

On natural disasters in the Asia Pacific Region

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Abstract

The first part of the paper concerned with lessons learnt from previous natural disasters, deals with the Tsunami disaster in Sri Lanka on 26 December 2004 being taken as an example of the natural disasters. The risk of natural disasters is increasing because of global warming and climatic change. Further knowledge sharing is important in all sciences especially in sustainability science. From the experience, the need of global education system for the risk management of natural disasters is noted. Next, the method of global education is discussed in terms of social network theory. The paper proposes a global education system which enables cooperative works of teachers for the risk management of natural disasters in Asian Pacific countries. The paper also emphasizes the fact that there were so many deaths due to Tsunami disaster in Sri Lanka because most of the people did not have an idea of what a Tsunami is. The cooperative educational system is produced by using recent information and communication technologies and it plays an important role for the development of sustainability science.

Introduction

The human being is just one of the species of life on the globe. The total amount of their activities is quite rapidly increasing as compared to that of the other species. Their activities produce undesirable phenomena such as air pollution, water pollution, global warming etc. Their activities are based on the resources on the globe but the amount of resources on the globe is limited. Nowadays, it has become an important problem to study how to manage human activities in allowable extent and allowable manner. The new science is named "sustainability science", which deals with a wide range of problems related to coexistence of the human being

and the global environment. Once we have got any valuable results in the study of sustainability science, we must share them with the other people. The knowledge sharing is important in any sciences, especially in sustainability science, because the problems of sustainability science are essentially “global” by nature. The present study deals with message transfers in society from the scientific point of view. The problem is related to social psychology, sociology, linguistics, informatics etc. In this study, social network theory is noted and it is explained how to put the problem in the framework of these theories.

The first part of the paper concerns with an example of the previous natural disasters: the tsunami disaster in Sri Lanka in 2004. It is pointed out that the need of global education system was one of the lessons learnt from the tsunami disaster. Next, we discuss the method of global education in terms of social network theory which helps us to study message formation and message transfers in societies. The last part of the paper concerns with a computer networking system to realize message transfer and knowledge sharing in Asian Pacific countries. We propose a global education system using a method of ICT (Information and Communication Technology) which enables cooperative works of teachers for the risk management of natural disasters in the Asian Pacific countries.

Lessons learnt from previous natural disasters

Sustainability science deals with a wide range of global problems related to coexistence of the human beings and the global environment. One important problem of sustainability science is “global warming”. There are two approaches for this, i.e., prevention of warming and adaptation to the warming environment. In the former approach, the mechanism of global warming is studied and methods to suppress the phenomena are proposed. While, in the latter, the global warming is accepted as an unavoidable thing, and ways to adapt to the warming environment are studied. The present study is based on the latter point of view.

The risk of natural disasters is increasing because of the global warming and the climate change. For example, occurrence of big storms, sea level risings, heavy rains, high tides, tsunamis and the coupled phenomena of these would cause quite large damage on various resources of countries. In the present study, we focus our attention on the risk management of natural disasters, in particular, education of the risk management of natural disasters in coastal areas of Asian and Pacific countries. The reason why we note these areas is that they have similar climates,

similar geographical conditions and similar ways of living, and the adaptation methods become naturally similar.

An earthquake of the magnitude of 9.3 attacked the northwest sea area of Sumatra on 26 December 2004. The earthquake was resulted from the complex slip on the fault in the area where the Indian plate sinks under the Eurasian plate. The earthquake produced tsunami waves, which devastated the coastal areas of Indonesia, Malaysia, Thailand, Myanmar, Bangladesh, India and Sri Lanka. The tsunami waves as high as 25 meters at maximum occurred and killed nearly 300,000 people in the whole area. In Sri Lanka, about 31,000 people were killed and 18,000 people were missed.

In Sri Lanka, about 49,000 people were killed or missed by the tsunami. One of the reasons why there were so many victims is that the most Sri Lankans did not have the idea of what tsunami is. There was no word for tsunami in Sri Lankan vocabulary. This is a typical example which shows why we need an education system for risk managements of natural disasters. We should not repeat such tragic and miserable experience any more. What Sri Lankan people have learnt should be shared with the other people. We need a global education system for risk managements of natural disasters.

Theoretical consideration of message transfer in society

Once we have got something to tell to the other people, the next step is to consider how to do this. In the example described in the previous section, we must consider how to send the message of Sri Lankan people to the other people to tell about what they have learnt from the tsunami disaster. The study on the method of knowledge sharing is very important in any sciences, especially in sustainability science, because the problems of sustainability science are essentially "global" by nature. Let us consider message transfers in society from scientific point of view. This problem is related to social psychology, sociology, linguistics, informatics, etc. Here, we note the social network theory which is popularly used in these days.

The social network theory is concerned with networks of any unit of society, i.e., individuals, companies, organizations and nation states. In the social network theory, the units are referred to as nodes or objects. There are definite relations between the nodes. A network is defined by a set of nodes and descriptions of

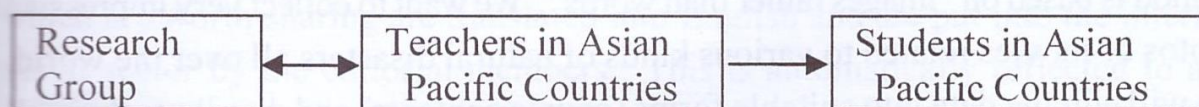
relations between the nodes. The social network theory is based on some propositions. Followings are the examples of the propositions.

- (1) Those nodes which are geographically near to one another are more likely connected.
- (2) Those nodes which have greater homophily are more likely connected.
- (3) The people who have common attributes are more likely to have connections, friendships or associations.
- (4) The proposition (1) is the idea of propinquity which is defined as being at the same place and at the same time. The term, homophily in the proposition (2) is defined as having common social attributes. The proposition (3) is a special case of proposition (2), where the nodes are individuals. We can discuss structural or topological aspects of connections of people or organizations in society. It is expressed by a sociogram. Usually, it is static information. Sometimes, it is possible to discuss the dynamics of network formation in society in terms of the social network theory.

It is quite natural to consider that the message transfer between linked nodes is much easier or more successful than the message transfer between unlinked nodes. Therefore, the message should be transferred between linked nodes. Considering the propositions (2) and (3), we can conclude that the message should be transferred between nodes which have greater homophily or between people who have common attributes. In our case, the message is something to do with sustainability science. We must pick up people who are homophilous to us with respect to sustainability science. We are teachers and researchers. So, the target people should be teachers and researchers in Asian Pacific countries. If we talk directly to passengers on streets in Asian Pacific countries about sustainability, nobody would understand our message.

The networks in the network theory are classified into three categories, i.e. ego-centric, socio-centric, and open-networks. The ego-centric networks are those that are connected with a single node. The socio-centric networks are the networks in a confined condition, for example, connections between students in a classroom. The open-networks are networks without confinement. Of course, the message transfer in the ego-centric networks is the most successful as

compared with those in socio-centric or open-networks. The teachers and their students form ego-centric networks. The sustainability science is concerned with our future problems. The message should be delivered to young generations. Our final target people are young people in Asian Pacific countries. It is not wise to send our message directly to the young generations, because we are not homophilous to them. Therefore, the network that we should produce is expressed by the following:



In this diagram, the connection between the research group and the teachers in the Asian Pacific countries is symmetric or non-directional. The two nodes are mutually related to each other. This is a very important issue for sustainability science. We do not like to force new ideas to developing countries, rather, we do like to produce new ideas, new methods, new techniques, and new systems to realize sustainable world with cooperation of all countries in the world.

Knowledge integration server systems for E-learning

Now, let us consider the realization of the network described in the previous section. In order to do this, we depend on the Internet technology. Namely, the nodes are to be connected over the Internet. We must build up a platform where the people in Asian Pacific countries easily learn and freely exchange ideas about sustainability science. The reasons why we consider the Internet for the network are the following:

- The Internet can easily connect distant people.
- The connection is mutual and real-time based.
- Multimedia type contents are easily shared.
- The contents are easily updated.
- The Internet education system (E-learning) is suited for introducing new subjects into school education.

- Coupling of user management, contents management, and security management is possible.

Nowadays, there are so many platforms on the Internet which present “social networking services (SNS)”. It is one idea to use such ready-made platforms for our activities. However, in this paper, we try to present a better platform which is specialized for our purpose. It is called knowledge integration servers system for E-learning (KISSEL). The idea is as follows: The teaching method is based on “images rather than words”. We want to collect very impressive photos or movies related to various kinds of natural disasters all over the world. We will edit the data into suitable forms (course contents) and distribute them all over the world. We expect they are used as an optional course material in school education. For this, we note the method of E-learning. By E-learning, we can easily introduce optional courses into existing curriculum of schools. The key point is that these works are carried out cooperatively by teachers’ communities in Asian Pacific countries.

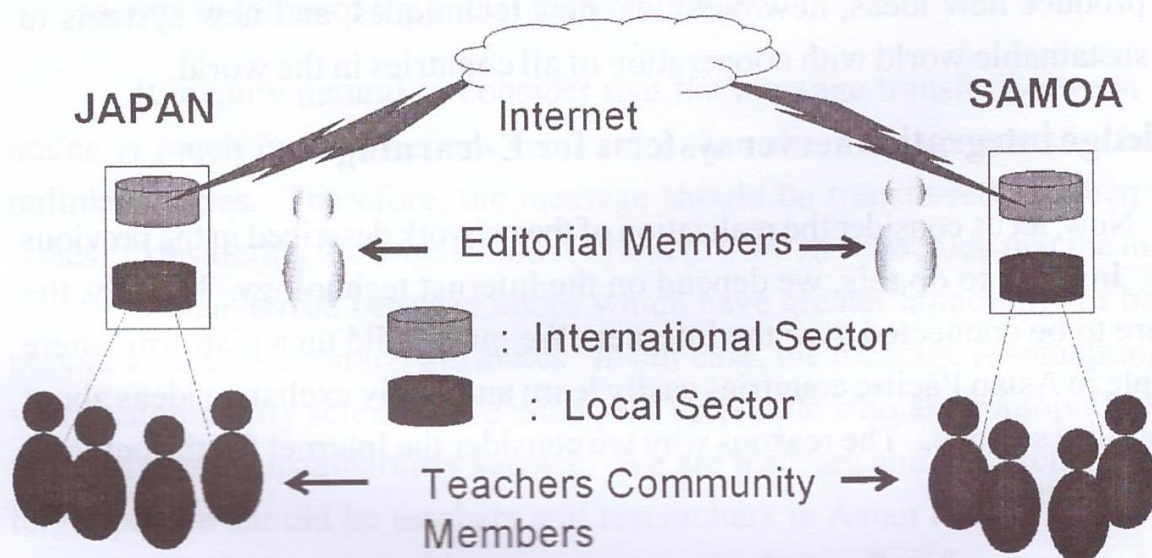


Figure 01.

Schematic explanation of network formation between teacher's communities of two different countries via KISSEL and the Internet.

Figure 1 shows schematically how the cooperative servers system, KISSEL works. Here, we may have a question: why do we need many servers (in the figure, two servers) instead of just one server? The reason is that we want to send messages

especially to young generations; therefore, the contents should be described in their native language. Thus, the content of KISSEL server is divided into two parts. One is the international sector where English is used as the common language, and the other is the local sector where the contents are described in their native language. Only the contents in the international sector are copied each other by using mirroring function of the server. Each KISSEL server of the country is managed by the teachers' community of the country. The local sector of the KISSEL server is freely used for any domestic purposes. Some local contents which are worth sharing are translated into English and are put into the international sector by the editorial members. This is automatically reflected to any other KISSEL servers of the different countries. The KISSEL has already being prepared for Japan, Samoa and Sri Lanka. It will be installed also in Fiji, Hawaii, Vietnam and Bangladesh, in the near future. In such a way, networks between teachers' communities in Asian Pacific countries will be naturally produced. In other words, such servers system is needed for producing cooperative relationships in Asian Pacific countries. The other reason why we need many servers is that the each KISSEL server works as a cash server of the country. Cash servers are quite needed in Asian Pacific countries because of their narrow bandwidth of the digital networks.

The contents of the international part of KISSEL, at present, are classified into three categories. The first is concerned with E-learning techniques. Teachers in Asian Pacific countries are not always familiar with E-learning techniques. Useful knowledge and techniques are presented for the people who are willing to start E-learning. The second category is concerned with natural disasters. The third category is related to geographic information system (GIS) technique and kite photography. The GIS is useful for risk managements of natural disasters. The GIS gives large scale information of geographical features, on the other hand, the kite photography gives microscopic information.

It should be emphasized that the KISSEL is designed exactly for such collaboration. Remember the mirroring function of the KISSEL explained in Fig.1. This function of mirroring serves as an emergency communication system. The KISSEL server provides a platform to exchange information which is valuable for those people who are in panic situations brought by natural disasters. If one KISSEL server is damaged by a natural disaster, the other KISSEL servers back it up. The people can access via mobile phone to one of the distant KISSEL servers and can get the

same services (chattering, BB and data sharing) as given by their own server, because any data including the emergency information on each of the KISSEL servers is always being mirrored.

Conclusion

In the first part of this paper, the tsunami disaster in Sri Lanka in 2004 was introduced. From the experience, we learnt the need of global education system for the risk management of natural disasters. Next, the network for the global education was examined on the basis of social network theory. From the theoretical examination, it was concluded that the suitable form of the network is mutual connections between researchers and teachers in Asian Pacific countries. As the platform for the global cooperation, the KISSEL was proposed. It is made of several cooperative servers settled in Asian Pacific countries. The important function of the KISSEL is mirroring of contents of the servers. The KISSEL is a knowledge sharing platform for E-learning and sustainability sciences. The point is that the contents of the KISSEL are developed cooperatively by the effort of all the members of the communities. At present, the contents of the KISSEL are concerned with E-learning techniques and risk management of natural disasters. The cooperative method of knowledge sharing presented in this paper will work for any fields of sustainability science.

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