficult to receive international recognition, although, it hosts eco-related events nationally and internationally once in a while. The international community and the Japanese government are supportive of eco-policies in general. Yet, Japanese citizens, including those of Toyota City, are not concerned about the environment and climate change as much as other social issues such as health care or social welfare.

5.4. Discussion

So far, internal and external factors were introduced to help assess Toyota City's eco-policy. Positive sides are: The Japanese government and the international community are supportive of environmental initiatives, including those of environmental model cities. The purchase of eco-products has also been financially supported through subsidies by the Japanese government and the city government of Toyota City, which also receives financial and technological support from the Toyota Motor Corporation and other stakeholders. The aging of population means that Toyota City can also encourage the concentration of living along public transportation routes and create commercial facilities toward the establishment of a compact city for the efficient use of energy and/or resources.

In this context, with support from the government and the private sector, Toyota

City has been making efforts to establish Ecoful Town and Ha:mo and enhace the purchase of NGCs and the smart house to promote eco-policy nationally and internationally.

Nonetheless, Toyota City has issues with promoting eco-policy, as many citizens do not recognize the city's eco-policy and have not changed their eco-behaviors at the socially desired level. Therefore, some of the objectives set to achieve a mission and vision is unlikely to be achieved. The issue of promotion may be relevant to partnerships: while Toyota City has been working closely with the Toyota Motor Corporation, it has not collaborated with other eco-cities. It is suggested that Toyota City should collaborate with and learn from other eco-cities, for example Toyama City, as it has been successful in promoting its eco-policy.

Toyama City is selected as both an environmental model city and an environmental future city by the Japanese government. Also the city has been selected as a model city of the District Energy in Cities Initiative (SE4ALL: Sustainable Energy for All) by United Nations and the Resilient Cities Initiative by the Rockefeller Foundation. There is no doubt that Toyama City has been successful in promoting eco-policy nationally and internationally.

Toyama City is similar to Toyota City in population size and arguably more disadvantaged without a presence of global company like the Toyota Motor Corporation, but succeeded in receiving national and international recognition. Despite limited resources available to support eco-city initiatives, Toyama City has competed against other cities and won because it has (created) competitive advantage, competing strength

gained over others by offering greater values (Ehmke, 2012). According to Porter (1985; 1996), competitive advantage can be generated through the following factors: 1) cost leadership; 2) differentiation; and 3) focus. Cost leadership is an advantage in that an organization offers the same services as its competitors but at a lower cost. Differentiation is an advantage where an organization delivers higher quality services for the same price as its competitors. Focus is a strategy in which an organization concentrates on narrow, exclusive segments and establishes market niches. An organization can possess competitive advantage when it creates and/or adds unique value based on these factors (Campbell et al., 2012; Gaddis Ross, 2014; Goldsmith, 2013). Joldersma and Winter (2002) state that public organizations like the city government should determine its strategy with concentration on differentiation and focus. Nonetheless, social marketing practitioners, including city government personnel, might not be segmenting their target audience adequately and are aiming at influencing as many people as possible (Takahashi, 2009). Toyama City's case suggests one important lesson in marketing strategy: it differentiates itself from other eco-cities by focusing on investing in and/or selling one or a few eco-items (Hsieh and Chen, 2011; Huselid, 1995; Porter, 1985; Wernerfelt and Karnani, 1987). While the city's strategy is comprehensive, its focus on public transportation, evolved around LRT, makes the city unique and differentiates its eco-policies from those of other cities. Back in the 2000s, the use of LRT was considered out of date and obsolete in Japan. Nonetheless, the city decided to re-establish the LRT system and used it as a pivotal tool for success. That is innovation. Although innovation is often considered new technological invention, using

old things and ideas in new ways is also innovation (Hargadon and Sutton, 2000; Sanger and Levin, 1992). Since innovation is unique and valuable (Kim and Mauborgne, 1997), it entails competitive advantage. What can other cities with intentions to promote eco-policies learn from Toyama City's case? As is Toyama City, most cities, if not all, have limited financial, human, and technological resources. Toyama City's case suggests that cities should focus on investing their resources into one or a few segments that are crucial in promoting their eco-policies, such as transportation and energy. In the case of Toyama City's eco-policy, that was public transportation, notably LRT, and to a lesser extent, sustainable energy, agriculture, business, and so forth. If one specific segment becomes a competitive advantage, unique with great value, it can attract additional resources for other segments such as business and agriculture, as illustrated by Toyama City.

Toyota City therefore should also focus on developing one or a few unique eco-items to promote its own eco-policy. A potential eco-item unique for Toyota City may be Ecoful Town, a showcase pavilion supported by the Toyota Motor Corporation and a driving force of promoting its eco-policy. Yet, it may not be as impactful as LRT, which is becoming a practical public transportation for Toyama citizens. Ecoful Town is also planned to be closed down after finishing its role as a showcase pavilion of Toyota City's eco-policy. Instead, the eco-family card/Toyota eco-points can be a unique sales point of Toyota City's eco-policy, we will be described in the following Chapter. The detailed description of Toyama's eco-policy goes beyond the scope of this study. However, future research will include it, possibly for comparative studies between the

eco-policies of Toyama City and Toyota City. That way, Toyota City and other eco-cities will learn from Toyama City in promoting eco-policy. As Parsons ad Lepkowska-White (2018) note, monitoring "competitors" helps learn basic information about them and what creative approaches they use to generate supporters.

5.5. Conclusion

Overall, given internal and external factors examined in this study, Toyota City's eco-policy is not moving in a wrong direction. The Japanese government and the international community as well as the private sector are supportive of environmental initiatives, certainly advantageous for Toyota City to promote its eco-policy. However, there still remain issues of the promotion of the eco-policy locally and internationally. Locally, citizens' recognitions of some eco-themes are lacking, and few citizens act on eco-items comprising eco-policy. Internationally, the city's eco-policy has not yet been recognized by the international community. As a reference for Toyota City to promote eco-policy, this study mentioned Toyama City as an exemplary eco-city. Toyama City has been selected as a model city by various national and international environmental initiatives, whereas Toyota City has been selected as one national environmental initiatives. Toyota City therefore could learn how to promote eco-policy from the case of Toyama City, for example, focusing on one eco-item comprising the eco-policy (e.g., the eco-family card/Toyota eco-points).

6. Promoting the eco-family Cards/Toyota eco-points

We have so far examined Toyota City's eco-policy with empirical studies (Chapters 2 through 4) and strategic and analytical studies (Chapter 5). Whereas empirical studies suggested some improvements in citizens' awareness/knowledge of the eco-policy and how to further improve them, they also indicate the limitation of the KAB model that this dissertation has relied on as a theoretical orientation. Therefore, the KAB model may need to be modified or developed into a new model applicable to the promotion of Toyota City. Strategic and analytical studies suggest that although Toyota City has some strengths (e.g., support from the Toyota Motor Corporation) and opportunities (e.g., the Japanese government and international community are supportive of environmental initiatives) in promoting the eco-policy, Toyota City has failed to focus its resources on one or a few specific eco-items, unlike Toyama City that has been successfully doing so, notably focusing on LRT.

In this chapter, we will explore promoting the eco-family card/Toyota eco-points, one of the eco-items comprising Toyota City's eco-policy as well as modifying and/or developing the KAB model into a new theoretical model. To do so, we will conduct individual and focus group interviews with stakeholders such as personnel from Toyota City Hall and an environmental NPO basing in the city, a marketing expert, and citizen groups. We will then conduct a questionnaire study with Toyota citizens. The reason why we focus on promoting the eco-family card among other eco-items is as follows: Eco-items such as NGCs, the smart house, and the heat island effect are not exclusive to Toyota City's eco-policy and commonly seen in other cities as well. Ecoful Town is a

unique eco-item of Toyota City's, but it is planned to be closed down after serving as a showcase pavilion of the city's eco-policy in the 2020s and thus may not be the best eco-item to promote toward the future. Ha:mo can also be Toyota City's unique eco-item, but it is not used and unlikely to be used by the majority of Toyota citizens because they already own private cars, and Ha:mo may be more appropriate to be promoted for visitors to Toyota City. Indeed, according to a pilot questionnaire study conducted in Toyota City in May 2018, more non-Toyota citizens (3.1%) than Toyota citizens (0.7%) claimed that they used Ha:mo. The eco-family card/Toyota eco-points is an eco-item unique to Toyota City and has been relatively successful, though there is still room for improvement. Therefore, the eco-family card/Toyota eco-points may be the best item to promote. At the same time, although the eco-family card is exclusive to Toyota citizens, the eco-point system itself has been implemented, albeit unsuccessful, in some other cities. Therefore, the case of the eco-family card of Toyota City has the potential to help promote other cities' eco-policies.

6.1. Promoting eco-products in social marketing

In this section, we will review the concepts of social/green marketing focusing on products because the eco-family card is a product. As described later, products in social/green marketing can be intangible (e.g., pro-environmental behaviors) and tangible (e.g., eco-points). Green product marketing may be characterized by design and production that is environmentally sensitive and/or responsive to the environmental interests and concerns of stakeholders (Walker and Hanson, 1998).

The concepts of social marketing have been developed by various scholars (Andreasen, 2002; Dibb, 2014; Luca et al., 2016; Madill and Abele, 2007; National Social Marketing Council, 2014) and summarized below:

1. Behavior change: Intervention seeks to change behavior and has specific measureable behavioral objectives;
2. Audience research/insight: Formative research is conducted to identify target consumer characteristics and needs. Intervention elements are pretested with the target group;
3. Segmentation: Different segmentation variables are applied so that the strategy is tailored to the target segment;
4. Exchange: Consideration is given to what will motivate people to engage voluntarily with the intervention and what benefit (tangible or intangible) will be offered in return;
5. Marketing mix: Intervention consists of promotion (communications) plus at least one other marketing 'P' (product, price, place). Other Ps might include policy change or people;
6. Competition: Intervention considers the appeal of competing behaviors. The developed intervention strategies seek to minimize the competition;
7. Theory: Using behavioral theories to understand human behavior and to inform the programs which are developed; and
8. Customer orientation: Attaching importance to understanding the customer, their attitudes and beliefs, knowledge and the social context in which they are placed.

Social marketing programs do not necessarily have all these elements, though purely communication campaigns or merely educating people are not social marketing (Madill and Abele, 2007). In social marketing, there is a diverse range of psychology and sociological behavior change theories and models, explaining behavior at the individual and societal level (Dibb, 2014).

These social marketing concepts play significant roles in addressing social issues at the following levels (Da Silva and Mazzon, 2016): 1) Diagnosis of social problems; 2) Social behavioral changes and benefits; and 3) Social marketing mix. In this dissertation, social problems (i.e., issues of citizens' recognition and behaviors about Toyota City's eco-policy) have been diagnosed in the Chapters 2–5. Social changes and benefits (i.e., having the eco-family card, acquiring eco-points, and receiving goods/services) and eventually pro-environmental behaviors) will be reviewed in the next section, followed by the construction of the social/green marketing mix.

6.1.1. Social behavioral changes and benefits

According to Da Silva and Mazzon (2016), behavior change occurs as follows: 1) pre-contemplative—individuals in this stage do not intend to change their current behavior in the near future, and are unaware of the benefits of changing their behavior; 2) contemplative—individuals are aware that a change might be beneficial and are seriously thinking about changing their behavior; 3) preparation/decision-making—individuals intend to take action in the near future and

may have taken some inconsistent action in the recent past; 4) action—individuals modify their behavior, experiences; 5) maintenance—individuals work to maintain behavior change over a long period; and 6) termination—individuals adapted behavior as a habit and lifestyle (Da Silva and Mazzon, 2016).

Da Silva and Mazzon (2016) explain the procedure of social changes in a social campaign in the following order: 1) Designing the value proposition (i.e., what audience values) of the campaign and raising awareness in the target audience through ideas and benefits; 2) Informing the change benefits to the target audience in order to achieve cognitive change, causing them to reflect on the possibilities of changing behavior; 3) Creating opportunities to receive them. Such a step refers to action change; 4) Encouraging them to prioritize well-being (i.e., introducing the cultural and thus behavioral change); and 5) Changing individuals' values in relation to well-being is a progress in one's perceptions and position.

6.1.2. Social/green marketing mix

The marketing mix sets the strategies of marketing, including social marketing. Product in social marketing is intangible as it is an idea, behavior, or prevention, arising from social problem analysis. In social marketing frameworks, therefore, product strategies are often considered promotional vehicles rather than products (Madill and Abele, 2007). However, intangible products can be followed by tangible ones (e.g, eco-family cards/eco-points) (Da Silva and Mazzon, 2016). Price means all costs involved in a concept of change, including non-monetary ones: physical, time, social,

and psychological. According to Madill and Abele (2007), "the weakest element in the social marketing strategy is a lack of understanding of the pricing component and the development of strategy concerning price" (p. 44). Place means where, when, and how products are available for a target audience. Place is related to distribution channels and product should be easily accessed (Bernhardt et al., 2012). In many cases, place is equivalent to convenience (e.g., distance to a recycle station). Promotion is a popular communication tool that is important to persuade the target audience and explain how the social marketing campaign will support them (Da Silva and Mazzon, 2016). Thus, promotion requires understanding the target audience to position the campaign benefits and ensure a sustainable and healthy relationship between social marketers and target audience (Da Silva and Mazzon, 2016).

Davari and Strutton (2014) note that one key difference that discriminates green marketing from commercial marketing is the green marketing mixes:

- Green products are typically created through environmentally friendlier processes. As Da Silva and Mazzon (2016) mention, green products can be intangible (behavior change), or tangible (e.g., eco-points) to facilitate the process toward behavior change.
- Green prices account for the premiums that consumers often must pay to acquire green products. As already indicated in Chapter 5 and in the current section, prices are often regarded as costs including non-monetary ones such as time and effort in social/green marketing.

- Green promotions typically play the most important role in green marketing mix because green marketing is seen as little more than promotions of products that purportedly benefit the environment (Kinoti, 2011).
- Green places involve management of distributing green products from their places. Since few consumers actively seek green products just for the sake of going green, how and where to make green products available are important.

6.2. The eco-family card/Toyota eco-points

Eco-points are a policy strategy that stimulates the self-interest behavioral motivation of "points" and aspects of psychological strategies to encourage the altruistic behavior motivation of "eco." The system is that points are given as an economic incentive to each eco-action, and these points are exchanged for products. Economic incentives play a crucial role in promoting eco-policy. According to Vezich, Gunter, and Lieberman's (2017) that employed fMRI to examine why individuals reported that they would buy green products but do not do so, "participants actually showed greater activity in regions associated with personal value and reward during standard ads relative to green ads" (p. 405). That is, individuals prioritize personal interests over social interests. Sato, Kurauchi, and Morikawa (2007) note that citizens who use eco-points do not only place emphasis on the economic incentives of "points" but the altruistic aspect of "eco," and the tendency to be altruistic has become stronger after having the points. Previous studies also report that eco-points enhance pro-environmental behaviors (Taniguchi and Morikawa, 2007).

In Japan, eco-points were originally preceded by regional efforts. Because the eco-money gained great results at the 2005 Aichi World Exposition, the concept of the Expo eco-money was adapted to eco-points, which have been continuously implemented in various cities, including Toyota City, since then (Shirai, 2014). The Expo eco-money was aimed at making eco-actions of citizens, corporations, and governments visible in the form of eco-points. These eco-actions include: 1) bringing own bags in shopping; 2) participating in environmental education and enlightenment activities; 3) eco-declaration; and 4) use of public transportation (Taniguchi and Morikawa, 2007).

Toyota City adapted the Expo eco-money system and started the eco-family card/Toyota eco-points in 2009 when the city was designated as an environmental model city by the Japanese government. For citizens to receive the eco-family card/Toyota eco-points, citizens make "eco-family declaration" certified by the city government and work on environmental actions such as above. By doing so, the city aims to reduce CO_2 emissions from the residential household sector by 365 kg per person per year (Toyota City, 2018b).

When registered citizens purchase an eco-product using an eco-family card at an affiliated store or recycle something at a designated place, they receive eco-points. These points can be exchanged for certain goods, such as garbage bags, toilet papers, stationery, bus tickets, or gift vouchers. Toyota City has worked to increase the number of affiliated stores, and therefore the use of the eco-family card/Toyota eco-points (Ito, 2014).

With efforts made by Toyota City, the number of citizens with the eco-family card has been increasing and approximately one-thirds of the total household of the city owns it. Since 2014, the city has also issued eco-points on behaviors concerning health promotion (Toyota City, 2017b) because Japanese eco-policies include measures for aging society as seen in the environmental future city initiative (Japan for Sustainability, 2014). However, the rate of increase has been stagnant in the last few years (Figure. 6.1).

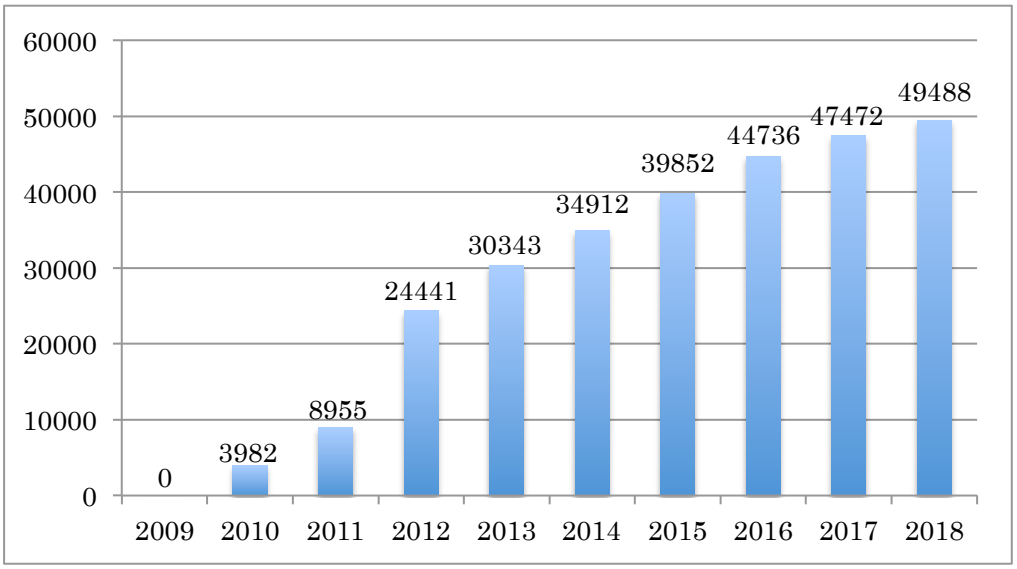

Figure 6.1. Number of households with the eco-family card

Indeed, despite the success of eco-money in the 2005 Aichi World Exposition, there have been few successful cases of the eco-point system at the regional level where limited businesses and communities participate (Toyokawa Eco-point Study Group, 2012). Shirai (2014) also notes some reasons that eco-points at the regional level are

often not fully successful: 1) There are not many opportunities to acquire eco-points, 2) there are few opportunities to use eco-points for goods/services, or 3) even if there are opportunities, the goods/services are not attractive. In the following section, we will discuss several examples of eco-point systems that have been implemented in some cities.

6.3. Previous studies

There exist several pieces of academic literature on eco-point systems in the context of Japan. Taniguchi and Morikawa (2007), for example, conducted a questionnaire study with visitors to the Expo eco-money center set up in the 2005 Aichi World Exposition. Given that the concept of the eco-point system was born with the Expo eco-money then, it is important to examine how it was perceived. This study also helps understand socio-demographic segments to be targeted and opportunities (where to acquire and use points) to promote eco-points. The number of respondents was 1,065, with 29% being male, 66% female, and 5% unknown. Although the exact number is not shown, Toyota citizens represent the respondents the most.

Among the visitors to the eco-money center, 35.6% of them were in their thirties and 27.3% were in their forties. Given that 22.5% and 18.9% of the visitors to the 2005 Aichi World Exposition were in their thirties and forties respectively, those who were in their thirties and forties were more likely interested in the eco-money than the others. Overall, concerning respondents' opinions about the eco-money, 436 (58.8%) reported that they enjoy practicing eco-activities because of eco-points, and 186 (25.1%) claimed

that they collect eco-points for goods/and services.

Regarding the issue of making eco-money more attractive, 62.6% of respondents reported the increase of stores or places issuing eco-money, while 50.5% claimed the enrichment of products exchangeable for eco-money. Concerning how respondents got to know about eco-money, 303 respondents said the Word of Mouth (WOM), 188 said TV, and 187 said magazines or guidebooks. WOM can thus be an effective way to spread green communications because it is seen as more credible than advertising (Allsop, Bassett, and Hoskings, 2007) and an influential communication channel (Smith and Brower, 2012). Notably, they received the information about eco-money from those who had used eco-money. Interestingly, 148 or about a half of those who got the information via WOM did so from cashers at the supermarket and 121 said from their friends. Only 20 respondents said that they did so from their family members.

Taniguchi and Morikawa (2007) concluded that the requirement for the future eco-money agenda was expansion of activities and places issuing eco-money rather than enrichment of exchangeable products. They go on to say that being fun (collecting points) as well as being familiar with activities and convenience for participation is an important element for promoting and sustaining altruistic environmentally conscious actions.

With regard to introducing the eco-point system, Shirai (2014) conducted a questionnaire study with 869 citizens in the Arakawa Ward in Tokyo. The aims of the study are as follows:

1 The study examined what kinds of activities (e.g., recycling) may enhance citizens' intentions to act pro-environmentally. This study also examined what kinds of goods/services were desired in return of eco-points.

2 This study identified socio-demographic factors (i.e., sex, age, affiliation) that can be a priority target to promote eco-points as well as differences in needs/wants to the menu of goods/services according to socio-demographic factors. In addition, this study analyzed where respondents obtained eco-information for each type of socio-demographic factors.

3 Based on the findings above, this study explored how to promote eco-points that would be popular with citizens. To enhance pro-environmental behavior that has not so far been enacted, actions with a high rate of implementation start (not done but want to do in the future) should be taken into account.

In this study, socio-demographic types included environmental opinion leaders, school activity participants, employees/public servants, housewives, young males, and young females. Eco-activities included energy and water saving, recording energy use, the use of public transport, the use of bicycle, greening activities, installation of solar power generation systems, purchase of eco-products, purchase of local products, and taking one's own shopping bags, one's own bottles, and one's own chopsticks.

Being employees or civil servants is statistically significantly associated with 13 out of 16 eco-activities in terms of a high rate of implementation start. Also, young females and school activity participants have significant associations with eight and six

out of 16 eco-activities respectively in terms of a high rate of implementation start. That is, employees/civil servants, young females, and school activity participants should be targeted to promote eco-points or other eco-related activities from the standpoint of a high rate of implementation start.

Whereas the aforesaid study on the Expo eco-money indicates that women in their thirties and forties are environmentally conscious (Taniguchi and Morikawa, 2007), it is important to note that housewives have few statistically significant eco-activities in terms of a rate of implementation start. Shirai (2014) argues that it may be because housewives already act pro-environmentally, including eco-points and thus they may not be the best target to further promote eco-points.

With regard to product/service menus, respondents reported that they would act pro-environmentally if they were given these eco-products: household goods such as toilet papers, eco-electric appliances, gift vouchers, organic vegetable and fruits, bicycles, PC related products, and plants/planters. Young females are statistically significantly associated with nine items out of 13, such as organic vegetables and eco-electric appliances. This socio-demographic factor (i.e., young female) is likely to respond the goods/services in return of eco-points/eco-activities. Again, housewives have only one item (i.e., plants/planters) that was significantly significant. This means that housewives would not react to increasing the variety of goods in return for eco-points perhaps because they are satisfied with the goods currently exchangeable for eco-points.

Regarding how to acquire eco-related information, school activity participants do

so from activities related to the parent-teacher association (PTA) and employees/civil servants, and young males and females receive eco-related information via the internet and mail magazines. Particularly, over 60% of young males do so from the internet or mail magazines. On the other hand, only 13% of respondents receive eco-related information from brochures and/or leaflets from the city government. Notably, less than 10% of employees/civil servants, young males, and young females rely on brochures/leaflets for eco-related information. The study also reveals that few young males and females currently act pro-environmentally, but young females are more willing to do so, as their higher rates of implementation start in both eco-activities and goods/services indicate.

Findings show significant differences in eco-activities to receive eco-points and eco-goods in exchange for eco-points according to socio-demographic factors. Differences in needs and wants for eco-activities and good/services by socio-demographic factors were identified. For this reason, local governments need to design activities and goods/services, according to the needs of different socio-demographic types in designing the eco-point system. In other words, emphasis should be placed on socio-demographic types sensitive to eco-points: "company employees/civil servants," "young women," and "school activity participants" who have high rates of start of implementation in response to eco-activities/eco-points. Among them, participating activities and affiliated groups were identified for school activity participants and company employees/civil servants. This makes it easier for the city government/social marketers to promote eco-points through collaborations with these

activities and groups in which they participate or belong to. As part of creating a smart community, Shirai (2014) suggested, more agile operation such as developing eco-points linked with HEMS may be considered (e.g., If one's electricity use falls under a certain amount, he/she receives eco-points).

Watanabe and Nishimura (2013) explain the nationwide eco-point system that subsidized the sales and purchase of eco-cars and eco-electronic appliances in Japan that started in 2009. The eco-point system is consisted of the following factors: 1) Consciousness of environmental improvement and energy saving; 2) Regulation; 3) Incentive; and 4) Competition. They argue that emergencies/crises such as the 1970s Oil Shock (and the 2011 Great East Japan's Earthquake) encouraged Japanese to establish environmental consciousness (Watanabe and Nishimura, 2013). However, such a consciousness is short-lived. Hence, it is necessary to have regulations to rationalize and maintain the conscious. Regulations help determine "who" is responsible for practicing energy saving and "who" benefits from this practice (Watanabe and Nishimura, 2013). Yet, the effects of regulations may be restrictive. Therefore, incentives are needed. Under the circumstances of the eco-point system starting from 2009 in Japan, regardless of a sharp decline in demand just after the financial crisis, sales of eco-electric appliances and eco-cars far exceeded the expectation. Such eco-point system may be more effective if it is linked with some regulations (Watanabe and Nishimura, 2013). Competition is believed to foster not only efficiency but also citizen focus as it tends to be customer oriented, achieved through the adoption of market-oriented management approaches (Molander et al., 2018). Also, social marketing intervention considers the

appeal of competing behaviors (including current behaviors).

Toyokawa Eco-point Study Group (2012) discusses several examples of cities that have introduced eco-points and their issues. Komagane City in the Nagano Prefecture, located in the Central region of Japan, collaborate with stores in the local shopping area and its eco-points can be used as eco-money there. The eco-points can also be used to pay for consulting fees at hospital and issuing certificates of residence at the City Hall. As is the case with Toyota City, approximately one-third of the total population has the eco-point card. The problem is that the eco-point system of eco-points has not been well understood by citizens (eco-points are used by only 60% of the eco-card holders).

Toyama City has also implemented the eco-point system to promote public transportation and revitalize commercial facilities in the central urban area. Citizens who shop in the local shopping districts and use public transportation systems are subject to eco-point issuance. All the costs related to eco-points are born by the city government. The problem is that since the eco-points are consumed only for the use of city parking lots and public transportation, they are not actively issued in shopping districts. Therefore, the eco-points do not benefit directly local small businesses. The eco-point systems in many cities have not been functioning well. Indeed, some city governments are considering how to end them (Toyokawa Eco-point Study Group, 2012).

In the context of Toyota City, Ito (2017c) also conducted research that involves eco-points (i.e., the eco-family card/Toyota eco-points). Around 40% of the total

respondents, including those already using them, knew eco-family cards, but only 17.3 % actually use them. Among those who knew but do not use the eco-family card, 37.5% of them said that they found the registration process troublesome, and 15.6% said that they did not know the registration process. Among those who knew but do not use the eco-family card, 12.5% said that one of their family members already has the eco-family card (the city government set a "one family one card" rule), and also 12.5% said that they do not know how to use eco-points. Whereas 72.7% of those who already have the eco-family card reported that they use the card because they can exchange eco-points for some goods, 13.6% said that with the eco-family card, they feel that they contribute to the environment. That is, more citizens obtain the eco-family card for economic incentives rather than ecological incentives. However, this result implies that citizens are satisfied with the current goods exchangeable for eco-points (e.g., toilet papers), as touched on by Taniguchi and Morikawa (2007). This is a motivating finding for the city government because it cannot bear the costs for luxurious goods in return for eco-points.

The literature review tells us that the city government should target young single women because of their high rate of implementation start (Shirai, 2014). Given Taniguchi and Morikawa's (2007) study suggests, many housewives may already have the eco-family card and eco-points, and thus not appropriate to be targeted. Watanabe and Nishimura (2013) emphasized the significance of both incentives and regulations to promote eco-points in the context of Japan. As also mentioned by Wymer and Polonsky (2015) and will be described in the next section, only the well balanced combination of

incentives and regulations as well as other factors will lead the government to succeed in sustainable behavior change. The study of the Toyokawa Eco-point Study Group (2012) introduced several studies about cities that had adapted the eco-point system. It tells us the general picture that cities struggle with maintaining the eco-point system due to a lack of support. For instance, the eco-point system does not benefit the private sector, which is therefore not active to promote the system. Ito's (2017c) study then tells us that citizens in Toyota City will likely to acquire the eco-family card/Toyota eco-points for economic and materialistic benefits rather than for the environmental concern or protection. However, citizens' needs and wants as well as how to further promote eco-points remain unclear. Increasing the variety of goods/services in return for eco-points is often suggested (Taniguchi and Morikawa, 2007), but is costly for the government and may not motivate citizens to have the eco-family card, as they prioritize places to acquire eco-points (i.e., convenience) rather than goods/services.

Given all the above-stated elements, it is not appropriate that the city government merely set desired eco-behaviors/actions and regulate citizens to pursue them, though they are also important, without considering citizens' needs and wants. It is thus essential to examine what stakeholders, including citizens, want and need, and explore to establish a successful eco-point system.

6.4. Potential factors for successful social/green marketing

Social/green marketing interventions are designed to be focused specifically on behavior change and on encouraging pro-environmental behaviors (Gregory-Smith et al., 2015). In this section, we will explore factors to be considered to adequately implement social/green marketing interventions/activities/programs. We will begin with incentives and regulations, as they are considered significant factors to promote eco-points (Watanabe and Nishimura, 2013). It may be important to note that incentives and regulations are not entirely separate entities. These factors are incentives, regulations, branding, and norms.

6.4.1. Incentives

There is a general consensus that incentives, often in the form of a financial payment or reduction in costs, can be effective in developing pro-environmental behaviors (Gregory-Smith et al., 2015). To the contrary, the lack of internal incentives is recognized as a potential impediment toward pro-environmental behavior (Darnton et al., 2006). To change behaviors, more emphasis should be placed on showing direct benefits to targeted individuals (Madill and Abele, 2007).

Social marketers utilize the exchange principle to create behavior change (Collins, Tapp, and Pressley, 2010). Creation of exchange will encourage a behavior change on the part of the targeted market. Because of this customer orientation, social marketing programs will be characterized by consumer research, pretesting, and monitoring, market segmentation, and strategies for beneficial exchanges to target audience

members (Madill and Abele, 2007). As explained by exchange theory, when an individual perceives more costs than benefits associated with performing a behavior, positive behavioral outcomes are unlikely (Lee and Kotler, 2011). The costs include physical and mental discomfort (i.e., the physiological and psychological distress that participants experienced when trying to maintain positive social behaviors) and time and effort (i.e., the non-monetary costs associated with undertaking prosocial behaviors in social marketing). For instance, one can feel that finding time to go get eco-points is troublesome and thus find it difficult to get motivated to continue that behavior. This created perceptions of inconvenience associated with having to continue with participants' activities. As Chib et al (2009) note, convenience eases the performance of behaviors, improving their utility. Conversely, a lack of convenience, or inconvenience will result in behavior abandonment, rather than continuation (Zainuddin, Dent, and Tam, 2017).

Based on the examination of environmental behavioral change, Chib et al. (2009) identified two important factors to be considered in designing campaigns for pro-environmental attitudinal and behavioral change: 1) the time frame required to influence change: and 2) the types of stimuli needed to instigate [incentivize] change. Chib et al. (2009) propose the Temporal Incentives Model of Social Influence, incorporating both practical and theoretical consideration.

Table 6.1. Temporal Incentives Model of social influence

	Intangible stimuli	Tangible stimuli
Short-term	Social acceptance Convenience Low-involvement	Cost-saving measures Monetary privileges Fines/Bans
Long-term	Environmental effects Societal effects Lifestyle enhancements	Tax incentives Awards of recognition Life-long benefits

Environmental campaigns draw on a combination of twelve socially and individually stimulating modules. These modules, both positive and negative, are classified within a matrix intersecting time frames with stimuli (Table 6.1).

"Social acceptance" provides campaign audiences the sense of social inclusion and involvement when adopting attitudes and behaviors toward environmental issues endorsed by peers. "Convenience" is associated with the individual's perceptions about the difficulty and manageability of undertaking particular actions. Audiences are inclined to participate in efforts with "Low-involvement." Encompassing both physical and mental involvement, youth are generally motivated to act when the commitments are limited. However, it is critical to differentiate between low-involvement and no-involvement.

Individuals may be motivated to assess and adopt pro-environmental attitudes and behaviors when the long-term "environmental effects" are visible. Here, audience reactions are dependent on their importance placed on altruistic values including the well-being of their physical and social surrounding (Chib et al., 2009). "Cost-saving

measures" include actions to undertake in cutting costs, such as a nominal reduction to utility bills or reduced prices for environmentally friendly products. "Monetary privileges" tempt audiences to adopt a particular mind-set toward environmental causes through awarding cash or presents, or getting paid for recyclables. On the other hand, "fines/bans" use the fear appeal to deter or regulate certain behaviors (Wonneberger, 2017).

Publicity awarded or recognized actions through "tax incentives" and "award recognition" are long-term and tangible stimuli. "Life-long benefits" such as lifetime memberships and privileges, for example, offering permanent bill reductions, measured supply of drinking water and supply of recycled paper, could draw audiences into a long-term commitment toward pro-environmental actions. Tangible incentives (e.g., eco-points) are attractive in offering expedited and visible results of actions. While such incentives could motivate sustained attitudinal change, they also support continued alterations to behaviors (Chib et al., 2009).

6.4.2. Regulations

As Wymer and Polonsky (2015) note, government interferences in the markets, such as market-based regulation, have been helpful in reducing environmental degradation. For example, many jurisdictions regulations are placed car fuel efficiency and emissions. The positive outcome arises for consumers as well. For instance, purchasing cars that have reduced operating costs financially benefit consumers. All suppliers (i.e., auto manufactures) face the same constraints with respect to improving

fuel efficiency, and thus, regulations stimulate innovation and benefits for all. In other instances, as mentioned in the previous section, governments intervene through offering tax incentives or subsidies that reduce the costs of decisions, such as having lower car registration fees (or taxes) associated with hybrid vehicles (Gallagher and Muehlegger, 2011) or tax rebates for people who install solar panels on their homes (Van Benthem, Gillingham, and Sweeney, 2008).

These examples demonstrate areas that government can create incentives, sometimes through regulations, that motivate individuals to behave in a more prosocial, environmentally friendly manner. These are, in effect, governmental green marketing initiatives that may make sustained improvements in the environment (Wymer and Polonsky, 2015). Apart from incentives and regulations, the concepts of branding and norms are often discussed in social/green marketing.

6.4.3. Branding

Social marketing programs are sometimes referred to as a brand. Multi-year consistency of a social marketing campaign is considered important in making it a brand (Lankard and McLaughlin, 2003; Madill and Abele, 2007). Not only social marketing programs but also social behaviors can be considered a brand by generating a prosocial reputation (Semmann, Krambeck, and Milinski, 2005). Having the reputation of caring about the environment can help in one's social sphere because environmentally conscious individuals are seen as trustworthy and loyal (Barclay, 2004). Green marketing messages that appeal to one's reputation or status (a type of branding) are

thus effective (Vladas, Tybur, and Van den Bergh, 2010).

A person can be seen as altruistic when he or she buys a green product that requires some self-sacrifice. The person is demonstrating a willingness to incur cost in order to help the environment and society. This action of altruism can elevate the person's social branding (Smith and Brower, 2012).

6.4.4. Norm

Cialdini, Reno, and Kallgen (1990) explain the concept of descriptive norm, which is what is typical or normal, and what most individuals do in a given situation. They continue to argue that the perception of what most individuals do motivates others to do the same. Rettie, Barnham, and Burchell (2011) also state that consumers assess green marketing initiatives, products, or behaviors in the context of what they understand to be socially normal and mainstream. Further, consumer adoption and discontinuation of environmental behaviors are influenced by their understandings of what is normal and anormal. That is, some sustainable behaviors are currently not adopted because they are seen as not normal. Similarly, some less sustainable behaviors are difficult to change because they are perceived as normal (Rettie, Burchell, and Riley, 2012).

Social normalization related to eco-behaviors occurs through some activities and products that gradually become accepted as normal, while other activities may be denormalized. For example, in the 1960s, taking shopping baskets or bags to the shops had been normal. Subsequently, this became less normal because shops provided plastic

bags, but taking one's own bags has recently become normal again. This reflects a cycle in which taking bags to shops has undergone a process of denormalization, followed by a more recent process of social normalization, accompanied by a corresponding denormalization of plastic carrier bags. Similarly, respondents noted that recycling has become normal nowadays indicating that recycling has gone through a process of social normalization (Rettie, Burchell, and Riley, 2012). Therefore pro-environmental behaviors are often driven by the personal as well as social norms (see also Gregory-Smith, Manika, Wells, and Veitch, 2017; Lamm, Tosti-Kharas, and Williams, 2013). These subjective norms, in turn, may influence the environmental behaviors.

This process is addressed in the Theory of Planned Behavior (TPB) (Ajzen, 1991) that posits an individual's intended behavior is a product of one's attitude toward the given behavior as well as one's subjective norm (i.e., one's perception of the desirability of the intended behavior to others who are important to the individual), an extension of the theoretical framework of the aforesaid KAB model as well as the theory of reasoned action (TRA) (Ajzen and Fishbein, 1980). As Ohtomo and Hirose (2007) note, both TRA and TPB as well as KAB are goal oriented. TPB argues that consumers' environmental beliefs coalesce to form their attitudes toward green behaviors. In turn, these attitudes generate intentions to purchase green products. TPB explains behaviors in terms of complex relationships between socio-demographics, norms, and self-efficacy, as well as knowledge and attitudes, feedback and socio-demographics (Gregory-Smith et al., 2015).

A norm is similar to a brand in that one cares about how their affiliates see what

s/he has or does. Positioning a brand (e.g., a social marketing program or pro-environmental behavior, as mentioned in the previous section) as normal should encourage behavior adoption. This is particularly true of green products which are often relevant only to a small niche of very green consumers (Rettie, Burchell, and Riley, 2012). Research on social norm indicates that individuals are more likely to be influenced by the behavior of close reference groups. This helps to explain why responses on the normal scale were frequently related to demographic characteristics. In many cases what is considered normal behavior differs between different segments of the population, and it is therefore often possible to identify relevant demographic variables that can be used in targeted social marketing campaigns to change these conceptions (Rettie, Burchell, and Riley, 2012). A prime example of such a socio-demographic variable is young women with a high rate of implementation start in the aforesaid study of Taniguchi and Morikawa (2007): what is currently normal for young women is that they are concerned about the environment but do not take actions. Social marketers have to help them normalize their pro-environmental behaviors. With these pieces concepts in mind, the following sections explain the methodology of the current research on how to promote the eco-family card/Toyota eco-points.

6.5. Methodology

6.5.1. Sample

Individual and focus group interviews and questionnaires were conducted with personnel from the city government and the largest environmental NPO based in Toyota City, marketing experts and citizens. The personnel from the city government and the largest environmental NPO were targeted for this study because they are familiar with the city's eco-policy. Marketing experts were involved as they are adept at marketing concepts and its applications to promote eco-policy. Citizens were also asked to participate because unless they are involved, eco-points would not be further promote at the operational level. Overall, they are likely to be able to provide feasible explanations about how to promote eco-policy. The research took place in June, July, August, and October 2018. Verbal consent was given by all the participants.

6.5.2. Methods: Individual and focus group interviews and questionnaires

Interviews are the most common method of qualitative data collection (Donalek, 2005) and have been a key primary data source for research (Arsel, 2017). Exploratory interviews, which this study employs, intends to expand the researcher's knowledge of areas about which little is known (Schensul, Schensul, and LeCompte, 1999). To do so is necessary to find key informants who are well informed (Schensul, Schensul, and LeCompte, 1999). A focus group interview is a particular kind of group interview. As Cohen, Manion, and Morrison (2011) explain that a focus group interview encourages the interaction of a group who discusses a topic provided by the researcher, leading

toward a collective view. Thus, "[i]t is from the interaction of the group that the data emerge…to discuss a particular given theme or topic, where the interaction with the group leads to data and outcomes" (p. 436). Breen (2006) explains that a focus group interview is employed "to generate [new] ideas for the purpose of devising recommendations for future change" (p. 464).

The number of participants for individual interviews was 14 and focus group interview study was 17. This number falls into the range often suggested in the literature for focus group interviews. Rabiee (2004), for example, notes: "the number generally suggested as being manageable is between six and ten participants; large enough to gain variety of perspectives and small enough not to become disorderly or fragmented" (p. 656). Krueger (2002) also suggests a similar number of participants for a focus group, but between six and eight are preferred. According to Raibee (2004), the group should have homogeneity of background in the required research area: otherwise the discussion will lose focus. This study meets that criterion as well: all the participants are stakeholders involved in eco-activities in Toyota City. The number of participants for the questionnaire study with citizens was 149.

6.5.3. Procedure

The studies were conducted between May and October in 2018. At the beginning of the interviews, the author provided the context of why this study was being conducted. The participants were provided with background information from the literature review and asked for opinions regarding how to promote eco-policy. The focus group interviews

took one hour. The length of the discussion also fits within the range often suggested in the literature (Rabiee, 2004). The questionnaire study was conducted in a similar manner but took 10-15 minutes for participants to fill out the questionnaire.

6.6. Results

6.6.1. Director of the Eco-life Center in charge of promoting eco-points based in Toyota City Hall

The first interviewee was the director of the Eco-life Center at the City Hall. The interview took place on May 24, 2018. He was selected as a participant, as the center is in charge of issuing/promoting eco-points. The author first asked him the current situation of the eco-family card. As the portal website of the eco-family card shows, he said, the number of households with the eco-family card has been increasing since its inception in 2009 and reached 50,000 households out of the total of 170,000 households in Toyota City as of the time of the interview. He affirmed that the city's ultimate goal is obviously to enable all the households to hold the eco-family card in the city. So far, the city government has borne almost all the costs for the eco-family card, which he thinks does not seem to be sustainable. The city therefore has been working on reaching out more companies or other organizations for collaboration by asking them to use eco-points for their eco-related corporate social responsibility (CSR) or other activities and hires the disabled. For example, there is a company that collects disused articles. The disabled citizens polish them and sell them on the Yahoo auction. Those who bring

disused articles to the company's designated place are given eco-points. The city government also collaborates with farming organizations: citizen volunteers who help them pick up blueberries and red beans and are given eco-points. This way, the city can help the farming organizations with the issue of scarce labor forces in the field of agriculture. These acts coincide with the existing literature on partnerships between the government and the private sector in the context of social and environmental marketing. For instance, Madill and Abele (2007) affirm, "partnerships have traditionally been important features of social marketing programs" (p. 31). Also, businesses are seeking partners who incorporate sustainable business practices (Sisodia, Wolfe, and Sheth, 2007).

The author asked the director about the possible use of smart phone applications to manage eco-points, as previous research indicated that citizens found the registration process of the eco-family card troublesome. He replied that although the use of smart phone applications for eco-points might be an issue to be addressed in the future, it is costly to develop one. Creation of an application costs a few million yens (tens of thousands of USD). If one does not have a card, he or she can get a paper ticket for points or added to the registered integrated circuit (IC) cards. The issue is to select activities that are worth eco-points. It is difficult to determine whether or not a given activity is suitable for (giving) eco-points. It is obvious that one can receive eco-points by recycling at a recycle station. One can receive eco-points even by doing radio gymnastics (in collaboration with the Health Section of the City Hall). Yet, one does not receive eco-points by turning off the light or driving eco-cars. In the end of the

interview, he emphasized that citizens' recognition of the eco-family card is important to lead to obtaining it: some citizens do not know what they are, even if they see it somewhere.

6.6.2. Marketing expert

The second person whom the author interviewed was a marketing professor who has worked as a marketing manager for major companies such as the Japan Airlines and HIS, one of the largest travel agencies in Japan. The interview was conducted on June 5, 2018. First of all, when I asked how the city could possibly promote eco-points, his reaction was: "How has the city government been able to succeed in popularizing eco-points to a third of all households in Toyota City?" There is no precedent that points provided by the city government reached that far. The general issue of eco-points seems that there is no place to acquire them and no attraction to use them. It is difficult for the city government to compete against the private sector in convenience or commodity attraction. Therefore, enforcement such as incentives/regulations that only the city government can provide will be required. For example, (as Komagane City had done), eco-points should be used to pay for the fee of residence certificate.

6.6.3. Director of Eco-T

On June 12, 2018, the author interviewed the director of ECO-T, the largest environmental NPO in the city of Toyota. The organization is involved in promoting the eco-family card/Toyota eco-points, by organizing and/or participating in eco-events

with the Environmental Policy Section of the City Hall.

The City Hall has been making efforts, for example, by creating a Facebook account, including the content of eco-points, but the page has received few Likes. The city also has created a portal website called the Ecopoint Navi to help popularize the eco-family card. Yet, there have been few visitors. Also, since 2017, the eco-family card has been connected with transport IC cards or Nanaco (Seven Eleven's point card) for convenience. Once they have been registered, the IC cards can store points. However, few seem to know about it.

Regarding the government enforcement or regulations toward the eco-family card, he said, the best opportunity may be when people move in Toyota City from outside. The City Hall staff should explain to new comers that Toyota City is an eco-city, and how having the eco-family card is part of citizens' responsibility. The city government should oblige citizens to have the eco-family card like NHK (Japan's national public broadcasting organization)'s viewing fee. If the city government can collaborate with real estate agencies in the city, it might work. University students who move to Toyota City, for example, may not transfer the certificate of residence at the City Hall. There is no harm for the real estate companies to collaborate.

The director concluded that it is praiseworthy that Toyota City is able to run the eco-point system, as the city can afford to it. It would be even better to become more sustainable if other stakeholders also share financial burdens.

6.6.4. Citizens-1

On May 20, 2018, the author interviewed a group of citizens without any particular knowledge or interests of the environment. As the existing literature suggests, it is important to know what they want or think. One respondent said, first and foremost, citizens need to have the eco-family card and then may be more motivated toward pro-environmental behaviors for the fact that they have and use it. The biggest reason why citizens do not have the eco-family card is that they find the registration process troublesome, as also indicated by the previous research in the Chapter 4. The city government just needs to provide opportunities to facilitate the registration process. Another respondent suggested collaborating with the My Number card (a card with a 12-digit ID number issued to all citizens and residents of Japan to pay taxes or wire money overseas) at the City Hall or distributing registration forms for the eco-family card at school.

As previous research also indicates, there are not many opportunities (i.e., activities and places) where citizens receive points. In this regard, another respondent suggested being able to get eco-points when charging EVs at the battery station or to get eco-points if the utility bill falls under a certain amount. Also, there are not many opportunities to use points (i.e., exchange for goods and services). Whereas previous research showed that exchangeable goods/services do not have to be more luxurious, one respondent suggests getting discounts at movie theaters or other affiliated stores.

This focus group interview tells us that "place" may be more important than the "product" unlike Davari and Strutton, (2014) and Kangun and Polonsky (1995) who

mentioned that a product plays the most important role in the green marketing mix. This statement is also related to "price" (e.g., costs from transportation and time/effort). Participants all agreed that places to acquire points should be accessible. One respondent concluded that "even when we participate in certain eco-activities, we cannot feel how much these activities contribute to solving environmental issues; therefore we lose interests in these issues."

6.6.5. Policy Section vice-chief/Promotion Section personnel of the City Hall

On June 26, 2018, the author interviewed the vice chief of the Environmental Policy Section and personnel of the Environmental Promotion Section at the City Hall. The author first asked how the eco-family card initiated and gained popularity, as mentioned by the aforesaid marketing expert. The origin of Toyota eco-points derived from "eco-seals" at supermarket in the city. Around the year 2000, there was an eco-movement that citizen-consumers took one's own bag and received eco-seals, each of which was equivalent for 20 yen (20 US cents) to be used at supermarket. The movement became popular, but 70% of citizen-consumers still received plastic bags at supermarket. Then supermarkets stopped giving away plastic bags and started charging them (the price varies among supermarkets but around between 3-5 yens or 3-5 US cents). Since then, 90% of citizen-consumers have been taking their own bags. This suggests that regulations may have stronger impacts than incentives. Because of the previous eco-movement of taking own bags and receiving eco-seals, according to the Policy Section chief, citizens made a smooth transition to eco-points.

When the author asked about goods/services for eco-points, the vice chief replied that most citizens exchange eco-points for gift vouchers. He continued to say that the goods can be anything, but they should serve to improve eco-behaviors or are locally produced food that can contribute to the local economy as well as energy saving.

The existing literature suggests that citizens may prioritize convenience (place to acquire eco-points) over goods/services exchangeable for eco-points. The aforesaid citizens group also said that places to acquire eco-points should be close to their home or work. The vice chief said that it is difficult to increase the number of places to acquire eco-points due to financial issues. However, they go around and hold mobile eco-point exchange meetings or provide/exchange eco-points at various events.

Eco-points are not without criticism. Some city personnel claim against the system because it is costly to maintain it. It is an interesting measure to address environmental issues, but the cost performance may not be praiseworthy. The city government bears almost all costs and issues almost all eco-points. It is controversial how long and to what extent the city government will have to and be able to bear the costs. Eco-points are unique to Toyota City and found interesting by external observers. However, they typically turn away after hearing the costs of managing eco-points, saying “Only [affluent] Toyota City can do it”.

The author asked the Policy Section vice-chief if they can oblige citizens to have the eco-family card. He replied, “We have tried to tie eco-points to the My Number card. However, The My Number card and Toyota eco-points use different types of systems and are not compatible. Also, My Number is not a card to be used in daily life, either.

Therefore, we gave it up." The author also asked them if we can ask local real estate agents to ask customers to register the eco-family card. This is compatible with the idea mentioned by a citizen group member to "take action first and then move on to awareness." The Policy Section vice-chief said that personnel at the Civic Division of the City Hall explain to those who transfer the residence moving-in notification about the eco-family card (though they do not hand out the application/registration forms to them).

When the author talked about making the registration compulsory to those who move in the city, the personnel from the Promotion Section claimed: "I personally do not want the eco-family card to be compulsory. I am not really concerned about the number of households with the eco-family card. I do not find it necessary to just increase the number of the eco-family card holders. Our resources are not inexhaustible and thus we cannot just indiscriminately distribute the card. I do not find it meaningful to practice eco-activities without awareness.

However, the Policy Section vice-chief said that although the currently popular theories suggest that environmental awareness/knowledge lead to pro-environmental behavior via modifying attitudes (Levine and Strube, 2012; Polonsky, Vocino Grau, Garma, and Ferdous, 2012) and as also reiterated by the directors of the Eco-life center and the ECO-T, it is also important to first take actions, that is, to have the eco-family card. It would be ideal that citizens collect eco-points even without awareness that they are practicing eco-activities.

The author told the personnel about the aforesaid eco-point literature that young

women may be the best target to promote the eco-family card (Shirai, 2014; Taniguchi and Morikawa, 2007). They replied that the city government collaborates with Starbucks within and outside the city of Toyota (e.g., Anjo City and Chiryu City) and asks Starbucks employees to do workshops such as making sleeves using recycled materials and cool sharing (sharing a air-conditioned room with others to save energy) and light down (with little light and electricity or only candles) because many of Starbucks customers are young women. Indeed, the majority of the participants to the events that take place at Starbucks are young women.

6.6.6. Eco-T staff

On August 28, 2018, the author interviewed 17 volunteer staff working for Eco-T (called "interpreters" as mentioned in Chapter 3) regarding the following matters: through what kinds of eco-activities they would like to receive eco-points; what kinds of goods they would like to receive in exchange for eco-points; and what can encourage citizens to have the eco-family card.

Participants were asked through what kinds of eco-activities they would like to receive eco-points. All of them reported the purchase of eco-products, 15 reported recycling and also participation in eco-learning events and seminars, eight reported bringing one's own bag and also health activities; and five reported the use of eco-cars. Others are: the use of bicycles and the public transport; participation in volunteer activities (e.g., cleaning the street); cool and warm sharing; and visits to eco-facilities.

All of the 17 participants would like to receive eco-points for the purchase of

eco-products arguably because many Toyota citizens, including the research participants, obtained the eco-family card to have been subsidized for the purchase of eco-products such as eco-cars or electric appliances. That is, part of subsidies for these eco-products was paid through eco-points by the city government. Likewise, fifteen of them would like to receive eco-points for recycling because they have indeed received eco-points by recycling. They also mentioned eco-learning as a means of receiving eco-points because they are interpreters who are directly involved in eco-learning by teaching citizens about the environment. Eight reported bringing one's own bag because, as the Policy Section vice-chief explained in the previous interview, eco-points are originated from eco-seals that were given by bringing one's own bag instead of receiving plastic gabs at the supermarket in Toyota City.

Participants were also asked what kinds of goods (or services) should be exchanged for eco-points. 17 respondents reported garbage bags, 15 reported gift vouchers, 14 reported toilet papers, and only one reported a residence certificates. Others included locally grown products such as rice, fruits and vegetables; donations to environmental/social activities; recycled composts/fertilizers; detergent; wooden products using thinned timbers; credit charges to IC cards; and garbage bags for inflammable garbage. Garbage bags, gift vouchers, and toilet papers have already been exchanged for eco-points and all of them seem to be equally popular goods for exchange. Other goods and/or services were not mentioned by no more than a few respondents. These results may imply that the current goods exchangeable for eco-points are supported by the users and other goods do not necessarily have to be

added to them.

Participants were also asked what could encourage citizens to use eco-points. One respondent said that when individuals move to Toyota City, the city staff should explain the eco-family card. He continued to say that, although obliging them to have the eco-family card is too compulsive because resources to make and distribute it would be wasted, informing them of eco-points is important. Another respondent suggested that the city should use the Sun Flower Network (a local TV channel covering Toyota City) to promote the eco-family card. Several respondents suggested that the city government distribute the eco-family card to each individual instead of each household. One said, "I think that there will be more people to use the eco-family card if it is issued to individuals rather than households." Currently, it may difficult for some citizens to use the eco-family card because it is distributed to each household, not each individual citizen. One respondent said, "My husband has the eco-family card, and I cannot use it. I would like the city government to issue at least two eco-family cards to each household." Although the city government should inform citizens of the fact that eco-points can also be acquired using IC cards, the mechanism of acquiring eco-points through IC cards is not widely understood. If the city government further intends to promote the eco-family card, one eco-family card per family may not be enough. It is suggested that the city government should be able to issue at least two per family.

6.6.7. Citizens-2

On October 14, 2018, the author conducted questionnaires with 149 Toyota citizens who visited Eco-T for an eco-event entitled the Reuse Festa. As is the case with the interviews with the Eco-T interpreters in the previous section, the author asked the following items: eco-activities to receive eco-points; goods to exchange for eco-points; and motivations to have the eco-family card. The last item is an open-ended question.

Table 6.1. Eco-activities to acquire points

Q1. Through what kinds of eco-activities would you like to acquire points?		
	N	%
Recycling	134	89.93
Bringing own bags	96	64.43
Purchasing eco-products	88	59.06
Eco-learning	57	38.26
Doing health activities	44	29.53
Using eco-cars	18	12.08

Purchasing eco-products and recycling are popular activities to acquire eco-points for both citizens and Eco-T interpreters. However, eco-learning seems less popular to citizens than to Eco-T interpreters, while bringing own bags is more popular to citizens than to Eco-T interpreters. It is understandable that Eco-T interpreters value eco-learning more than citizens do, as it is their task to teach about the environment. Currently, eco-points are no longer acquired by bringing own bags, though they used to be. Eco-T interpreters' eco-awareness may be more updated than citizens in general.

Table 6.2. Goods/services to exchange for eco-points

Q2. Through what kinds of goods/services would you like to exchange for eco-points?		
	N	%
Garbage bags	112	75.17
Gift coupons	87	58.39
Toilet papers	76	51.01
Residence certificate fees	16	10.74

Garbage bags, gift coupons, and toilet papers are all favored by more than 50% of respondents. The order of preference is the same as that of Eco-T interpreters, but as discussed in the previous section, these goods are supported by the users and do not have to be replaced with other goods to attract more users. Four respondents reported tissue papers and two reported locally grown products. There were many other goods mentioned, but not by more than one respondent.

Regarding what the city government should do to encourage citizens to start using the eco-family card, a number of suggestions were made. Six (and the largest number of respondents) claimed that the city government should enable a household to have at least two eco-family cards, or enable each citizen to have one eco-family card. As one respondent said, "The city government should distribute the eco-family card to every citizen." Similarly, four respondents reported that the city government should provide children with the eco-family card. One respondent said, "If children have the eco-family card, not only they but their parents might also become environmentally aware and encouraged to have ones." In the same vein, one respondent said, "The school should

provide application forms for the eco-family card." Another respondent said, "In issuing residence certificates, the city government should provide the eco-family card."

Other than that the city government should provide the eco-family card to each citizen, the term "supermarket" is identified nine times in the text. Given that verbs such as "can" and "use" are counted 19 and 11 times respectively, citizens wish that the eco-family card were usable at the supermarkets nearby, ideally as electric money.

6.7. Discussion

Through existing literature review and individual and focus group interviews and questionnaires, the current research examined activities to acquire the eco-family card/Toyota eco-points, goods/services to receive in return of the activities, and socio-demographic factors to identify appropriate target audience to promote the eco-family card/Toyota eco-points. The literature review reveals that citizens are more or less satisfied with goods/services exchangeable for eco-points (e.g., toilet papers, garbage bags, gift vouchers), yet find places of activities to acquire points such as a recycle station and eco-learning facilities crucial. The literature review also reveals that few young males and females currently act pro-environmentally, but young females are more willing to do so, as their higher rate of implementation start indicates. This fact may make young females an attractive target to promote eco-points because they already have pro-environmental attitudes, which have not yet been transformed into behaviors.

The interview study suggests that Toyota City has already been working on young female as a target audience to promote eco-policy, for example, organizing eco-related workshops and events in collaboration with Starbucks where many of the customers are young women. This collaboration may make it easier to promote the eco-family card at these workshops and events.

The interview study also confirmed that issuing and maintaining the eco-family card is costly. As Christensen (1994) argues, green products inevitably cost more to produce than ordinary alternatives. Promotional campaigns are similarly expensive to introduce, explain, and justify the benefits of going green. The issue is how much the city government should/can bear the cost, and involve the private sector to share it. Ultimately, green marketing strategies are not only costly and complicated but difficult to execute successfully (Davari and Strutton, 2014).

It is noteworthy that, although the Promotion Section personnel claimed that he was against the idea of distributing the eco-family card to every citizen unless they are environmentally aware or knowledgeable, the Policy Section vice-chief and others said that whereas theories suggest that environmental awareness/knowledge leads to pro-environmental behavior via attitudes, it is also important to first take actions, even without awareness, to have the eco-family card/Toyota eco-points. This may be an interesting and insightful comment that might influence the theoretical framework that this dissertation originally employed: the KAB model. In the KAB model, individuals first become aware or knowledgeable of environmental issues and then act pro-environmentally via modifying attitudes. Mainly due to its simplicity (Hargreaves,

2011), the KAB model has become popular and applied to other relevant theories, notably Ajzen's (1991) "theory of planned behavior," which posits that behavioral intention precedes behavior through interactions between one's attitude toward a specific behavior, their beliefs about what others think about the behavior (i.e., the subjective norm), and their perceived level of control over the behavior (i.e., perceived behavioral control).

If the comments of the directors of the Eco-life Center and Eco-T, the Policy Section vice-chief, personnel of Eco-T, and citizens that the city government should distribute the eco-family card to each citizen or at least two cards per household are examined in a theoretical framework, however, behaviors come first followed by awareness. To be more detailed, having the eco-family card itself is what the author calls "surface" pro-environmental behaviors without much awareness, knowledge, and attitudes (AKA) (Joglekar, Banerjee, and Mishra, 2014; Olufemi, Miji, and Mukhola, 2016), as opposed to "deep" pro-environmental behavior with AKA and beyond, as will be explored later. This logic may help form a new theory that can be called behavior(surface)-awareness-knowledge-attitude-behavior(deep) (BAKAB). If a surface behavior is consistent, that may be a simple habit, not mediated by AKA (Aats and Dijksterhuis, 2000). If a deep behavior is consistent, that may be an applied habit, determined by the past behavior (Aats and Dijksterhuis, 2000). For instance, if one does not litter for a simple habit, s/he may still do other things that may be environmentally unfriendly such as consuming too much water/electricity or driving a private car. In contrast, if one does not litter as an applied habit, s/he may act pro-environmentally

(e.g., consuming less energy or driving an eco-car) in other contexts.

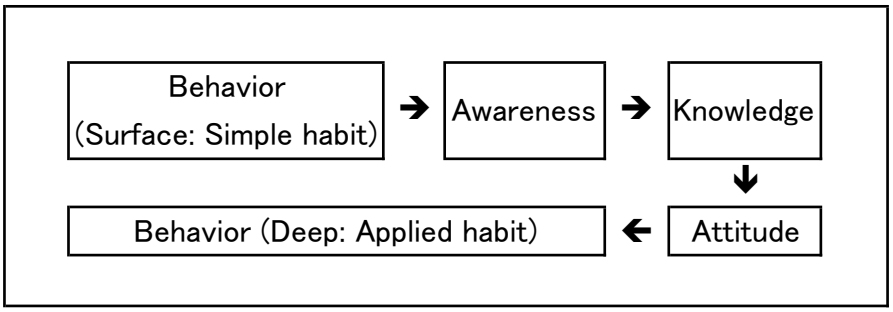

Figure 6.2. BAKAB Model

The idea of this theoretical framework is that the surface behavior is a critical starting point to help raise awareness through involvement in eco-activities (e.g., recycling, purchase of eco-products, and the use of public transportation). The rest follows AKA/KAB that lead to the deep behavior. This new theoretical framework may be supported by the goal directed behavior, social practice theory, and the dual-process of reactive (unintentional) and intentional decision-making involved in eco-friendly behavior.

The goal directed behavior has been suggested by Bargh and Chartrand (1999) and Bargh et al. (2001) and applied by Ohtomo and Hirose (2007) in the context of environmental behaviors. In this theory, the environment relevant to present objects, events, and behavior of others enables individuals to activate goal directed behaviors through actions to form habit. In the context of promoting the eco-family card/Toyota eco-points, the environment refers to having the eco-family card. Actions refer to eco-activities such as recycling and purchase of eco-products. Goals refer to the collection of eco-points and the exchange for goods/services for citizens and citizens'

pro-environmental behaviors for the city government. This goal directed behavior occurs without the person's awareness but with automation (i.e., something happens when certain conditions are met) and the whole series of automatic behaviors form habit. Whereas awareness (or the conscious self in Bargh's term) accounts for only 5% of behaviors (Bargh and Chartrand, 1999; Bargh et al., 2001), the environment (e.g., behaviors of others) directly causes mental activity such as perceived behavioral control and intentions. For instance, with little experience in recycling, the association between perceived behavioral control and intentions become weaker. Also, if the recycling facility is not well equipped, the association between perceived behavioral control and intentions become weaker (Knussen and Yule, 2008). Activating the mental representation of behavior outside of awareness prepares individuals to initiate rapidly the corresponding behavior to mobilize additional resources and spend effort on a task (Aarts, Custers, Marien, 2008). Chartrand and Bargh (1999) call this phenomena the chameleon effect: "nonconscious mimicry of…behaviors of one's interaction partners, such that one's behavior passively and unintentionally changes to match that of others in one's current social environment" (p. 893).

Similar to the goal directed behavior, social practice theory explains that individuals may act on something not because they make a rational choice but because that is socially practiced. Social practice theory derives from a wide range of social and cultural theories, developed by Bourdieu, Giddens, Taylor, and Foucault (Reckwitz, 2002). Social practice theory diverts attention from individual decision making, and turns attention toward social and collective organization of practices that broad cultural

entities shape individuals' perceptions, interpretations, and actions within the world (Shove and Warde, 2002). In social practice theory, environmental behaviors are not seen as the result of individuals' attitudes, values, and beliefs but as part of social practices (Warde, 2005). In turn, the performance of various social practices is seen as part of "the routine accomplishment of what people take to be normal ways of life" (Shove, 2004, p. 117). As Warde (2005) notes, "the principal implication of a theory of practice is that the sources of change behavior lie in the development of practices themselves" (p. 140).

To explain elements that may influence eco-friendly behaviors, Ohtomo and Hirose (2007) suggest the dual-process of reactive (unintentional) and intentional decision-making involved in eco-friendly behavior developed from Ajzen's TRA and TPB. They argue that environmental behaviors are influenced by 1) intentional motivation that can lead to behavior willingness and unintentional motivation that can lead to behavior acceptance and 2) prototype image that influences behavior acceptance as a passive psychological factor which allows environmentally unfriendly behavior. According to Ohtomo and Hirose (2007), this prototype explains the negative factor to accept risk behavior such as smoking, drinking, and littering. However, given that prototype is also a kind of social norm that influences social practice, it can act positively to enhance pro-environmental behaviors.

To help put theory into practice and to promote a specific behavior, Fujii (2003) suggests an experience induction method. He argues that there is not as rich information as real experience. For instance, he explains, an effect called simple contact effect:

simply an action of touching an object enables individuals to have positive attitudes toward that object (Fujii, 2001). Due to this effect, simply having behavioral experiences may change attitudes, and subsequent behavior. Fujii further argues that one practical, highly effective method to take the advantage of this effect to promote a specific behavior is to use structural strategies by changing the system so as to oblige individuals to have it or by implementing measures to provide economic incentives to have it.

In the BAKAB framework, the first surface behavior will eventually serve not only to help raise awareness but to reinforce the last deep behavior, as the past behavior has the direct influence on the future behavior to be more permanent (Aarts and Dijksterhuis, 2000). After all, as is often indicated, it is only through their repeated performance that practices are sustained (Shove and Pantzar, 2005).

In examining this BAKAB model, the aforesaid concepts of social normalization, social branding (e.g., I am engaged in eco-activities or purchase green products because they are what others do or what makes me look better), and regulations and incentives (e.g., I am engaged in eco-activities or purchase eco-products because it costs/benefits me) first focus on surface behaviors (e.g., having the eco-family card), which makes it easier for individuals to be environmentally aware and acquire environmental knowledge and attitudes (AKA), and then move onto deep behavior (e.g. engaging eco-activities as applied habit in any contexts).

In the current context of Toyota City, the eco-family card/Toyota eco-points are incentives, and perhaps to a much less degree, social brands. However, the distribution

of the eco-family card to as may citizens as possible based on the BAKAB approach ad through regulation (virtually obliging them to have one) may make the eco-family card socially normal.

Practically, with the presence of the eco-family card, citizens participate in eco-activities in which they would not participate otherwise. Citizens, for example, attend environmental forums on climate change for eco-points but learn something about the theme as well. Also, citizens participate in health promotion activities such as radio gymnastics for eco-points. As is one of the main purposes of the future eco-model city initiative (i.e., addressing the aging society which Toyota City is also pursuing), the eco-family card has a potential for Toyota City to become a more comprehensive eco-city (also by promoting health) like Toyama City mentioned as an exemplary eco-city in Chapter 5. With the BAKAB model, it may be possible to convince policy makers such as the Promotion Section personnel, who are opposed to promoting the eco-family card for citizens without environmental awareness, to do so. In social marketing, this serves as an upstream approach (e.g., appealing to the policy level stakeholders) as opposed to midstream (e.g., community and family level stakeholders) and downstream (e.g., individual citizens) approaches (Andreasen, 2006; Dann, 2010; Gordon, 2013; Hoek and Jones, 2011; Luca, Hibbert, and McDonald, 2016; Newton, Newton, and Rep, 2016; Wood, 2016; Wymer, 2011). Given that upstream approaches have relatively been disregarded in social marketing, this research also contributes to developing this area.

6.8. Conclusion

This chapter has explored how to promote the eco-family card/Toyota eco-points through literature reviews and interview and questionnaire studies. Through literature review, this study identified several factors such as potential target audience (i.e., young female), target activities and goods/services are not as important as the place and convenience for citizens to adapt the eco-family card. Whereas there are a number of issues to be addressed to fully promote the eco-family card/Toyota eco-points (e.g., costs of maintenance and development of the system), the current research suggests that the eco-family card has a potential to broaden the concept of Toyota City's eco-policy and helps promote it in a more comprehensive manner by also promoting health and the discussion on the theoretical framework of BAKAB supported by the goal directed behavior, social practice theory, and the dual-process of reactive and intentional decision-making might also help mobilize policy makers toward promoting the eco-policy by influencing the existing theoretical framework in a unique and practical way.

7. Conclusion

7.1. Discussions, implications, and recommendations

This dissertation discussed three empirical studies relying theoretical orientations on the KAB model (one for a review of Toyota citizens' recognition of eco-policy, another for analysis of associations between socio-demographic factors and environmental awareness, and the other for examination of underlying gaps between citizens' environmental knowledge and behaviors), one analytical and theoretical study with social marketing approaches to examine and promote eco-policy, and one empirical study in an attempt to promote the eco-family card/Toyota eco-points, which also contributes to develop the KAB model into the BAKAB model. The first study on citizens' recognition (or knowledge/awareness) of Toyota City's eco-policy demonstrates that Toyota citizens in 2015 were significantly more aware of the city's eco-policy than non-citizens and all other groups (non-Toyota citizens in 2012 and in 2015, and Toyota citizens in 2012). These findings suggest that the city's promotion of its eco-policy to its citizens was probably effective, at least to some extent. The most significant change among individual items was for Ecoful Town. The establishment of Ecoful Town was arguably a driving force in communicating the eco-policy to Toyota citizens. The idea and practice of establishing eco-towns like the Ecoful Town can be transferable and applicable to other eco-cities seeking to further promote their eco-policies.

To do so, we have some suggestions to improve citizens' awareness in the future. First, the city may wish to consider creating a promotional character (a yuru-chara).

Yuru-charas are costumed mascots, often created for public relations purposes by local governments, particularly in Japan (Weblio 2015). Kumamon, for example, is a popular yuru-chara from Kumamoto Prefecture who helps popularize local traditions and attractions. CNN (2014) reports that yuru-chara-related sales reached nearly 16 billion USD in 2012.

Establishing a smart street near Toyota City Station could increase awareness among citizens and visitors. A smart street is defined as an environment-friendly street that integrates advanced technology and services. It could use water-retentive technology, with rooftop and wall greening, and solar power. A system to inform citizens about the progress of the eco-policy (e.g., the percentage of CO_2 compared with 1990 levels) could be built as part of the smart street so that citizens can check on progress periodically.

Regarding the second study on the associations between socio-demographic factors and environmental awareness, citizens with higher education levels and middle or high household incomes tended to know more about the city's eco-policy. The city government should therefore focus its eco-awareness promotion activity on citizens without university degrees and with low household incomes. Given that environmental education (EE) is often suggested as a way to improve environmental awareness and knowledge (Ernst, Blood, and Beery, 2017; de Carvalho and Leite, 2016; Gifford and Nilsson, 2014; Hungerford and Volk, 1990; Varela-Losada, Vega-Marcote, Perez-Rodriguez, and Alvarez-Lires, 2016) and Toyota City residents without university degrees tended to know less about the city's eco-policy, the city government should target EE *at the basic level* (from primary to secondary schooling). This approach should raise eco-awareness in citizens from an early age, and they would retain this awareness into adulthood (Williams and Chawla, 2016).

Toyota City has already implemented experiential EE programs in many primary and secondary schools. Formal schooling cannot, however, directly improve awareness among citizens over the age of 18 years old. To reach a wider population, Toyota City has thus established Eco-T, where environmental literacy trainers, or "interpreters", organize a number of environmental education programs such as "designing smart houses" and "running Eco Town" plus study tours of forests and the city center for adults and children. These activities enable participants to familiarize themselves with particular aspects of the city's eco-policy. Ecoful Town is another option for experiential learning.

Although Eco-T and Ecoful Town may help to promote the city's eco-policy by providing non-formal EE, adults will only visit them if they are aware of their existence. The city government should try to reach citizens with low household incomes, as they are less aware of the eco-policy. The use of social networking sites (SNS) for outreach is one way to reach them (Camay, Brown, and Makoid, 2012; Cheung et al., 2015; Grossberndt, van den Hazel and Bartonova, 2012). SNS, particularly Facebook, are now increasingly the platform for these interactions (Lilleker, 2015). Using Facebook may therefore be an effective way to promote Toyota City's eco-policy because it can reach the population segments that are less knowledgeable about the eco-policy and those no longer in formal education.

To maximize the potential of Facebook to promote the eco-policy, we suggest that it also be used in the context of an EE classroom, or at venues such as Eco-T. Andersson and Öhman (2017) showed that young people's experiences of conversations

about environmental and sustainable issues in SNS are relevant in classroom discussions. Under the guidance of teachers, students can discuss issues related to eco-policy on the Facebook page created by Toyota City, and post their comments or solutions during class and homework time. Curricula could be designed for students to encourage their friends or family members to get involved. Students could, for example, participate in extracurricular activities such as attending eco-related events publicized using Facebook, preferably with friends, family members, and others, and then posting photos and/or comments on SNS. This would arguably help to increase the number of stakeholders, while enabling young people to broaden their recognition and understanding of the city's eco-policy. The current themes of the eco-policy do not focus on EE and/or the use of SNS. These initiatives are important to raise awareness among those who are relatively unaware of the eco-policy, but may be terminated without support. This research may provide some evidence of the significance of these initiatives as well as suggestions about combining these initiatives to promote the eco-policy.

Concerning the third study on the examination of underlying gaps between environmental knowledge and behaviors, the majority of respondents act or do no act on eco-items for economic reasons. For those who drive NGCs, they are energy- and cost-effective. Those who do not drive NGCs considered them expensive. Given that several respondents reported that they do not like the design of NGCs, car companies developing NGCs might want to work on the issue. Although more than one third of respondents knew about Ha:mo, only one respondent actually used it. The largest

obstacle for promoting Ha:mo is the fact that majority of Toyota citizens have cars in part because many of the citizens work for the Toyota Motor Corporation. This is a difficult issue to deal with. This study indicates that increasing the number of Ha:mo stations would not be a solution because few respondents reported that they did not use Ha:mo for the long distance between home and workplace. Perhaps, Ha:mo should be promoted to visitors of Toyota City, instead of Toyota citizens.

Regarding the heat island effect, barely 10% of respondents took measures, though 60% of the total respondents knew about it. The biggest reason why they knew but do not act on it is that they do not know what they can do. The city government should inform citizens of appropriate measures that they can take, such as greening (e.g., placing planters), planting trees, and watering. Similarly, the biggest reason why citizens knew but have not visited Ecoful Town is that they do not know what is there or what they can do there. The city government should inform citizens of the activities in Ecoful Town, such as driving an NGC or eating at a restaurant Hogaraka.

The top three reasons why citizens knew but do not live in the smart house are: 1) they live in an apartment or mansion, 2) they have recently purchased a house, and 3) the smart house is expensive. Like the case of Ha:mo that the majority of citizens have their own cars, it is infeasible to force those who have their own houses or rent apartments/mansions to purchase smart houses. It would be more reasonable for the city government, as suggested by previous studies, to count some renovation for energy saving and energy generating systems, such as installment of solar panels, as smart houses. Many respondents find the registration process of the eco-family card

troublesome or they simply do not know the registration process. Therefore, the city government should facilitate the registration process. Citizens should be able to receive the eco-family cards at any affiliated store or place after filling out a simple form because many citizens do not actively find or do not seek information about the eco-family card. The study also indicated the limitation of the KAB model on which this dissertation has relied and suggested that the KAB model be developed into a new model: the BAKAB model. The BAKAB model may help convince policy makers and others to encourage more citizens to have the eco-family card and enhance citizens' deeper pro-environmental behaviors.

The analytical study on promoting eco-policy suggested that internal and external factors are positive for Toyota City to promote its eco-policy: the Japanese government and the international community as well as the private sector, notably the Toyota Motor Corporation, are supportive. Yet, Toyota City's eco-policy still involves some issues in promoting citizens' awareness and behaviors related to the eco-policy. The study suggested Toyama City as an innovative eco-model city for Toyota City and other eco-cities to learn from the city how to promote eco-policy. Although Toyama City is a middle-sized city, just like Toyota City, the city has been successful in promoting eco-policy nationally and internationally by focusing on investing in a few eco-items comprising eco-policy, notably LRT, and differentiating itself from other eco-cities. Therefore, Toyota City also should focus on one or a few eco-items, such as the eco-family-card/Toyota eco-points, as it is unique to Toyota City.

In this context, the last empirical and theoretical study explored how to promote

the eco-family card/Toyota eco-points, an eco-item comprising Toyota City's eco-policy. The literature review part of the study helped identify target activities to acquire eco-points, target goods/services exchangeable for eco-points, and target populations. The study found that citizens do not seem unsatisfied with the current goods/services. Instead, citizens prioritized eco-activities, or rather, places to acquire eco-points and thus convenience over goods/services. Given a high rate of implementation start, the literature review indicates that young female may be the best target population for eco-points to be promoted. Toyota City has been working with Starbucks to involve young women to promote its eco-policy by doing eco-related workshops and other events. Eco-points can certainly be promoted at these workshops and events as well. This study also suggested that the KAB model could be further modified and developed into the BAKAB model in the context of Toyota City's eco-policy. As suggested by the respondents' comments from the interview and questionnaire studies as well as existing theories such as activation of goal-directed behavior (Aarts and Dijksterhuis, 2000) and social practice theory (Hargreaves, 2011), having the eco-family card as a first surface behavior, even without awareness, may help improve awareness, knowledge, and attitude, and lead to a deeper and more permanent behavior. Supported by this BAKAB model, it is possible to convince policy makers (e.g., the Promotion Section personnel) and promote the eco-family card that, for example, in collaboration with local real estate agencies as well as the aforesaid Starbucks, the eco-family card becomes not only incentives but social norms through enforcement/regulation for more Toyota citizens to have the eco-family card. The

BAKAB model illustrates that this surface behavior might be a critical start to promote citizens' deeper pro-environmental behavior.

7.2. Conclusion

This dissertation identified and addressed issues that Toyota City faces in promoting its eco-policy based on three empirical studies. Chapter 1 introduced the background of environmental model cities, theoretical orientation of the current research (i.e., the KAB model) as well as social marketing approaches. Since the city's designation as an environmental model city by the Japanese government in 2009, it has addressed environmental issues based on five themes (i.e., transportation, forests, the urban center industry, and public welfare and livelihood). Given that the ultimate objective of promoting eco-policy is to enhance citizens' environmental behaviors, this dissertation used the knowledge-attitudes-behaviors (KAB) model as a theoretical backbone and social marketing as a conceptual and practical framework.

Chapter 2 reviewed Toyota City's eco-policy and Toyota citizens' recognition of eco-policy. Findings suggested some evidence that the city's activities may have been effective in increasing awareness of its eco-policy among its citizens. Awareness of the city's eco-policy was significantly higher among Toyota citizens in 2015 than in 2012 and among those from elsewhere in either period. To further improve citizens' recognition of the eco-policy, suggestions such as creating the *yuru chara*, establishing the smart street, and conducting action research into the current promotion activities were made.

Chapter 3 is an analysis of associations between socio-demographic factors and eco-awareness to further explore how to raise public awareness of eco-policies. The findings suggested that education and household income are significantly associated with environmental awareness. That is, citizens with higher education and middle or high household incomes tended to know more about the city's eco-policy. To address citizens with low household incomes and without higher education, the study suggested the applied use of SNS, notably Facebook, for environmental education and as a means of informing citizens of learning opportunities provided at environmental institutes such as Eco-T and Ecoful Town.

Chapter 4 analyzed underlying gaps between citizens' environmental knowledge, attitudes, and behaviors and possible reasons why citizens act or do not act on eco-items comprising eco-policy while they are aware of them. The findings suggested that the reasons for acting or not acting on eco-items are economic, environmental, and others, but the majority of respondents act or do not act on eco-items for economic reasons. For instance, those who drive eco-cars find them energy- and cost-effective, while those who drive eco-cars do not find them expensive. The study also indicates the limitation of the KAB model and suggested exploring an applied model from the KAB model to be used in the context of Toyota City's eco-policy

Chapter 5 explored to promote the city's eco-policy with social marketing approaches. The author elaborated on marketing approaches that may be relevant to promoting eco-policy in Toyota City and employ several strategic business tools to analyze Toyota City's eco-policy. Although there are several positive aspects such as

the political and financial support from the Japanese government and the international community and the aging population, Toyota City has issues with promoting eco-policy, as many citizens do not recognize the city's eco-policy and have not changed their eco-behaviors at the socially desired level. Therefore, some of the objectives set to achieve a mission and vision is unlikely to be achieved. The case of Toyama City was discussed that the city has been successful in promoting eco-policy nationally and internationally by focusing on a few eco-items (e.g., LRT) and differentiating itself from other eco-cities. Toyama City's success may be attributed, consciously or unconsciously, to its marketing strategies to create competitive advantage: focus and differentiation. Toyota City is about the same population size as and more affluent than Toyama City, but may lack these marketing strategies.

In this context, through literature review and interview and questionnaire studies, Chapter 6 explored how to promote Toyota City's eco-policy by focusing on the eco-family card/Toyota eco-points. The literature review identified potential target activities, target goods/services, and target audience. The literature review suggests that whereas citizens are satisfied with goods/services exchangeable for eco-points, they consider activities, especially where to acquire points, important. The literature review also suggests that to further promote eco-activities including the eco-family card, young female may be the best target, given their high rate of implementation start. The interview and questionnaire studies suggest that the eco-family card has a potential to broaden the concept of Toyota City's eco-policy. In the context of Toyota City's eco-policy, this means that the development of the KAB model into the BAKAB model

for a more practical implication. The discussion on the BAKAB model supported by findings from the interview and questionnaire studies as well as the goal directed behavior and social practice theory may influence the existing theoretical framework in a unique and comprehensive way. The BAKAB model also may help convince policy makers and others for more and more citizens to have the eco-family card.

After all, despite a number of issues, Toyota City's eco-policy has a potential to be an international exemplar. Few studies so far have been conducted to assess and promote the city's eco-policy. This study makes a substantial academic and practical contribution by empirically and theoretically addressing this issue and fulfilled the existing research gap.

7.3. Limitations and agendas for future studies

There are several issues with the current research to be addressed in the future. This study has conducted analyses on the assessment of Toyota citizens' recognition, on the relationships between socio-demographic factors and Toyota citizens' recognition, and why Toyota citizens act or do not act pro-environmentally. However, this study has not fully covered the marketing part of promoting eco-policy. For instance, following the theory of BAKAB, the city's collaboration with the real estate companies to promote eco-points was suggested, but was not empirically implemented and its impact was thus not assessed during the study period. This remains to be the issue of future research. Also, this study only covers the city of Toyota. The BAKAB model was established based on the studies of Toyota people such as the directors of the Eco-life Center and

Eco-T, the personnel from the city government, Eco-T staff, and citizens. It is important to make the case of Toyota City to apply it to other eco-cities.

I therefore end this dissertation with some suggestions for future research. First and foremost, to further promote Toyota City's eco-policy, we should consider how to market it nationally and internationally. One of the feasible ways to do so is to look at other eco-cities in Japan, as suggested in Chapter 5, notably Toyama City, which is both an environmental model city (national), environmental future city, and SDGs future city designated by Japan (national), and a model city of the District Energy in Cities Initiative (SE4ALL: Sustainable Energy for All) by United Nations (international) and the Resilient Cities Initiative by the Rockefeller Foundation (international). Toyama City's eco-policy has succeeded by focusing its resources on a few eco-items, notably LRT, and differentiating it from others.

We could first conduct empirical research in Toyama City similar to that conducted in Toyota City and then moves on to examine whether they act or do not act on the eco-items comprising eco-policy such as LRT and the bike sharing services, and why they do so or they do not. We could second take a further look at how Toyama City has successfully promoted its eco-policy from social marketing perspectives. Toyota City will be able to learn from the experiences of Toyama City.

It is also important for future research to explore how surface pro-environmental behaviors can be developed into deep pro-environmental behaviors. We have identified the limitations of the KAB model in promoting pro-environmental behaviors and suggested BAKAB because habits are formed only by past behaviors (Aarts and

Dijksterhuits, 2000; Aarts, Custers, and Marien, 2008). We therefore hypothesized that since KAB lacks elements in surface pro-environmental behaviors, it may not lead to deep pro-environmental behavior through AKA. In other words, KAB may work with surface pro-environmental behaviors followed by awareness. In future research, we will test this hypothesis from practical and theoretical perspectives. Practically, we will promote the eco-family card through an upstream approach backed up by the BAKAB model and examine how citizens' eco-behaviors in relation to the eco-family card/Toyota eco-points (e.g., recycling) by analyzing changes in the use of eco-points in the long run. This practice will quantitatively indicate whether citizens engage in eco-activities in a sustainable manner.

Theoretically, threshold theory may be a supplementary model to be applied toward developing deep environmental behaviors. Although threshold theory generally assumes that individuals' behavior depends on the number of other individuals already engaging in that behavior (Granovetter, 1978), it is not only the number of others doing the act but the "point where the perceived benefits to an individual of doing the thing in question exceed the perceived costs" (Granovetter, 1978, p. 1422). Different individuals have different thresholds (each individual will calculate his or her cost and benefit from undertaking an action. A situation may change the cost and benefit of the behavior, so threshold is situation-specific), which may be influenced by various factors such as socio-economic status, education, age, personality and so forth.

In the context of environment management, Groffman et al. (2006) define ecological threshold is the point where small changes in an environmental driver

produce large responses in the eco-system. These responses can be positive and negative. Kobayashi et al. (2014) provide examples in their optimal livestock management that "ranchers operating on healthy rangeland have sufficient private incentive to maintain rangeland health, while ranchers operating on degraded rangeland will pursue rehabilitation only if treatment success rates are improved or treatment costs reduced relative to current levels" (p. 623). The former is an example of a positive response and the latter is that of a negative response.

In the context of supporting BAKAB and promoting Toyota City's eco-policy, threshold concepts can be applied to both spreading and deepening pro-environmental behaviors. To spread pro-environmental behaviors, as Granovetter (1978) notes similarity between threshold and the diffusion of information, the threshold model is often materialized through the media, including social media, for example, disseminating information that the majority of citizens already have the eco-family card and acquire eco-points through eco-activities. This way, individuals may come to be aware that they would also have to have the eco-family card and acquire eco-points through eco-activities. This practical application of the threshold model supplements BAKAB in that it helps citizens become aware of the eco-family card/Toyota eco-points instead of merely distributing and set thresholds. As Granovetter (1978) asserts, the distribution of the thresholds determines the outcome of the aggregate behavior such as environmental awareness and behaviors. The threshold model therefore helps citizens not only have the eco-family card but become aware, which may bridge BAKAB and existing AKA/KAB models (Table 7.1).

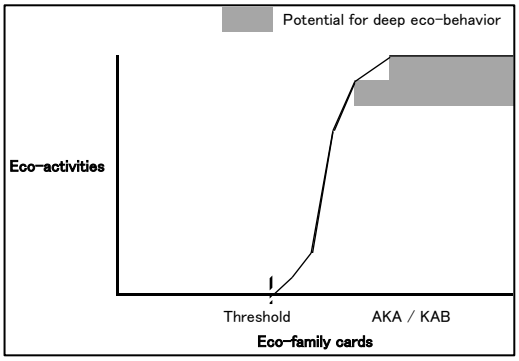

Figure 7.1. BAKAB with Threshold models

Future research will thus integrate threshold concepts into BAKAB, and test and further examine BAKAB working toward deep pro-environmental behaviors in the context of Toyota City's eco-policy by examining how citizens' eco-behaviors in relation to the eco-family card/Toyota eco-points by checking in changes in the use of eco-points.

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