【研究ノート】

Two-Phase Decision-Making Model of Enviormental Conscious Behavior and Its Application for The Waste Reduction Behavior

環境配慮行動の２段階モデルとごみ減量行動への応用

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日本語要旨：

本研究の目的は，省エネ行動，リサイクリング，その他の環境配慮行動に関する研究を概観したうえで，環境配慮行動の２段階モデルを提案し，そのモデルによってごみ減量行動の規定因を説明することである．２段階モデルは，環境配慮行動の実行までは２つの段階をたどること，すなわち環境に優しい生活を送りたいとの目標意図の形成の第一段階と，それに続く個別の環境配慮行動の行動意図を形成する第２段階からなることを仮定している．ごみ減量行動の社会調査結果はこのモデルによって説明しうることを確認した．

SUMMARY

The purposes of this study are to review relevant researches on energy conservation, recycling, and other environment conscious behaviors, to propose a two-phase decision-making model of environment conscious behabior, and to explain the determinants of waste reduction behaviors based on our model. The model consists of two phases; the first phase of forming a general goal intention to live proenvioronmental lifestyle and the latter phase of forming a behavior intention to choose a specific environmental behavior. Survey results of waste reduction behaviors could be explained successfully by this model.

Key words

Environmental conscious behavior, two-phase decision-making model, waste reduction

1. Introduction

An environmental friendly attitude does not necessarily lead to environmental conscious behavior. Despite the environmental friendly attitude, or a contributive attitude to environmental protection, many people actually take a resources-wasteful behavior that

imposes heavy burden on the environment. This means that there must be another factors rather than the environmental friendly attitude, which determine one's behavior. Those factors that influence one's choice of environmental conscious behavior are not yet fully identified. Although various factors associated with the environmental conscious behavior are now being classified in the domains such as energy saving or recycling efforts, researchers are not concerted in their view on the important factors. Moreover, no comparison has been made between the determinants of environmental conscious behavior across the domains such as household wastewater problem, garbage problem, and energy problem. Now I would like to propose a general model that can equally explain the environmental conscious behavior. Then I would like to apply this model to waste reduction behavior and determine whether the behavior is explicable by the model or not.

2. Characteristics of the previous models for environmental conscious behavior

The psychological study of environmental conscious attitude and behavior has begun with the energy saving efforts after the oil crisis. Since then, with the growing social attention to general environmental problems, the subject area of the research has been expanded to include different cases such as garbage problem. While many research results have been accumulated, a few models were proposed in oreder to explain the determinants for environmental conscious behavior. I herein take up four major models that explain environmental conscious behavior to compare the characteristics.

Based on the major decision making theories of social psychology, each model targets individual cases of environmental conscious behavior such as energy saving and water saving. However, as these models differ in their supposed factors as determinants for the environmental conscious behavior, they can be broadly divided into two groups: One is for models focusing on the facilitative factors that motivate the environmental conscious behavior. They assume that motivation to avoid damage by environmental problems and sense of responsibility for the environmental pollution can be the major determinants for the behavior. The other is for models focusing on the restricting factors that control environmental conscious behavior. They assume that direct evaluation on the environmental conscious behavior is the major determinants for such behavior, in which each behavior is examined for whether it is disadvantageous to private benefits such as comfort, or whether it is complied with the social norm of the reference group.

Honnold & Nelson (1979)[1] explains consumers' energy-saving behavior under energy crisis based on the conflict decision theory (Janis & Mann, 1977[2]), by characterizing energy saving efforts as coping behavior against emergency situation. They identify two determinants for energy saving behavior: one's perception of seriousness of the energy situation under which one's daily life may be affected, in other words, a sense of crisis. The

other determinant is one's perception of effectiveness of the energy saving efforts as a countermeasure, in other words, a sense of efficacy. The figure 1 shows this model in a schematic form.

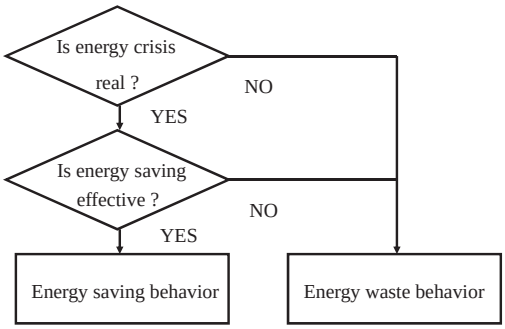

Fig. 1 Honold & Nelson's model for energy saving

Van Liere & Dunlap (1978)[3] presume that an environment protection behavior is pro-social behavior which contributes to overall social benefit and that it is motivated by personal norm. They explain refuse incineration in a backyard in a residential district, based on norm activation theory (Schwartz, 1977[4]) for the helping behavior. They suppose if one is aware of the polluted air in the neighborhood and feels a sense of responsibility to the air pollution in incinerating garbage, he/she will refrain from garbage incineration as the personal norm activates, warning him/her not to pollute the air. Figure 2 shows the outline of this model.

Both two models assume decision making scenes where an active attitude for commitment in environment and resource protection activities as well as its awareness are created by orienting individual attention to the seriousness of the environmental problems. This perhaps accounts for the fact that influence

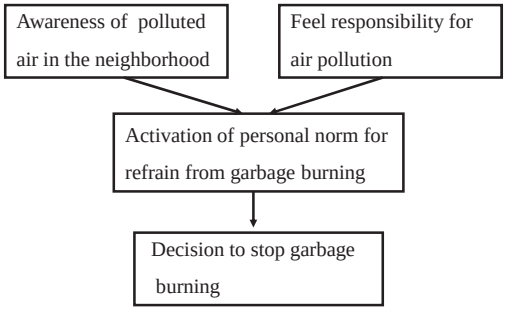

Fig. 2 Van Liere & Dunlap's norm-activation-model for garbage burning behavior

from other people's norm or evaluation of costs associated with the environmental conscious behavior are excluded from factors, although they are naturally considered in the decision making scenes where one determines whether he/she should take environmental conscious behavior or not. Therefore, these models may be able to explain the environmental friendly attitude that is one of the major determinants for behavior, but not the environmental conscious behavior itself.

On the contrary, the following two models give greater importance to factors that directly control the environmental conscious behavior.

McClelland & Canter (1981)[5] think that energy consumption behavior is controlled by the action reinforcer. They classify the reinforcer of consumption behavior into three categories of behavior consequences; private benefit, private cost, social cost. Based on the social trap model (Cross & Guyer, 1980[6]), they further presume that evaluation of the behavior consequences such as private benefit or cost including comfort and trouble immediately following the energy consumption action is the major determinant. As the social cost (environmental pollution) is the late-appear-

ing behavior consequence, evaluation of the environmental effect cannot be the major determinant for the behavior. Figure 3 shows the outline of this model.

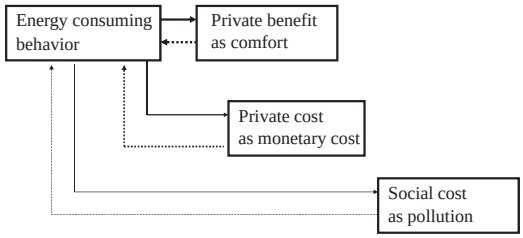

Fig. 3　McClelland & Canter's social trap model for energy consuming behavior

Seligman & Ferigan (1990)[7] presume that consumption behavior allows people to rationally choose an action that maximizes the expected benefit. Based on the reasoned action theory by Fishbein & Ajzen (1975)[8], they claim that the determinants of energy and water consumption behavior are the attitude toward the behavior and the subjective norm for behavior. For example, it is highly likely that someone saves energy or water only when he/she will not have a significant damage on the private benefit by this action, or when he/she may receive social sanction from the reference group by a wasteful action. Figure 4 shows this model in a schematic form.

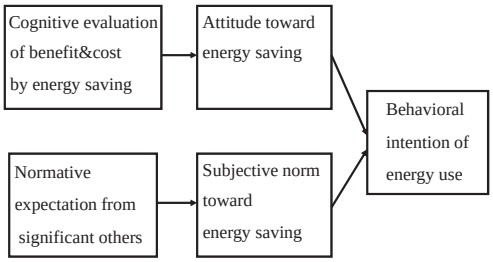

Fig. 4　Seligman & Ferigan's reasoned action model for energy and water consuming behavior

These two models described above assume individual consumption scenes where one's attention is oriented to selection between environmental conscious behavior and resource wasteful behavior, giving greater importance to factors directly related to one's action. However, they cannot rationalize a consumer who takes actions according to the environmental friendly attitude while knowing his/her environmental conscious behavior would damage his/her private benefit, since these models did not incorporate the process of how an environmental friendly attitude grow.

These two types of models are mutually complementary as they look at two different levels of factors – one for general attitudes and the other for specific actions – while they shed light on the linkages between factors and their determinants. Perception of environmental problems including recognition of environmental crisis and its responsibility or sense of effectiveness of countermeasures is the factor primarily related to developing environmental friendly attitude. On the other hand, evaluation of private benefits and costs or evaluation of social norm is the factor primarily related to the individual environmental conscious behavior. The sequence of a process in which one realizes the seriousness of the environmental problem and carries out a specific behavior can be divided into two phases: development of an attitude and execution of an action.

3. Two-phase model for environmental conscious behavior

Based on those preceding models, I shall introduce a general model for the factor linkages between the environmental behavior and its determinants (hereinafter "the general model") (Hirose, 1994[9]). Figure 5 shows the outline of the idea. I presume that the decision making process before an action can be divided into two phase: the first phase is up to the development of an environmental friendly attitude and the second phase is up to the execution of an environmental conscious action. Based on this presumption, it shows a linkage between an attitude and its determinants as well as a linkage between an action and its determinants.

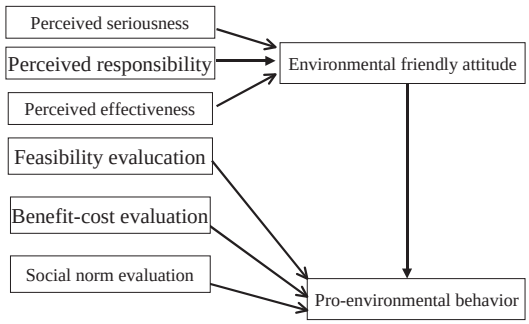

Fig. 5 General model of pro-environmental behavior（Hirose, 1994）

3.1 Development of environmental friendly attitude

A contributive attitude that one takes toward an environmental problem such as garbage problem and global warming is to be called herein environmental friendly attitude. The primary factors to determine whether one should take an environmental friendly attitude or not can be classified as perceptions of three aspects of the particular environmental problem at issue.

One of the environmental perceptions is the recognition of the seriousness of an environmental problem and the awareness of an environmental crisis to foresee the probability of such problem, in other words, a sense of crisis. The more one recognizes the seriousness of an environmental problem, the more he/she wants to take a contributive attitude to do something about that problem.

The second perception of environment is the recognition of the locus of responsibility to know who or what is the cause for that particular environmental pollution or destruction, in other words, a sense of responsibility. For example, if one strongly feels responsible for the environmental pollution, he/she all the more tends to take an environmental friendly attitude.

The third environmental perception is the recognition of validity of a countermeasure to solve the environmental problem, in other words, a sense of effectiveness. One will have a greater sense of effectiveness of a countermeasure when he/she can deem that the problem such as a local garbage problem is solvable by his/her efforts along with other people, than when one feels that the individual commitment to addressing the global warming has almost no effect.

As stated above, one needs to go through three checkpoints of environmental perception in order to reach the waypoint, which is the development of an environmental friendly attitude. Having this attitude may be referred to as acquiring a driving motor to activate the

environmental conscious behavior related to such attitude.

3.2 Execution of environmental conscious behavior

The latter half phase is up to execute a behavior in accordance with the environmental friendly attitude in actual act scenes such as recycling of bottles and cans. The decision on whether to take an action or not is affected by the evaluation of the behavior from three different aspect.

The first issue to be brought up is the evaluation of the feasibility of a behavior. In order to allow environmental conscious behavior to be carried out, credit must be given for one's knowledge and skills that are required for the behavior, or an external system and mechanism for the behavior to be taken must be considered as being in place.

The second behavior evaluation is the benefit and cost evaluation of the consequences brought by the behavior. One estimates how much his/her current convenience or comfort would be damaged by changing to the environmental conscious behavior. If one's benefit loss and cost increase are great when he/she changes to the environmental conscious behavior, he/she will refrain from behaving environmental consciously.

The third behavior evaluation is the social norm evaluation of the behavior, which means to rate the behavior according to the norm and expectations of the reference group. One may behave environmental consciously by considering the influence from subjective norm, even though he/she does not have an environmental friendly attitude.

One must jump over three hurdles – evaluation of the behavior from its three aspects – before reaching a goal of executing individual environmental conscious behaviors.

3.3 Characteristics of the decision making of environmental conscious behavior

The reason for dividing decision making into two phases is due to the three characteristics in environmental conscious behavior. Firstly, in most cases, the time point of developing an environmental friendly attitude disaccords with that of deciding and executing an environmental conscious behavior. Secondly, in order to put an environmental friendly attitude into action, one need to take various environmental conscious behaviors associated with that particular attitude. Thirdly, as the consumption behavior pursues primarily convenience and comfort, the environmental friendly attitude is only a secondary target. Therefore an environmental friendly attitude is not always recalled in any consumption scene. All these characteristics suggest that attitude and behavior do not necessarily accord with each other.

4. Application of the general model to wastes reduction behavior

This general model is subject to examination into whether it is able to explain the relation between environmental conscious behavior in an individual environmental problem case and its determinants. There are several previous studies (Yamakawa, Kamishita, Miyamatsu, Terashima, 1996[10];

Matsui, Ohsako, Tanaka, Hata, Kakisaki, Fujinami, 1997[11]; Nonami, Sugiura, Ohnuma, Yamakawa, Hirose, 1997[12]) in which this model was applied to adults' garbage reduction behavior or recycling behavior, however, this paper gives a report of the results of our survey research conducted on the garbage reduction behavior (Yorifuji & Hirose, 2002[13]). I will herein examine to what extent this general model can explain both adults' and children's garbage reduction behavior.

4.1 Sample of the survey research

A questionnaire survey was conducted for 914 people in 457 groups of children ranging from 4th to 6th graders and their parents in two elementary schools in Nagoya city. After teachers have asked parents to take a survey of their garbage and recycling practice conducted by parents and children, they passed questionnaire sheets for adults and children with an envelope to the children. At home, parents and children separately wrote answers to the questionnaire sheets, and then put them into the envelope to give it back to the teacher through children. All the questions were answered anonymously and collected in sealed envelop. The valid respondents ratio was 77% and the proportions of each sex and grade of the children were almost even.

4.2 Measures for garbage reduction behavior and its determinants

4.2.1 Measures for garbage reduction behavior

Ten questions for children's garbage reduction behavior and thirteen questions for adults were asked on five point scale of 1 ("very rare") to 5 ("always"). The means of ten questions for children's garbage reduction behavior was 2.79 (α=.64) and that of thirteen questions for adults' garbage reduction behavior was 3.27 (α=.77).

4.2.2 Questions about environmental perception

The three perceptions of the garbage problem – a sense of crisis, a sense of responsibility, a sense of effectiveness – were asked to children with three questions for each item and to parents with four questions for each item on a scale of 1 ("do not agree") to 5 ("agree"). Factor analysis was made to children's nine questions and parents' twelve questions and one inappropriate question for children and two such questions for parents were excluded before conducting the revised factor analysis. The result showed that there were three factors of children's environmental perception, which were interpreted as follows: the first factor is the sense of effectiveness (α=.63), the second factor is the sense of crisis (α=.61), the third factor is the sense of responsibility (α=.42). Assigning three factors for parents' environmental perception was also considered as reasonable and they were interpreted as follows: the first factor is the sense of crisis (α=.80), the second factor is the sense of effectiveness (α=.72), the third factor is the sense of responsibility (α=.45). Factor scores were used for the measures of environmental perception.

4.2.3 Questions about garbage reduction attitude

The following two questions about waste reduction attitude were asked to parents and children on a 5-scale: "I want to do my best not to create waste", and "I will pay attention to reduce garbage as much as possible". The means for two questions about children's garbage reduction attitude was 4.25 (α=.80), the average for parents was 4.40 (α=.70).

4.2.4 Questions about behavior evaluation

Three behavior evaluation items for garbage reduction behavior – a sense of feasibility, a sense of burden, a sense of norm – were asked to children with two questions for each item and to parents with three questions for each item on a 5-scale. After the factor analysis, inappropriate question to parents was excluded and another factor analysis was newly conducted. The results showed that there were two factors for children, which were interpreted that the first factor is the sense of feasibility and the sense of burden (α=.59), the second factor is the sense of norm (α=.63). There were three factors for parents, which were interpreted that the first factor is the sense of burden (α=.73), the second factor is the sense of norm (α=.64), and the third factor is the sense of feasibility (α=.55). Factor scores were used for the measures of behavior evaluations.

4.3 Relationship between garbage reduction behavior, garbage reduction attitude, environmental perception, and behavior evaluation

Garbage reduction attitude and related factors:

In order to verify that the general model can be applied to the garbage reduction behavior of adults and children, it was first examined whether environmental perception is reflected in the garbage reduction attitude, and next whether the attitude is linked with behavior. A multiple regression analysis was conducted, in which environmental perception (a sense of crisis, a sense of effectiveness, a sense of responsibility) and behavior evaluation (a sense of feasibility, a sense of burden, a sense of norm) were hypothesized as explaining variables, garbage reduction attitude was hypothesized as a dependent variable. Figure 6 shows the result of parent's data, and figure 7 shows the result of children's data. These results showed that a sense of crisis and a sense of effectiveness were significant explaining variables for parents (R^2=.20, F(4,329)=21.48, p<.001). For children, the sense of norm in addition to the sense of

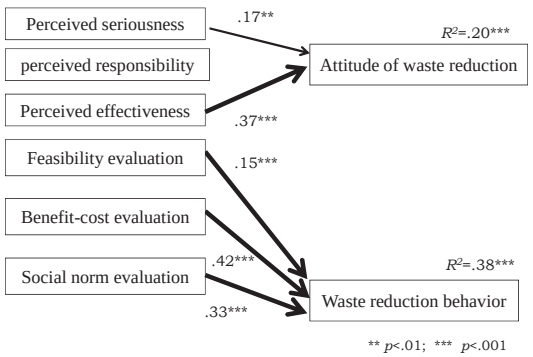

Fig. 6　Parent's waste reduction behavior and its determinants (Yorifuji & Hirose, 2002)

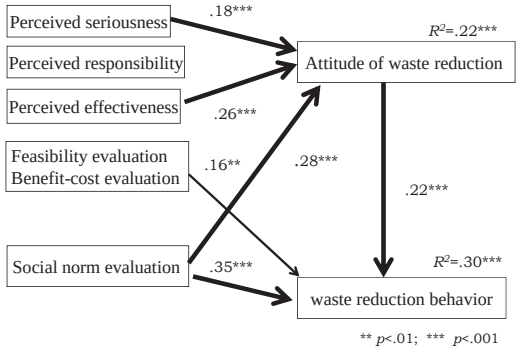

Fig. 7 Children's waste reduction behavior and its determinants (Yorifuji & Hirose, 2002)

crisis and effectiveness were significant explaining variables (R^2=.22, F(4,317)=24.03, p<.001).

Relationship between garbage reduction behavior and environmental perception, behavior evaluation, and garbage reduction attitude: In order to examine whether garbage reduction attitude, environmental perception, and behavior evaluation affect the garbage reduction behavior, a multiple regression analysis was conducted, in which environmental perception, behavior evaluation, and garbage reduction attitude were hypothesized as explaining variables, garbage reduction behavior was hypothesized as a dependent variable. The result showed that the sense of feasibility, the sense of burden, and the sense of social norm appeared as significant explaining variables for parents (R^2=.38, F(6,318) =33.79, p<.001). The garbage reduction attitude, in addition to the sense of feasibility, burden and the sense of social norm, appeared as significant explaining variables for children (R^2=.30, F(5,305)=27.33, p< .001).

5. Conclusion

The general model for environmental conscious behavior was examined whether it is able to explain the garbage reduction behavior of adults and children.

As for the question of whether the garbage reduction attitude can be explained by three environmental perceptions, adults' attitude was in accordance with this model. However, children's garbage reduction attitude was strongly influenced by the sense of social norm in addition to the environmental perceptions. Adults' garbage reduction attitude was determined when they sense the seriousness of the garbage problem and realize that their garbage separation or reduction effort will help to solve the problem. On the other hand, children's garbage reduction attitude was determined by the expectation from adults around them about their behavior, in addition to the sense of seriousness of the garbage problem and the sense of effectiveness. As the general model had assumed, adults recognized that their own attitude toward garbage reduction differs from the subjective norm or other's expectation. However, children's own garbage reduction attitude was closely associated with their sense of social norm or expectation from their parents. This is because children largely depend on their parents' expectation when they develop their own attitude.

As for the determinants of garbage reduction behavior, adults had only the behavior evaluation – the sense of feasibility, the sense of burden, and the sense of social norm –

which affected their garbage reduction behavior. One of the reasons for why the garbage attitude did not appear as a determinant of garbage reduction behavior may be because most of the adults have come to take more positive attitude toward garbage reduction since the survey was conducted during the period that the garbage reduction was considered as a serious issue in Nagoya city due to the shortage of refuse disposal facilities and there were frequent reports on related issues by the mass media. Therefore, it can be interpreted that many of the surveyed adults had positive attitudes but did not actually carry out the garbage reduction behavior, or that their attitude diverged from their behavior. For children, on the contrary, their behavior depended on the presence of garbage reduction attitude as the primary factor, in addition to the sense of feasibility, the sense of burden, and the sense of social norm. The results for the children were more corresponding to this model.

As we could confirm in both adults and children that the behavior evaluations – the sense of feasibility, the sense of burden, and the sense of social norm – were the factors that strongly determine the garbage reduction behavior, and that the environmental perceptions were determinants for the attitude but not for the behavior, we may be able to conclude that the result of this survey largely supports the general model. It was confirmed that the general model for environmental conscious behavior is able to explain the garbage reduction behavior. However, further examination of the validity of this general model by covering other cases may be necessary in the future.

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