

Study on Environmental Statement for Home Appliances at Online Stores in Japan

Syuichi Kubota, and Kayoko Yamamoto

Abstract—This study aims to identify the current situation and problems of environmental statement for major four home appliances (refrigerators, washing machines, air conditioners and television receivers) sold at online stores in Japan, and then to suggest how to improve the situation, through a questionnaire survey conducted among businesses that operate online stores and online malls with multiple online stores. Results of the study boil down to:

- (1) It is found out that environmental statement for the home appliances at online stores have four problems; (i) less information on “three Rs” and “chemical substances” than the one on “energy conservation”, (ii) cost for providing environmental statement, (iii) issues associated with a label and mark placement, and (iv) issues associated with energy conservation statement.
- (2) Improvements are suggested for each of the four problems listed above, and shown are (i) the effectiveness of, and need to promote, a label and mark placement, (ii) cost burden on buyers, and (iii) need of active efforts made by businesses and of dissemination of legal regulations to businesses.

Keywords—Home Appliances, Environmentally-Friendly Product, Environmental Statement, Online Store, Japan.

I. INTRODUCTION

A. Background and Objective of the Study

IN Japan corporate commitments to environmental issues are now one of competitive conditions, instead of risk management against damages that may occur, mainly caused by worsening environmental problems and change in social values. Consequently, consumers’ increasing environmental awareness and statutory regulations under laws such as the Law for the Recycling of Specified Kinds of Home Appliances (Home Appliance Recycling Law, enacted in 1998) and Law for the Promotion of Effective Utilization of Resources (enacted in 1991) in particular have urged businesses to develop environmentally-friendly products mainly for home appliances. However, consumers often do not appropriately recognize environmentally-friendly products due to lack of a system to compare environmentally-friendly products with conventional ones for differentiation, in spite of the fact that the environmental considerations for a product mostly result in higher costs under the current product development system.

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This creates uncertainties for consumers about environmental considerations given, and also leads to a vicious cycle of poor sale due to their expensive prices and slowdown of environmentally-friendly products development. Therefore, appropriate environmental statement should be provided for environmentally-friendly products that are easy to understand.

In addition, as the number of shopping websites increases in these years, more consumers compare features among similar products on those websites at their home and/or office before purchase. While an advantage of the purchase at an online store is convenience to time-poor consumers who can purchase products online without a need to visit a brick-and-mortar store, its disadvantage includes no description or advice obtained from a clerk or other staff at a store when considering purchase, unlike a brick-and-mortar store. Thus, online stores are required to provide the information effectively and efficiently.

Under the circumstances, as the development of environmentally-friendly products has advanced as stated above, and the number of online shoppers is expected to continuously increase, it is necessary to actively push forward the provision of environmental information by online stores. The electrical industry sees manufacturers’ originality and ingenuity, and has accelerated the use of a label and mark that show specific environmental performance such as energy and resource conservation and recycling, as introduced in Chapter II. According to Han [1], however, online stores provide considerably less information on environmental considerations given to products than brick-and-mortar stores. Thus, it is necessary to swiftly identify the current situation and problems of environmental statement for home appliances at online stores.

Therefore, the study aims to identify the current situation and problems of environmental statement for major four home appliances (refrigerators, washing machines, air conditioners and television receivers) sold at online stores in Japan, and then to suggest how to improve the situation, through a questionnaire survey conducted among businesses that operate online stores and online malls with multiple online stores. For the purpose of the study, an online store means the one that has a website introducing its range of products for consumer sale. Specifically, it contains websites that sell products to consumers online and online malls with their e-stores locating at one website.

B. Earlier Studies in Relevant Field and Position of this Study

The number of studies on environmental considerations given to home appliances has increased with the gradual establishment of a series of relevant legal systems. The Law Concerning the Rational Use of Energy (Energy Conservation Law, enacted in 1979), in addition to the Home Appliance Recycling Law and Law for the Promotion of Effective Utilization of Resources mentioned in Section I-A above, all requiring retailers to provide information on environmental considerations for home appliances, in particular, brought about the advent of study cases on such a theme. Earlier studies on environmental statement for home appliances are broadly divided into the ones: (i) showing development and prospects of environmental information for home appliances; (ii) on environmental statement for whole home appliances; and (iii) on environmental statement for home appliances at online stores.

One of studies (i) "clarifying development and prospects of environmental information for home appliances" in an organized way is Ueno [2] that clarifies development, before and after the enforcement of the Home Appliance Recycling Law, of and future prospects for environmental considerations as well as environmental statement and/or information provided for home appliances. Studies (ii) "on environmental statement for whole home appliances" include: a report on a pilot project of providing information on energy conservation for home appliances by Mie Centers for Climate Change Actions [3]; study by Ide and Morita [4] that examines effective provision of environmental information for the four major home appliances in accordance with consumers' needs; survey on actual production, distribution and consumption of environmentally-friendly products, etc. conducted by Bureau of Citizens and Cultural Affairs, Tokyo Metropolitan Government [5]; and research conducted by Center for Environmental Information Science [6] on manuals for a "system to provide product environmental information" designed for consumers. Studies (iii) "on environmental statement for home appliances at online stores", like this study, contain Han [1] that identifies the current situation of information provision for environmentally-friendly products by online stores through comparison with brick-and-mortar stores, and Han [7] that identifies sale and consumption of environmentally-friendly products offered by online stores as well as consumers' awareness about and attitude toward environmental information.

Thus, it can be said that the number of studies on environmental statement for home appliances has gradually increased with the establishment of a series of relevant legal systems. However, a study on environmental statement provided by online stores has been initiated only recently as the number of online store users increases, and only just begun.

C. Scope of the Study

Based on results of examining outcomes of the earlier studies listed in the previous section, the study, for going one step

further from their outcomes, focuses its scope on:

1. Online stores with growing consumer market year by year and with increasing use expected, despite their problem of less environmental statement provided than brick-and-mortar stores; and
2. Home appliances among which an environmentally-friendly design has increasingly spread because of statutory regulations, and that have a variety of environmental information and may show gradual increase in sale at online stores, so as to identify the current situation of environmental statement by item.

The study examines major four items, namely, refrigerators, washing machines, air conditioners, and television receivers, among home appliances, for detailed analysis of environmental statement for individual home appliances. Reasons to have chosen them include not only the fact that they are required to have an environmentally-friendly design as specified resources-saved and specified reuse-promoted products under the Law for the Promotion of Effective Utilization of Resources, but also the environmentally-friendly design being especially spread among them to which the Home Appliance Recycling Law applies, and advanced efforts spent on indexes of effective use of resources and on environmental statement for them.

II. CURRENT SITUATION OF ENVIRONMENTAL STATEMENT FOR HOME APPLIANCES AT ONLINE STORES

A label and mark stating environmental performance of home appliances sold at online stores include those under a system operated by administrative bodies like national or local governments, by Shadan Hojin (or association corporations) and other entities, and by a company independently. As a representative example of a label and mark used for the questionnaire survey and so on in the study, Japan Environment Association's eco mark, Ministry of Economy, Trade and Industry's uniform energy-saving label, energy-saving symbol under Ministry of Economy, Trade and Industry's energy-saving labeling system, and Japanese Industrial Standards' J-Moss green mark presenting the content of six chemical substances restricted under the RoHS directive¹⁾ are shown in Figs. 1, 2, 3 and 4, respectively.

Furthermore, as an example of attempts by online stores, Fig. 5 shows a case of how a label and mark for air conditioners are used by "Biccamera.com" online store. It provides the energy-saving symbol under the energy-saving labeling system as mentioned in the previous section as an example of environmental statement, and index on a scale of one to five stars specified in the uniform energy-saving label, for consumers' easy reference in considering purchase. Use of the label and mark mentioned above would be deemed to indicate its efforts to ensure that consumers understand how environmental considerations are given to home appliances at a glance when they consider purchase of home appliances.



Fig. 1 Eco Mark

Source: Eco-label database, Ministry of Environment ²⁾



Fig. 2 Uniform Energy-saving Label

Source: Eco-label database, Ministry of Environment ²⁾

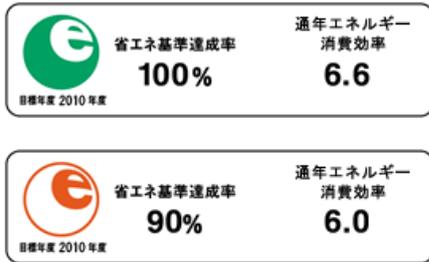


Fig. 3 Energy-saving symbol under the energy-saving labeling system

Source: The Energy Conservation Center, Japan ³⁾



Fig. 4 J-Moss Mark

Source: Japan Electronics and Information Technology Industries Association ⁴⁾

Fig. 5 Case of How a Label and Mark for Air Conditioners are used by Biccamera.com.

Source: Biccamera.com ⁵⁾

III. FRAMEWORK OF ANALYSIS AND OUTLINE OF SURVEY

A. Framework of Analysis

As stated in Chapter I, the study conducted the questionnaire survey among businesses operating an online store and online mall that deal with major four home appliances. A framework of analysis had been established that included four issues listed below, so as to clarify points to be analyzed in the results in designing and conducting the survey. Analyses 1 to 3 identify the current situation of business activities, based on results of the questionnaire survey. Analysis 4 discusses whether there is any gap between the business activities and consumers' awareness through the comparison between results of the analysis obtained in Analyses 1 to 3 and results of a survey of consumers conducted by Ide and Morita [4]. Chapter IV clarifies those four issues, and Chapter V suggests how a business should improve its environmental statement for consumers for their efficient collection of information on environmentally-friendly products at online stores, after identifying its problems.

Analysis 1: Corporate awareness about environmental information

Analysis 2: Current situation of environmental statement for home appliances provided by online stores

Analysis 3: Corporate future intention toward environmental statement for home appliances

Analysis 4: Gaps between business activities and consumers' awareness

B. Outline of Questionnaire Survey

Businesses that operate an online store and online mall vary greatly in size, from large-scale to tiny companies with only a few employees. It is impossible to identify all small-sized businesses, from which we probably will not be able to obtain a response to the survey due to their not-much-sufficient manpower. Therefore, specific businesses were chosen for the survey that would allow identification of different corporate attributes and would have a great impact on consumers, as follows:

- (1) Thirty-nine companies with an online store that sells any of the four major home appliances were chosen from 89 companies, in total, of top 49 home appliances retail stores and top ten companies in each relevant industry based on the sales ranking in the "Electric Household Appliance Marketing Data (2007 edition)" [8].
- (2) Another 22 companies mainly involved in online sale were chosen, after investigation of top companies in each item for the four major home appliances according to the store ranking by Kakaku.com⁶⁾ as of November 19, 2008.
- (3) Four companies operating an online mall were chosen that had turnover accounting for more than 90% of the whole market.

The questionnaire survey was conducted among 38 out of 65 companies chosen as described above that allowed us to send them our questionnaire. Valid responses were obtained from 13 companies, resulting in the valid response rate of 34.2%. The

questionnaires were sent and collected by mail from October 17 to December 26, 2008. The questionnaire mainly contains the following three sections. Section (iii) in particular asks about a desirable way to provide environmental information and about their future intention as to environmental statement after presenting consumers' needs for environmental information based on results of the survey conducted by Ide and Morita [4].

- (i) Corporate awareness about environmental information
- (ii) Current situation of environmental statement for home appliances provided by online stores
- (iii) Corporate future intention toward environmental statement for home appliances

IV. ANALYSIS OF QUESTIONNAIRE SURVEY RESULTS OUTLINE AND RESULTS OF SURVEYS

A. Corporate Awareness about Environmental Information

Fig. 6 summarizes answers to questions related to corporate awareness about environmental information. Answers to be chosen by the respondents are "necessary", "rather necessary" and "unnecessary", on an individual basis for "energy conservation", "three Rs" or "reduce, reuse and recycle", and "chemical substances". With regard to "energy conservation", over 60% of the respondents, the largest number, answered "necessary", highlighting the need of statement. For "three Rs" and "chemical substances", the most common answer is "rather necessary", demonstrating that their need is less strongly recognized than that of "energy conservation". More than 80% of the respondents chose "necessary" or "rather necessary", with a minority answering "unnecessary", for all of the three issues in the environmental information section, showing that a majority of businesses recognize the need of environmental statement.

Next, reasons why they chose their answers are sorted out, on an individual basis for "energy conservation", "three Rs", and "chemical substances". Many reasons why they answered that information on "energy conservation" was "necessary" or "rather necessary" concern consumers' interest, including "because of increasing consumers' interest". This would mean that most businesses generally have determined consumers' needs for information on "energy conservation". Some of the other reasons mentioned concern the response to an environmental problem such as "CO₂ reduction", "for protection of global environment", and "being committed to environmental issues as corporate philosophy or business policy". One of reasons why they answered "unnecessary" is "It is inefficient to provide energy conservation statement at individual stores. Statement of specifications by a manufacturer would suffice". This reveals a problem that basic specifications made public by home appliances manufacturers do not include energy conservation information.

Reasons why they answered that information on "three Rs" were "necessary" or "rather necessary" indicate that a large number of businesses consider that needs for environmental

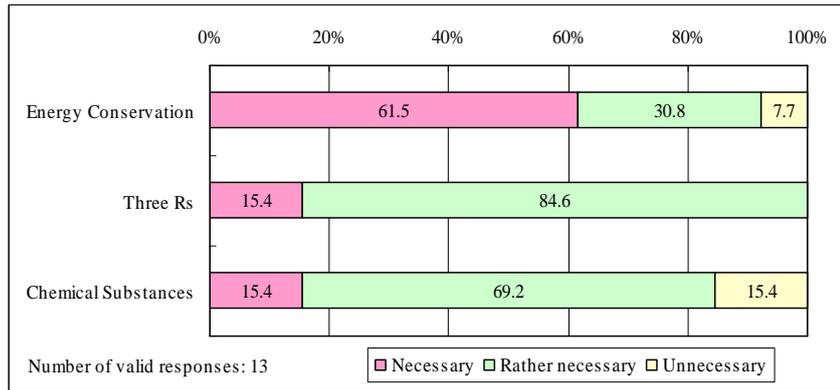


Fig. 6 Corporate Awareness about Environmental Information

TABLE I
CURRENT SITUATION OF ENVIRONMENTAL STATEMENT FOR HOME APPLIANCES AT ONLINE STORES (%)

Type of Environmental Information for Home Appliances	Television Receivers (11 responses)	Refrigerators (7 responses)	Air Conditioners (8 responses)	Washing machines (7 responses)
Uniform energy-saving label	0.0	14.3	12.5	—
Information on ozone layer protection such as CFC free	—	14.3	12.5	—
Green mark for energy-saving standard achievement rate of 100% under the energy-saving labeling system	0.0	0.0	0.0	—
Orange mark for energy-saving standard achievement rate of 90% or higher under the energy-saving labeling system	0.0	0.0	0.0	—
Power consumption information	72.7	85.7	100.0	85.7
Information on the annual power consumption in terms of yen	27.3	42.9	62.5	57.1
Resource conservation information for a product and its packaging materials	9.1	0.0	0.0	0.0
Description of environmental information, label and mark	18.2	14.3	12.5	0.0
Information on water conservation	—	—	—	57.1
Energy saving standard achievement rate	0.0	0.0	12.5	—
Information on recycling rate of product	0.0	0.0	0.0	0.0
J-Moss green mark	0.0	0.0	0.0	0.0
J-Moss content mark	0.0	0.0	0.0	0.0
Information on compliance with the Green Purchasing Law	0.0	0.0	0.0	0.0

considerations are still low while consumers' interest in them increase. Reasons why they deemed information on "chemical substances" "necessary" or "rather necessary" show, like information on "three Rs", that a large number of businesses consider that needs for environmental considerations are still low while consumers' needs are increasing. Reasons why they mentioned "unnecessary" include a problem that provision of statement involves some cost in spite of a low degree of interest among consumers.

B. Current Situation of Environmental Statement for Home Appliances at Online Stores

Table I shows results of the survey on the current situation of environmental statement for home appliances at online stores. The questionnaire was designed to answer separately for television receivers, refrigerators, air conditioners and washing machines that are major four home appliances. The top answer is "power consumption information" for environmental information with regard to "energy conservation", with 100%

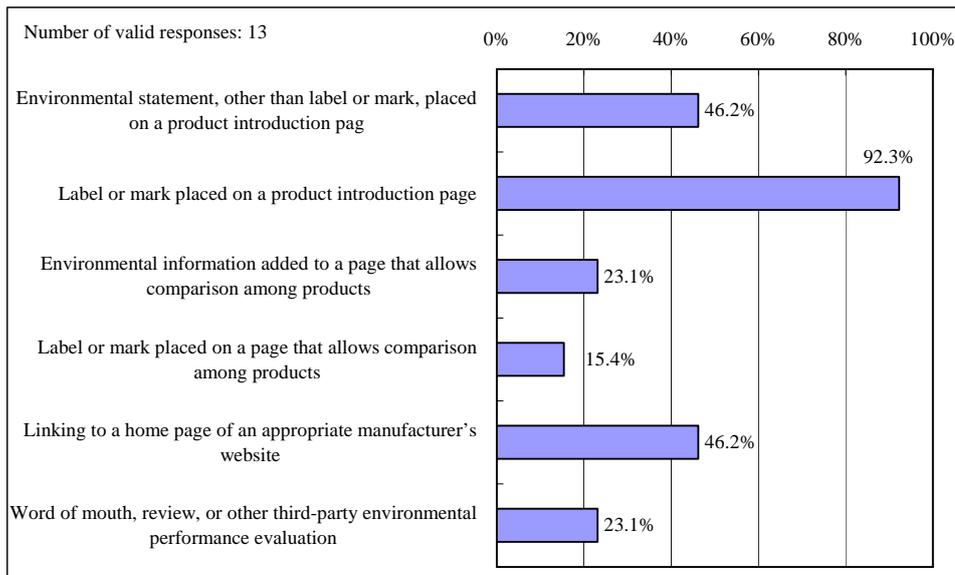


Fig. 7 Desirable Way to Provide Environmental Information (check-all-that-apply type question)

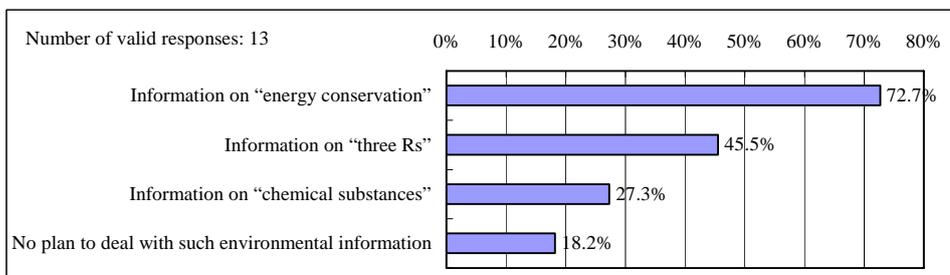


Fig. 8 Corporate Future Intention toward Environmental Statement (check-all-that-apply type question)

for air conditioners. A lot of the respondents provide "information on the annual power consumption in terms of yen", with some 63% for air conditioners. As for a label and mark, however, a few respondents put a "uniform energy-saving label (Fig. 2)" for refrigerators and air conditioners while none of them place an "energy-saving label under the energy-saving labeling system (Fig. 3)". In respect of environmental information related to "three Rs", only one respondent provides "resource conservation information for a product and its packaging materials" for television receivers. None of the respondents provide "information on recycling rate of product". The questionnaire contains a question about "information on water conservation" solely for washing machines. Over half of the respondents (about 57%) provide the information, less than "energy conservation". Only a few respondents provide environmental information with regard to "chemical substances. The number of respondents that offer "information on ozone layer protection such as CFC free" is one each for refrigerators and air conditioners. Furthermore, none of the respondents insert a J-Moss mark (Fig. 4) that shows whether any chemical substance with high environmental load is contained. These highlight that information on "energy conservation" is more likely to be

provided while the one on "three Rs" and "chemical substances" is less likely to be offered, and that labels and marks mentioned in Chapter I are seldom inserted.

C. Corporate Future Intention toward Environmental Statement for Home Appliances

The respondents' answers about a way to provide environmental information are summarized in Fig. 7. Around 92% of the respondents regard "label or mark placed on a product introduction page" as a desirable way, followed by both "environmental statement, other than label or mark, placed on a product introduction page" and "linking to a home page of an appropriate manufacturer's website" being chosen by some 46%. Based on these, one can predict that businesses are likely to use a label and/or mark when considering introduction of new environmental statement in the future while few respondents employ a label or mark as a way to provide environmental information at online stores at present.

Fig. 8 shows, on an individual basis for "energy conservation", "three Rs" and "chemical substances", results of a question about the intention to deal with such information at their online stores in the future. A few respondents, answering necessary" or "rather necessary" to the question regarding

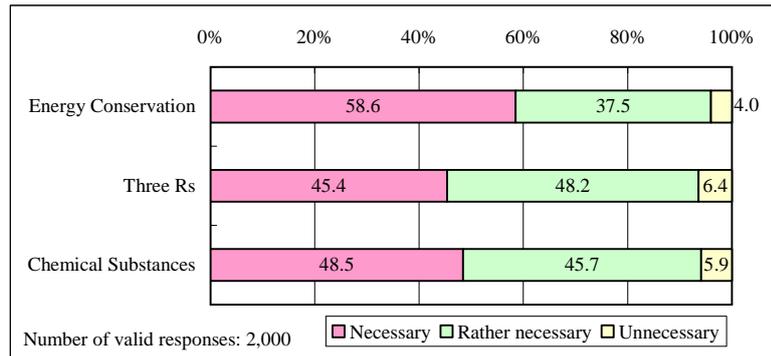


Fig. 9 Consumers' Awareness about Environmental Statement
Source: Ide and Morita [4]

corporate awareness about environmental information in Fig. 6, "intend to deal with such environmental information in the future. Again, this reveals that they are eager to provide information on "energy conservation" while being less eager to offer the one on "three Rs" and "chemical substances".

D. Gaps between the Business Activities and Consumers' Awareness

1) Gaps in Environmental Information

Fig. 9 demonstrates awareness about environmental statement shown by results of a consumer survey according to Ide and Morita [4]. Over 90% of the respondents answered "necessary" or "rather necessary" for all the three issues, showing that most consumers want environmental statement for products. More detailed comparison between corporate (in Fig. 6) and consumers' (in Fig. 9) awareness about environmental information indicate that they are similar in awareness about "energy conservation". However, there is a large difference in awareness about "three Rs", with about 80% of the businesses and 50% of the consumers answering "rather necessary". With regard to "chemical substances", some 70% of the businesses and 50% of the consumers chose "rather necessary". Based on those results of the comparison, one can presume that businesses underestimate information on "three Rs" and "chemical substances" while consumers deem such information important.

2) Gaps between Current Situation of Environmental Statement at Online Stores and Consumers' Awareness

Ide and Morita [4] points out that consumers want environmental information that allows comparison among products in the same category, including 1) ranking that shows the degree of environmental considerations on a several point scale using, for example, star rating, 2) information in terms of yen, such as electricity rate, and 3) list that enables comparison among products. However, as shown in TABLE I, "information on the annual power consumption in terms of yen" is the only environmental information that meets those consumers' needs at present. This demonstrates a gap between the current situation of corporate environmental statement and consumers' needs, which should be improved in the future.

3) Gaps between Corporate Future Intention toward Environmental Statement and Consumers' Awareness

According to Ide and Morita [4], as stated above, consumers want environmental information that allows comparison among products in the same category. On the other hand, the answer chosen by the largest number of the respondents as a desirable way to provide environmental information is "label or mark placed on a product introduction page" as shown in Fig. 7. Thus, a specific label and mark are considered to be the most effective way to provide environmental information at online stores that have some standard common to relevant manufacturers, and present star rating on a several point scale and/or numerical data such as yen amount.

As for information on "energy conservation", an index and labeling system have already introduced that allow comparison among manufacturers, and in fact an energy-saving symbol and uniform energy-saving label are in use. There is a J-Moss mark for information on "chemical substances". However, as shown in TABLE I, only a few online stores use the label, symbol or mark. It is necessary to urge businesses to use, and provide environmental information to be contained in, them.

As shown in Fig. 9, as for consumers' awareness about environmental statement, over 90% of the respondents answered "necessary" or "rather necessary" for all the three issues of "energy conservation", "three Rs" and "chemical substances". Taking into consideration the corporate future intention toward the environmental statement for home appliances, improvements suggested in Chapter V below would be required for realization of environmental statement that will meet consumers' higher needs, although online stores are expected to improve their environmental information for home appliances in the future. Improvements of environmental statement for "three Rs" and "chemical substances" presented in the next chapter would be particularly important.

V. PROBLEMS AND IMPROVEMENTS OF ENVIRONMENTAL STATEMENT AT ONLINE STORES

A. Identification of Problems

This chapter identifies the following four problems concerning environmental statement at online stores, according

to an analysis of results of the questionnaire survey from four perspectives in the previous chapter.

1) *Less information on “three Rs” and “chemical substances” than the one on “energy conservation”*

Results of the analysis in Section IV-A highlight less information on “three Rs” and “chemical substances” than the one on “energy conservation”. In accordance with results of the analysis in Section IV-B and open-ended answers to questions in the questionnaire, possible reasons for this are:

(1) Reasons based on the voices of corporation

A few respondents mentioned “inability to determine consumers’ needs for environmental information” as an issue to be solved, indicating that they have generally determined consumers’ needs for environmental information. It is presumed that they recognize “energy conservation” as environmental information of principal concern to consumers, and that they provide more environmental information on “energy conservation” accordingly. On the other hand, they may not completely determine or regard as low, consumers’ needs for “three Rs” and “chemical substances”. An answer of “lack of environmental information” would mean that environmental information on “three Rs” and “chemical substances” may be difficult to obtain while that on “energy conservation” are readily available. The information on “three Rs” and “chemical substances” would be difficult to provide online due to its huge volume of data and no common standard established, according to voices of “data preparation involves too much time because of excessively huge data volume”, and “there is no standard common to relevant manufacturers”. Answers of “lack of space for information” and “unable to afford to provide environmental information” indicate that they do not have enough space to place environment information on “three Rs” and “chemical substances” on top of the one on “energy conservation” highly needed by consumers and subject to statutory regulations, and can not afford to do so in terms of expense as well as human resources and time.

(2) Reasons concerning environmental statement

As the Energy Conservation Law stipulates that retailers should be committed to providing energy consumption and other information, environmental information on “energy conservation” abounds. In addition, the uniform energy-saving label system has databases provided by Ministry of Environment and other bodies, allowing home appliances retail stores and consumers to output what is contained in the label. This would be convenient to businesses.

2) *Cost for providing environmental information*

Detailed examination of results of the analysis in Section IV-B by type of sale and by scale finds that businesses with a sale type of specializing in online sale or online mall and with employees of 300 or less constitute a large portion of the respondents that answered “unable to afford to provide environmental information”. One can expect that stores specializing in online sale that enables small-scale operations, and businesses, even if being large in scale, of which core product is not home appliances, will not actively promote information provision unless the present situation changes.

Costs for providing environmental information are now borne solely by home appliances manufacturers and distributor firms.

3) *Issues associated with label and mark placement*

While results of the analysis in Section IV-B highlight the fact that only a few respondents use a label or mark at their online stores, results of the analysis in Section IV-C demonstrate that more than 90% of the respondents regard a label and mark desirable. Based on results of the analysis in Section IV-A and open-ended answers to questions in the questionnaire, the possible reasons for this are as follows: An answer of “lack of environmental information” would indicate that the reason is lack of an appropriate label or mark. In other words, there is no label or mark that is appropriate to use at online stores, or it is difficult to obtain a label or mark that they want to use. Additionally, as a voice of “data preparation involves too much time due to excessively huge data volume” presents, lack of time to organize data due to environment information that is too complicated, and too many labels and marks may be the reason. Therefore, it is required to consider unification of “overflowing” labels. According to answers of “lack of space for information” and “unable to afford to provide environmental information”, the reasons would include difficulty in placing because of excessively large size of current labels and marks, and various costs for placing labels and marks as stated in 1) of Section V-B below, resulting in non-placement.

4) *Issues associated with energy conservation statement*

Results of the analysis in Section IV-B reveal that a few online stores provide energy conservation statement although those statements such as a uniform energy-saving label are required by the Energy Conservation Law as revised. The revised law stipulates that electrical equipment and other retailers should be committed to providing energy conservation information to consumers. Specifically, the Energy Saving Subcommittee developed, and adopted at its eight meeting in July 2006, a guideline containing the uniform energy-saving label with a rating on a several point scale, commitments to be made by retailers, and other issues. Subsequently, in August 2006 commitments to be made by retailers were published as “measures to be committed to by entities with a retail business of machinery and/or equipment that consume energy”, and it was determined to implement the uniform energy-saving and other labeling by retailers in October 2006. Mie Centers for Climate Change Actions (2005) also points out the effectiveness of the energy-saving label and a problem that brick-and-mortar stores do not use the label, and mentions, as a reason for it, the fact that a few businesses use any label and mark, highlighting that the uniform energy-saving label is not commonly used.

B. *Suggestion of How to Improve*

Based on the analysis of the questionnaire survey results from the four perspectives in the previous chapter, suggested are the following improvements for the four problems concerning environmental statement at online stores:

1) *Less information on “three Rs” and “chemical substances” than that on “energy conservation”*

For the problem of less information on “three Rs” and “chemical substances” than that on “energy conservation”, reasons boil down to: (i) difficulty in obtaining information; (ii) no space for environmental information; (iii) inability to afford to provide information; (iv) huge data volume, and (v) no common standard for information established. Response to all the reasons will require placement of summarized information on “three Rs” and “chemical substances”. To that end, a label and mark would be effective.

With regard to labels and marks containing information on “three Rs” and “chemical substances”, like the major four home appliances that are the subject of the study, advanced efforts have been undertaken for computers that have environmental information related to “energy conservation”, “three Rs” and “chemical substances”. They include use of an eco-mark (Fig. 1) and PC green label. Their accreditation involves evaluation of environmental loads for “energy conservation”, “three Rs” and “chemical substances”. It would be necessary to devise a label and mark with an evaluation axis such as “three Rs” and “chemical substances” mentioned above for the major four home appliances in the future, so as to meet consumers’ high needs.

2) *Cost for providing environmental information*

It is considered that “inability to afford to provide information” is basically a problem to be solved by individual corporate efforts. Closer examination of the questionnaire survey results by company size, however, shows that the respondents unable to spend sufficient money have a small number of employees. Thus, a specific mechanism would be necessary that reduces costs for providing environmental information. For example, retailers’ costs reduction will be realized if manufacturers provide environment information, in addition to basic specifications like products’ prices and size. This will enable manufacturers to offer environmental information directly to consumers. Without any established rule common to relevant manufacturers for environmental statement, however, they may not actively offer environmental information unless they attempt to publicize their environmental considerations, highest degree among products with the same function, as a feature of that product.

Additionally, one of possible improvements is use of a label and mark containing information on “energy conservation”, “three Rs” and “chemical substances”, like the one in (1) above. This will allow placement of a label containing summary of complicated environmental information, and will save online stores from collecting information. Furthermore, environmental information tends to be regarded as the one to advertise a product by manufacturers, and costs for it have been borne by them as a matter of course. Looking ahead, however, it is necessary to deem costs for providing environmental information as social costs for forming a sound material-cycle society, and to consider sharing of the costs among manufacturers, retailers and consumers.

3) *Issues associated with label and mark placement*

A large number of the respondents regard the use of a label and/or mark desirable. It is presumed that businesses consider that they are highly needed by consumers. Given the fact that only a few online stores actually use them, their active utilization should be pushed forward. Mie Centers for Climate Change Actions (2005) confirms the effect of the energy-saving symbol and uniform energy-saving label. Acceleration of their use would be particularly effective. When it is difficult to use them due to space or other problems, it would be desirable to focus on, and provide, an important portion of environmental information on a website in a manner that will allow easy comparison with similar products, like the case of Biccamera in Fig. 5.

4) *Issues associated with energy conservation statement*

A few online stores provide energy conservation statement such as a uniform energy-saving label required by the Energy Conservation Law as revised in 2006. This is subject to statutory regulations, and ensuring the energy conservation statement requires adequate dissemination of relevant legal regulations to businesses, in addition to active efforts made by businesses themselves.

VI. CONCLUSION AND TASK FOR FUTURE STUDY

Conclusions of the study boil down to:

1. It is found out that environmental statement for home appliances at online stores has four problems; (i) less information on “three Rs” and “chemical substances” than the one on “energy conservation”, (ii) cost for providing environmental statement, (iii) issues associated with label and mark placement, and (iv) issues associated with energy conservation statement.
2. Improvements are suggested for each of the four problems listed above, and shown are (i) the effectiveness of, and need to promote, a label and mark placement, (ii) cost burden on buyers, and (iii) need of active efforts made by businesses and of dissemination of legal regulations to businesses.

Tasks for a future study include increase in the number of respondent businesses to be surveyed so as to identify a trend of stores participating in an online mall and those operated by home appliances retail stores by type of sale, for suggestion of improvements suitable for each type. Additionally, a well-thought-out method of survey should be developed to conduct more detailed survey also on small-sized businesses with not-much-sufficient manpower, in order to suggest measures to place efficient environment statement at online stores.

NOTES

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