

Environmental Education Based on Culture-dependent Environmental Cognition

- A Comparative Study between Jordan and Japan -

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ABSTRACT: Comparative surveys of environmental cognition among the university students in Jordan and Japan were carried out. Results were interpreted in terms of the social culture in each society. The responses to the questions on environmental values and conception became clear to show characteristic distributions intrinsic to and strongly regulated by the respective culture. Assuming the environment-oriented behaviors is subject to those values and conception together with the scientific and environmental knowledge, the multiple regression analysis was made for the variables corresponding to those behaviors. This analysis indicates what sort of information, or what type of knowledge, should be offered to the students in order to cultivate responsible behavior for the environment under a given social culture. The weakness in the information environment regarding various environmental problems in Jordan was also found, and the necessity of active risk-communication was pointed out, not only for the university students but for the general Jordanian public as well.

KEYWORDS: cognitive survey, social culture, environment-oriented behavior, environmental values, environmental conception, environmental knowledge, environmental education, information offer, risk communication.

The United Nation Framework Convention on Climate Change held in Montreal on December 2005 announced the requirement for the environmental conservation-oriented behavior and the cooperative tackling of the problem, recognizing the protection against the global warming as one of the major issues to be solved in this century. The public's values and conception of environment are, however, more or less subject to the cultural background within which they are immersed. The cultivation of responsible environmental behavior of the public among a certain society must, therefore, be made according to the environmental values and conception intrinsic to that society. In spite of such recognition, there exist few experimental studies about the effect of the different cultural and religious values on the environmental values and conception of the public.

From such a point of view, an international comparative study of cognitive survey on the environmental cognition, values and attitudes of the public was carried out in this paper, intending to show to what extent they differ from each other depending on the different social conditions. By using the result thus obtained, the authors have further investigated the sort of information and the type of environmental education recommended to be offered for the cultivation of responsible environmental behavior in each society.

The university students in Jordan and Japan were chosen at this time as the subjects to be targeted for our survey, since (1) they have different backgrounds of culture, but (2) they have the same attribute as the university student. Jordan is situated in the Middle East where the climate is arid and nature is not necessarily rich, the overwhelming social background being the Islamic culture. Whereas Japan is in the temperate monsoon region with rich and diverse nature, but without any dominant religious background.

The cognitive survey the authors made is described in the next section, followed by the result in its subsequent section. The cause-and-effect relation derived by using the multiple regression analysis and its implications are subsequently discussed. Conclusions are given in the last section.

Cognitive Survey

The surveys were carried out from July to August in 2005 in both countries by using the questionnaires with the same contents. The cognitive survey on the environment among the university students in Jordan is made for the first time, although

some have been carried out among school children (Subbarini, 1989; Ahalwat et al., 1994; Reid & Sa'di, 1997). The questionnaire is consisted of about 60 questions, each of which asks the attitude to a given statement. Their contents are categorized into the scientific and environmental knowledge, the importance of environmental problems, the relation between the subject's action and the problems, the monetary value of the environment, the spatial range of environment, the source of the environmental information, the environmental problems they desire to know in more detail, and so on. Almost all these questions are made in the same form where the answer is to be selected from seven choices ranged from "agree very strongly" to "do not agree at all". They were prepared in Arabic for the Jordanians and in Japanese for the Japanese. The questionnaires were distributed to students in the classroom, and the filled ones were recovered and classified.

Four universities were targeted in Jordan, Irbid National University in the far north, University of Jordan in the capital Amman, Mu'tah University in the mid-south, and Al-Hussein Bin Talal University in the far south. Total samples recovered from the four universities amounted to 495, ranging 100 ~ 200 samples from each university. 272 were filled by male students whose average age is 21.0 years old, whereas 218 were filled by the female students with the average age 20.9 (unknown gender for 5 samples). The number of students belonging to the field of science and engineering were 174 for the male and 103 for the female, the rest belonging to the field of humanities, social sciences, and others.

On the other hand in Japan, five universities, Hachinohe Technical College (Hachinohe City in northern Japan), University of Tokyo (Tokyo Metropolis in middle Japan), Science University of Tokyo (Tokyo Metropolis), Nihon University (Tokyo Metropolis), and Yamaguchi University (Yamaguchi City in southern Japan) were selected. The total number of samples recovered from those five universities is 263. That is 20 ~ 140 samples from each university. In those samples, 222 subjects were of male students with an average age 20.6, and 41 of female students with the average age 20.2. Almost all students belong to the field of science and engineering.

Due to the different disciplines of the students between the two countries, the relatively small number of samples, and to the use of questionnaires with different languages, this survey should not be regarded as a final one, but rather a preliminary one. The questionnaire in English was given elsewhere together with the detailed result (Ohnishi, Tyfour, & Ito, 2005).

Results and Implications

The final goal of environmental education is to foster the environmental literacy among the public and to cultivate responsible behavior towards the environmental issues. Such behavior is not a function of only the environmental values and conception, nor only the amount of knowledge. According to Ballantyne & Packers (1997), the information fed to a person from the outside is internalized through the conceptual framework. In this case, his or her values, knowledge and behavioral orientation have a mutual influence on each other to result in the change of them all, which is feed-backed to the conceptual frame. The concrete manifestation of environmental behavior, they claim, occurs according to the conception thus changed. Apart from the right and wrong for applying such a constructivist hypothesis to the university students who are immersed in a strongly regulated society in culture, the authors roughly arrange the questions of the survey into five categories according to their model. These are the general beliefs and values, the environmental values, the scientific and environmental knowledge, the environmental conception, and the environment-oriented behavior. Each of these will be described in what follows.

General Beliefs and Values

About ten questions in the survey belong to this category, which ask whether “*I do not care if any property is damaged if it belongs to a community (public), not of my own*” (this question or the variable regarding this question are referred to as GV1 hereafter, its semantic content being *importance of a common thing*), whether “*richness in material is more significant in our life than richness in mind*” (GV2, *materialism versus spiritualism*), whether “*I recognize my own role in the society*” (GV3, *recognition of social role*), and so on.

Generally speaking, the distribution of responses to the questions in this category is characterized by the facts that (1) in the case of Jordanian students, they tend to have a collectively unified attitude or strongly biased cognition for some specific issues, and that (2) the response by the Japanese shows a rather broad distribution or a peak at the neutral position “*neither agree nor do not agree*” with gentle wings on its both sides. An example for such distributions is shown in FIGURE 1 for the case of GV3. A similar distribution appears for the Jordanian students also in the case of GV1. Such unification of ethical cognition among the Jordanian students is very characteristic in its nature.

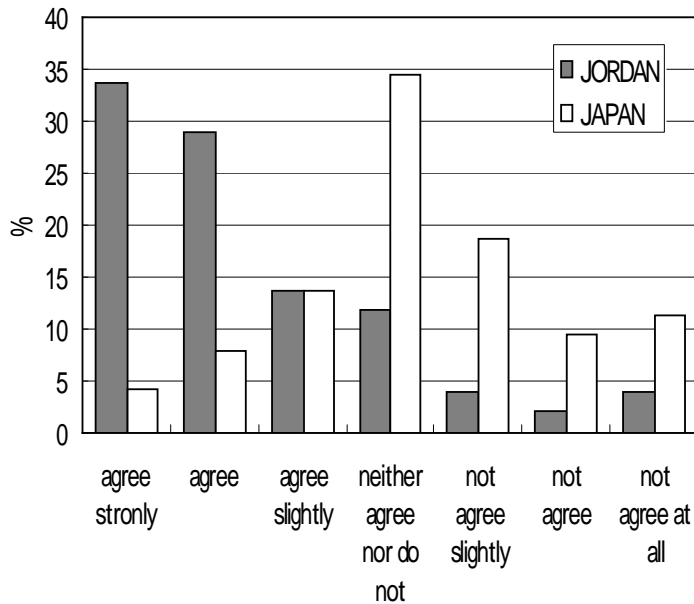


FIGURE 1. Distributional feature of the response to the question GV3, the recognition of social role

In Jordan as well as in other Islamic societies, the religious education has usually been executed in the compulsory stage of education to bring the values unified, along with the home discipline and education in the family and the preaching at the mosque. The regulation or the compulsion with regard to the environmental values is not an exception of this. In the Islamic society, to hold and to preserve the common values to other people is quite an important matter so that it is scarcely possible to be against this rule for them. Since nature was made by God and mankind was also made by God, to exist by identifying oneself with nature is a starting point for recognizing various types of environmental problems. Whether it is a global problem or a local one, the understanding of environmental problem has been made and educated according to a unified interpretation of nature. It may be a natural consequence, therefore, that the people under such a social condition preserve the collectively unified values of environment, as we see in the Jordanians' response to our question; namely the authors consider that the unification is due to an intrinsic culture which is prevailing through the whole country or even through the Arabic world, that is the Islamic culture (Ghonaimi, 1996; Dien, 2000; Abu-Hola, 2001; Khalid, 2004).

On the other hand, even for an ethical subject for which a rightful and righteous cognition is expected, the Japanese response does not show this sharpness in the distribution as that of the Jordanians. One of the reasons conceivable for this is that the Japanese society has been changed to the one which gives much weight to the

diversification of values. The personality and the individuality are highly evaluated in the modern Japanese society, so that young person's feelings are very diverse in beliefs and values in Japan. Moreover, for avoiding the choices at extreme positions as “*agree very strongly*” or “*do not agree at all*” for the Japanese students, it may partially be a manifestation of a Japanese tendency of not making clear decisions on any value issues.

FIGURE 2 shows the feature of distribution for the question GV2. The social surveys have been continuously carried out in Japan during the last 35 years, which ask the subjects “*is richness in material or in mind more important for you ?*”. According to those surveys, the supporters of spiritual richness became to be superior, at the first time, to those of material richness in number in the middle of 1970s, before that time the former supporters had always been inferior to the latter supporters though its relative number had gradually increased with time (MEXT, 2006). Although the question GV2 can not be directly compared with that result due to the different number of choices from each other, the response to this question clearly biases to the side of richness in mind for the Japanese students. It is the case also for the Jordanian students. The gross national product per capita in Jordan was about 1400 US\$ in 2004 at constant 1990 prices, whereas it was more than fifteen thousand US\$ in Japan in the middle 1970s (UN Statistics Division, 2006). Since the cognition of the Japanese who regard the

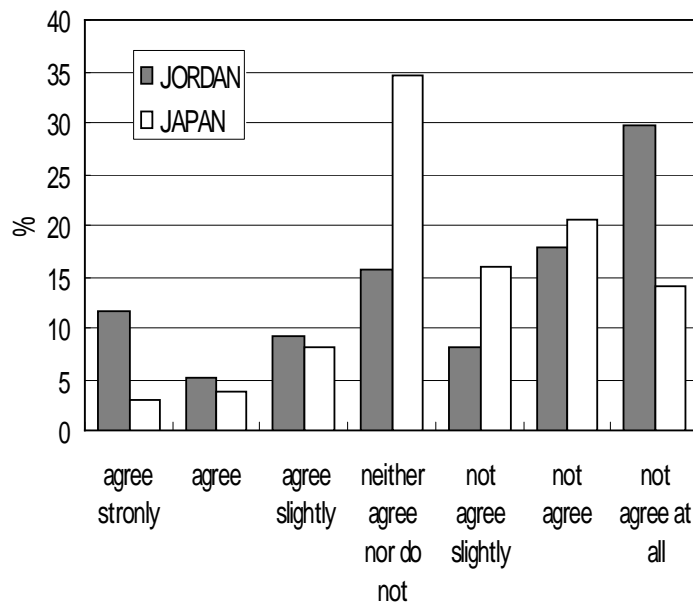


FIGURE 2. Distributional feature of the response to the question GV2, the materialism versus spiritualism

spiritual richness as to be more important has grown after the attainment of material richness and economical fulfillment, the cognition of Jordanian students clearly indicates the origin from some spiritual mind coming from the values of their own society, which are far from materialism.

Environmental Values

There are about ten questions in the survey belonging to this category. They ask the students whether "*global warming phenomenon is the most important issues of the environmental problems in our country*" (EV1, *global warming as the most important problem*), whether "*I am seriously worried about the expansion of environmental problem in future in our country*" (EV2, *expansion of environmental problem*), whether "*our country will be able to secure, from now on as until now, sufficient amount of water for enhanced population*" (EV3, *water security*), whether "*we have no obligation for the conservation of natural environment as it is the duty of the Government or of local municipalities*" (EV4, *responsibility for the environment*), and so on.

Of the five items of the air pollution, the fine dust dispersion in mining, the global warming, the desertification, and the water resources shortage, the most serious problems for the Jordanian and Japanese are respectively the water resources shortage and the global warming. Especially for the Jordanians, their cognition for the seriousness of water shortage is in a state of highly collective unification with a much sharper feature than in FIGURE 1.

FIGURE 3 shows the feature of the response to EV3. The distributions for the Jordanian and Japanese both center on the neutral position with roughly symmetrical wings on both sides. Such a feature of the Japanese may possibly be a manifestation of the indifference to the water problem in Japan. In addition to the Japanese case, the Jordanian's response to the future water security also indicates an indifferent or rather an optimistic view, which is quite peculiar and contradictory to their recognition that they are highly concerned about the water shortage.

One of the reasons conceivable for such an inconsistency for the Jordanians is that the response to the water shortage is just their unconscious manifestation of values or knowledge having been taught in school or in the society, whereas the question such as EV3 requires an ability to judge the situation by integrating and by comprehensively using their knowledge of various fields. The attitude such as "*not agree nor do not agree*", which counts the maximum rate of response to EV3, seems to correspond to the state, in this case, that they can not give a decision for its right and wrong due to the deficiency of the ability of knowledge integration and/or to the scarceness of their

knowledge sufficient for the judgment. If this really is the case, it indicates an important hint for improving the environmental education to be made hereafter in the Jordanian universities, as well as in the Jordanian society.

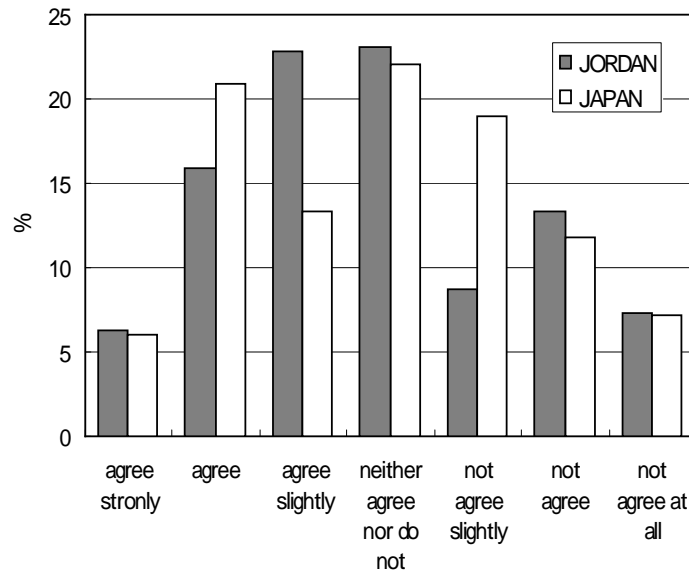


FIGURE 3. Distributional feature of the response to the question EV3, the water security

Scientific and Environmental Knowledge

About ten questions belong to this category, asking whether “*the weight of solution remains 1000 gram when we dissolve 100 grams of sugar in 1000 grams of water, once it is dissolved completely*” (K1, general science knowledge), whether “*I have knowledge of the effect of enhanced CO₂ concentration in the atmosphere on global environment*” (K2, environmental science knowledge), whether “*I roughly know the contents of Kyoto Protocol regarding the global environmental problem*” (K3, environmental sociology knowledge), whether “*our using of electricity is indirectly linked to environmental pollution*” (K4, integration of knowledge), and so on.

FIGURE 4 shows the distributions of the response to K1. The similar feature as this appears also for the other questions regarding scientific and environmental knowledge. Moreover, such a feature of the Jordanian students hardly depends on what discipline they belong to. Remarkable difference in the distributional features appears between two countries. The Jordanian’s neutral opinion “*neither agree nor do not agree*” in this case, which occupies a major fraction, may be interpreted, again, as the

state of inability to distinctly determine right and wrong because of their deficiency of sufficient knowledge about it. Such meager knowledge possibly leads the risk of misunderstanding or inconsistent judgment as pointed out earlier.

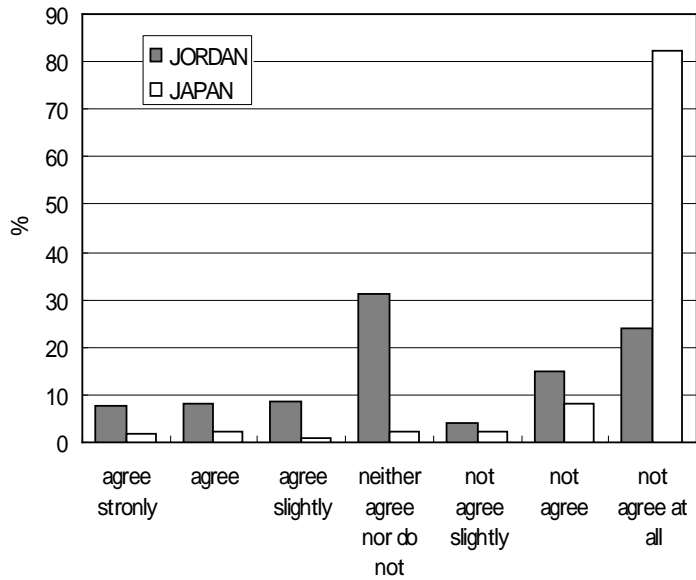


FIGURE 4. Distributional feature of the response to the question K1, the general science knowledge

The ratio of students who want to learn more about specific items on the environmental problem to the total number of target students was also surveyed. In the fourteen items except for “*nothing I want to know*”, the subjects for which the Jordanian students have higher ratio than the Japanese are only the “*sewage management*” and the “*waste disposal*”. The Japanese students, on the other hand, have high interest in the subjects such as the “*global warming*”, “*renewable energy*”, “*destruction of ecological system*” and the “*destruction of ozone layer*”. The values of that ratio averaged over the fourteen items are 16.4 and 30.6% for the Jordanian and Japanese students, respectively. It only increases to 16.9% in case of the Jordanian students who belong to the science and engineering fields. As indicated by these numerical values, the low interest together with the low ambition for the Jordanian students is imagined to be a major cause of the meagerness of knowledge in science and environment.

A survey carried out in 1995 (Al-Tobasi, 1996) shows that the news media in Jordan such as the newspaper and television do not offer environmental information sufficiently enough both in quality and in quantity to satisfy the public with common sense knowledge. Such a situation may not have been changed so much since then, so

that the *information environment*, whether it is related to the local problems such as the waste disposal or the global ones, has been quite weak in Jordan. It can not be denied that such weakness of information environment becomes to be one of the major causes of the low interest in the problems for the Jordanian students.

On the other hand in Japan, the thought of environmental conservation has grown and expanded during the last twenty years. The environment in this case is equivalent to nature in meaning. The thought of “conservation and protection of nature” now becomes to be a universal consensus of all Japanese. It is not too much to say that not a day passes that any mass medium does never report such a sort of environmental topics.

There is no doubt that such an extreme difference in information environment between the two countries lead the difference of the interest of students in the environmental problems. It is highly recommended to boost appropriate and sufficient offer of information to the public in Jordan through all means of mass media.

Environmental Conception

There are about ten questions belonging to this category, which ask the students whether “*Environmental deterioration in our country is inevitable as it is a resultant of social advancement*” (C1, *social advance and environmental deterioration*), “*Clean environment is a public property common to all people*” (C2, *environmental problem for all mankind*), “*I feel the spatial region of environment for me to be the whole world*” (C3, *spatial expansion of environmental problem*), “*The environmental problem affects not only the present generation but also the future generation*” (C4, *time expansion of environmental problem*), and so on.

From the response to C3, the environmental range which the Jordanian students recognize was found to be slightly more extensive than that of the Japanese. This is also clear from the comparison using the Likert number (Ohnishi, Tyfour, & Ito, 2005). The Jordanian tends to grasp the whole time and whole world as the environment for themselves. This seems to originate from and to reflect the Islamic education which is oriented to the global extension of time and space (Dien, 2000).

Of the questions C1 ~ C4, the responses to the C2 and C4 have quite sharp features with highly biased opinions in case of the Jordanian, just as the Japanese case in FIGURE 4. However, the responsive feature to the question which is required the analytic and comprehensive judgment based on one’s knowledge, such as whether “*Any environmental problem will not come out in our country from now on as until now*” (C5, *future assessment*), becomes considerably dispersive for the Jordanian. Such seemingly

inconsistent features as the sharp and dispersive responses for the Jordanian conceptions seem to originate, respectively, from the common culture inherent to their society and from the weakness of information environment on the subject which is not the issue of their religious culture, as already pointed out.

The response of the Japanese students to such a question as C5, on the contrary to the Jordanians, appears very sharp with a collectively unified opinion. The environment for the Japanese often means the nature familiar to all Japanese such as the mountain, the sea, the wood and the river, including ecological systems living within them. Such sentiments partially come from the self-examination to the nature destructed during the period of industrialization in 1960s and 1970s. The thought of environmental conservation and its related movements such as the energy saving and the recycling of materials are now supported by almost all Japanese and became to be a national consensus, so that the collective opinions regarding those issues as C5 have been tacitly formed in the Japanese society.

From these results, together with the ones in the previous subsections, the conception on environmental issues and the way of thinking on environmental ethics were found to be strongly subjected to the cultural environment prevailing among the respective societies. So far as the university students continue to live in such societies, they can never be detached from their cultural restrictions, notwithstanding whether or not they are really conscious of their own culture. Under such a situation, it seems to be almost impossible to change their values and conception by simply offering information from the outside, as Ballantyne & Packers (1997) claim.

Environment-oriented Behavior

There are more than ten questions categorized as “behavior”, which ask whether “*I am not prepared to pay any amount of money to prevent environmental deterioration in my country*” (B1, *monetary compensation*), “*It does not contribute to the settlement of global environmental problem even if I alone reduce the consumption of electricity*” (B2, *energy saving*), “*I do not consent to pay money for using water*” (B3, *payment for water*), “*Environmental deterioration is one of the most significant problems which must be solved by ourselves at present*” (B4, *settlement of environmental problems*), “*Driving a car contributes to the pollution of environment*” (B5, *recognition of root cause*), and “*I do not know the reason why it becomes such a serious problem to deteriorate environment*” (B6, *awareness of the problem*), and so on.

The responses to B2 and B5 show dispersive features for both the Jordanians and the Japanese, especially for the Jordanians. It may easily be possible to imagine the

probable influence of concrete and direct actions such as the throwing out of trash in the environment. However, to imagine and to estimate the final state of a complex cause-and-effect relation is required not only the various knowledge of background but also the ability and training specific to the disentanglement of the relation; for instance such as the case how the every day action like the consumption of electricity and energy in general is related to the environmental problems. This probably is one of the reasons for those dispersive features.

With regard to the payment for water use (B3) and for car ownership, large fractions of the Jordanian students choose the opposing answers of either approve or disapprove. The feature is exemplified in FIGURE 5 for the case of B3. Moreover for the Jordanians, the feeling for denying the environmental tax (B1) can not be neglected, in opposition to the Japanese case. There exists a considerable gap in the way of thinking between the Jordanian and the Japanese for compensating the environmental destruction.

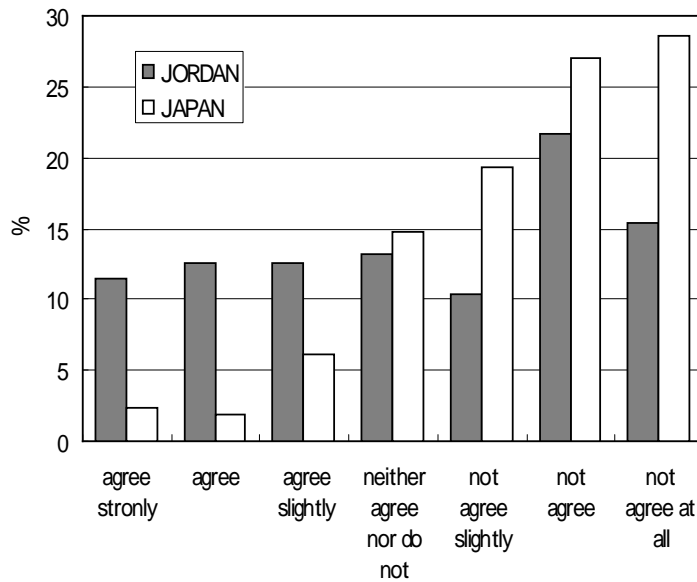


FIGURE 5. Distributional feature of the response to the question B3, the payment for water

Such a gap of monetary recognition may partially be due to the difference of living standard between the two countries, although some part of it may depend on the Islamic culture in Jordan where the public have been accustomed not to compensate by money for the use of nature (Ferragini, 2002). Moreover, the concepts such as the “environmental economics” or the “internalization of external cost” are not yet

prevailing in Jordan. These concepts are the measure or the action to include the expense, for instance for the case of electricity generation, in the electric fee for compensating the environmental destruction by the thermal power generation. On the other hand, for the case of the public in almost all developing countries, it should be remembered that they do not usually consider the aggravation of global environment as their own responsibility but as the cause of the industrializing activities of the already developed countries, some of which do not yet ratify the Kyoto Protocol.

FIGURE 6 shows the distributions of response to the B6 which is the question tacitly to ask a complex cause-and-effect relation. The distributional features for the two countries remarkably differ from each other; however, they are quite similar to the features in FIGURE 4 although the B6 does not intend to ask whether the students hold the scientific knowledge. About 22% of the Jordanian students responds by “*they do not know the reason*”, and 19 % says that “*they can not judge which is better*”, respectively. Such a high rate of non-positive response obviously indicates that the environmental problem is a quite invisible issue in Jordan. The cultivation of knowledge background is strongly required for the Jordanian, together with the notification of the social risk which necessarily appears in the future of Jordan (Ohnishi & Tyfour, 2006). For this purpose, it is suggested to widely offer the scientific and environmental knowledge and to actively promote the risk communication (Lundgren & McMakin, 1998) for the public through various types of mass media hereafter in Jordan.

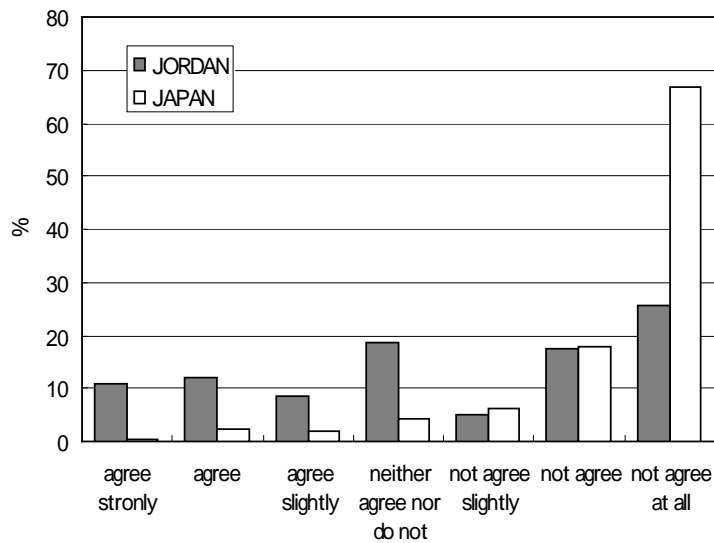


FIGURE 6. Distributional feature of the response to the question B6, the awareness of the problem

Multiple Regression Analysis

The Islamic culture seems to regulate the cognition of all issues including environment in Jordan (Ghonaimi, 1996; Dien, 2000; Abu-Hola, 2001; Khalid, 2004), whereas the thought of the conservation and protection of environment almost becomes to be a social rule in Japan. Thus, since the environmental values and conception seems to be firmly established as social norms in both countries, they are assumed here as the independent variables which are not influenced by any components. With a further assumption that the environment-oriented behavior is determined as the dependent variable of those independent quantities and of knowledge, it is investigated, by using the method of multiple regression analysis, what factors of those components the behavior is subject to. A conceptual diagram is depicted in FIGURE 7.

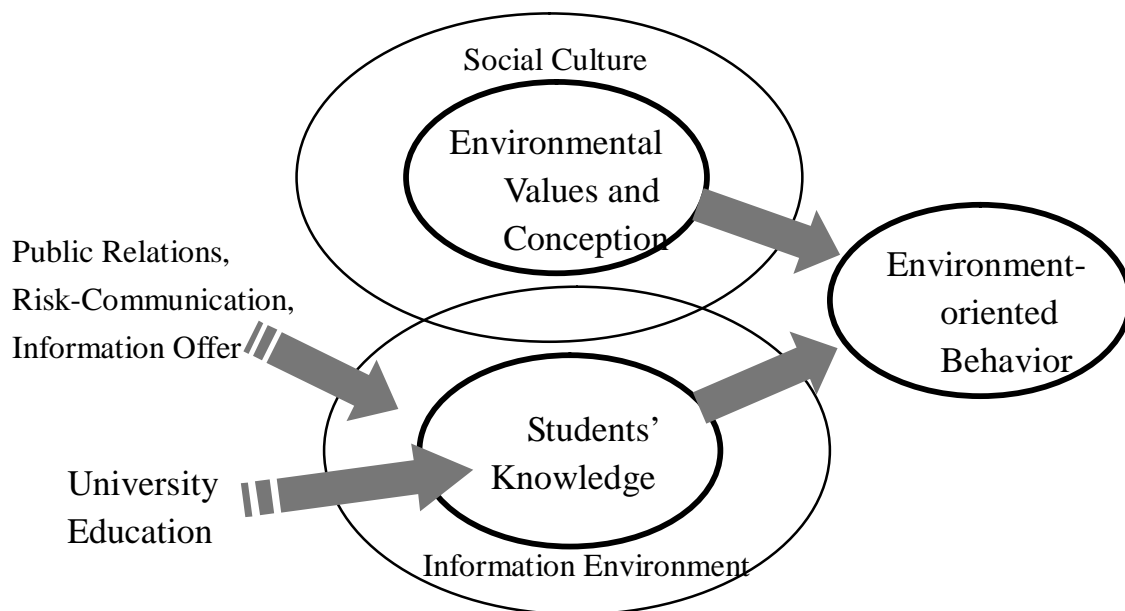


FIGURE 7. Conceptual diagram towards the environment-oriented behavior

The environment-oriented behaviors analyzed here are B1 ~ B6, whereas the values GV1, GV2, EV1, and EV2, the conceptions from C1 to C4, and the knowledge from K1 to K4 are introduced as explanatory variables. These variables were chosen because they are almost independent on each other with correlation coefficients less than 0.3. The analysis was made by the stepwise regression method. The discrimination of meaningful variables was made with the condition of t -value such that $t > 2^{1/2}$. The results are given in Table 1 for both the Jordanians and the Japanese.

In this table, the variable in italics with an underline means the question with regard to this variable to be a negative sentence, for instance as B1; "*I am not prepared to pay any amount of money to prevent environmental deterioration in my country*". The influential direction of explanatory variable on the dependent variable, therefore, should be considered according to the sign of the regression coefficient, and the negative or affirmative nature of the question. For instance, when the sign of the coefficient is positive between the variables of both negative sentences, the shift of the explanatory variable toward the positive (or more increasing) direction leads the dependent variable to the positive (or more increasing) direction.

The followings can be pointed out from Table 1 with regard to the dependency of the environment-oriented behavior on the explanatory variables.

(1) The predominant component of the conception in Jordan is C2, the environmental problem for all mankind, whereas it is C1, the social advance and environmental deterioration, in Japan. These may reflect the spiritualism in Jordan and the materialism in Japan so far as the environment is concerned.

(2) There exists contribution from relatively many components of values in Jordan, whereas not necessarily so in Japan. Moreover, the B1, the monetary compensation, for the Jordanian never depends on the conception, but only on the values (and the knowledge K4). These indicate the importance of the values, the Islamic values, which determine the behavior of the Jordanians.

(3) The B4 and the B6, the settlement of environmental problem and the awareness of the problem, for the Jordanians are caused by comparatively many components of the knowledge, whereas they are not so for the Japanese. The B4, the B5 (the recognition of root cause) and the B6 for the Jordanian are also subject to many factors of the values, the conception and the knowledge, whereas for the Japanese their cause-and-effect relations are relatively simple. These may reflect weaker homogeneity in mentality among the Jordanians than among the Japanese; namely, when compared to Japan, there probably exist more groups of people with different attributes in Jordan whose mental root to the behavior differs from each

other.

(4) When the relation is considered between the negative or affirmative nature of the question and the sign of the regression coefficient, the most incomprehensible aspect appears for the Jordanians in the way of contribution of the K3 on the B2 and the B6, especially the B6. Namely, for the Jordanian students, more and more they recognize the importance of the Kyoto Protocol or the environmental sociology (the K3), more and more they become unaware of the environmental problems (the B6). One of the reasons for such a very contradictory feature may be the insufficient and erroneous grasp of the environmental sociology. If this really is the case, it is highly required the further advancement of education on the environmental sociology in the Jordanian universities.

If it holds good for the former cited assumption that the values and the conceptions held by the university students can hardly be changed both in Jordan and Japan, Table 1 indicates which of the knowledge K1 ~ K4 is or are required to be offered more actively hereafter than ever for pushing such behaviors as B1 ~ B6 toward more environment-oriented direction. Namely to enhance the environment-oriented extent of a certain sort of behavior, it indicates the subjects on which emphases are to be put for the environmental education in the university. Expanding this discussion to the general public, the direction for the public relations or the risk communication (Lundgren & McMakin, 1998), which are to be done for promoting the social education, can be determined. In this respect, the followings should be noted for Jordan.

(1) For the Jordanian students, the cognitive state of the B2 and B5, the energy saving and the recognition of root cause, especially the B5, is low as compared to the Japanese. Moreover, the ratio of respondents who selected the choice of “*neither agree nor do not agree*” in B5 is considerably high for the Jordanians. Such a comparatively low state of cognition is closely related to the low level of knowledge of general science (K1) and environment science (K2). Much is expected hereafter to offer information on those subjects through the university education. More education on environmental sociology (K3) is essential in the Jordanian universities to cultivate the cognition of energy saving.

(2) On the other hand, information regarding the K4 (the integration of knowledge) must be offered for improving and enhancing the behavior B1 (the monetary compensation), the K2 (the environmental science knowledge) for the B4 (the settlement of environmental problem), and the K1 (general science knowledge), K2 and K3 for the B6 (the awareness of the problem). For the B3 (the payment for water) and the B5 (the recognition of root cause), also such education is required for

the integration of knowledge. Along with the education in the university, the promotion of social education is also highly required hereafter in Jordan on the above subjects.

Conclusion

The public's cognition not only for the environmental problems but for any issues is naturally subject to the surrounding culture, together with the information environment. Selecting Jordan and Japan as two representative countries, this study, although it is preliminary, investigated experimentally and comparatively the extent of difference in the environmental cognition among university students in two countries where the cultural background and information environment are different.

In Jordan where the Islamic culture prevails over the everyday life, the students' response to the ethical question on environment became clear to show a very sharp and collectively unified feature of opinion, although there appear inconsistent features among some questions. For the Japanese students, on the other hand, their response was found to occasionally become vague, indicating the manifestation of the variety of values among them. It was also found empirically that the students' behavior on environment depends not only on the values and conception, but heavily on the scientific and environmental literacy. Implications were obtained from this study on what sort of subject is required for the university education to more enhance the environment-oriented behavior of the students. With the assumption that the environmental cognition of the general public is also similar to that of the students, suggestion can be made on what subjects or contents of social education are desirable for enhancing the responsible behavior of the public towards the environment.

One of the implications of this study is the considerable weakness of information environment on environmental problems in Jordan. Positive activities of the public relations and risk communication via various measures and mass media are necessarily required to enhance the environmental literacy of the general public. It should be noted that the responsible behavior for the environment is a prerequisite for Jordan to develop hereafter in concert with the developed countries. It is just at this point that the active promotion of environmental education is required not only for the university students but also for the general public in Jordan.

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Table 1 Regression Coefficients^{†)}

Explanatory Variables	Jordan						Japan					
	<u>B1</u>	<u>B2</u>	<u>B3</u>	B4	B5	<u>B6</u>	<u>B1</u>	<u>B2</u>	<u>B3</u>	B4	B5	<u>B6</u>
Values												
<u>GV1</u>	0.254	0.199	0.159	0.122	0.088	0.225	0.213	0.218	-----	-----	0.147	0.110
GV2	0.218	-----	0.249	-----	-----	0.131	0.193	0.254	0.316	-----	-----	0.161
EV1	0.224	0.111	0.177	----	0.099	0.144	----	----	-----	0.081	-----	-----
EV2	-----	-----	-0.090	0.297	0.215	-0.100	-----	-----	-----	0.309	0.172	-----
Conception												
C1	-----	0.082	0.085	0.122	----	-----	0.099	0.247	0.357	-----	-----	0.170
C2	-----	0.258	0.200	0.275	0.219	0.189	0.137	-----	-----	0.228	----	-----
C3	-----	-----	-----	0.071	0.163	----	-----	-----	-----	----	0.103	-----
C4	-----	-----	-----	-----	0.095	0.091	-----	-----	-----	0.342	0.297	-----
Knowledge												
<u>K1</u>	-----	-----	-----	0.055	----	0.182	0.116	----	0.181	----	-----	0.230
K2	-----	-----	-----	0.132	-----	-0.168	-----	0.194	-----	----	-----	-----
K3	-----	0.134	-----	-----	-0.071	0.245	-----	-----	-----	----	0.080	-----
K4	0.198	-----	0.100	0.093	0.098	-----	-----	-----	-----	----	0.222	-----
R ² *)	0.717	0.768	0.783	0.942	0.868	0.763	0.726	0.727	0.735	0.962	0.941	0.738

†) “----“ denotes the meaningless variable for the explanation.

*) adjusted coefficient of multiple determination