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OPEN SOURCE, COLLECTIVISM, AND JAPANESE SOCIETY

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Abstract. This paper is about collectivism in the Network Society. Many researches about the Network Society evaluate collectivism, citing Japanese culture and Hacker culture as good models of such collectivism. However, some researchers, such as K. Abe in his analysis of "Seken," criticize Japanese collectivism. Abe's study pointed out the negative effect of Japanese collectivism on scientific progress. This paper will criticize Abe's study and offer a new model for evaluating collectivism, which has previously been evaluated in earlier studies about the Network Society. First this paper introduces the previous studies and considers a model of communication in the Network Society. Then this paper considers the results of a survey of Japanese engineers in order to test the validity and shortcomings of this model.

1. Introduction

Many researchers who have studied the Network Society have pointed out problems of Western individualism and the need for community-based collectivism. According to such researches, grass-roots relationships yield psychological benefits. Besides which, these kinds of relationships promote innovation in the Network Society. Shared information resulting from interpersonal trust is the basis of the innovation.

Such studies about the Network Society often deal with Hacker Culture and Japanese Culture. Hacker Culture is, of course, a very important example of cultures in the Network Society. The communication style in Japanese companies, which are comparable to traditional local communities, is a successful one. Many researchers assert that, Japanese companies effectively share information. From their point of view, this characteristic of Japanese companies is needed in the global Network Society.

However, some Japanese researchers also pointed out serious problems in the Japanese society. This paper focuses on the "Seken" analysis by K. Abe. Abe held that many important systems of modern society are based on Western individualism, whereas many problems of modern Japanese society occur because real individualism does not exist in Japan. Instead of individualism, pre-modern human relations, also referred to as "Seken," are very influential in Japan. An analysis of "Seken" emphasizes the negative effects of "Seken" on science, especially the human sciences with their emphasis on theoretical researches.

From my point of view, the issue about Japan and collectivism, as pointed out by researchers of the Network Society, is both very important and valid. However, opposing viewpoints that are also significant because of their importance and validity. Hence, Abe's "Seken" analysis has to be dealt with, if we are to conduct a meaningful study of communication in the Network Society. That is why this paper also deals with "Seken" analysis.

As may be obvious, human relations in Japan are multifaceted with each facet differently influencing open source movements and the sharing of information. Many of us may believe that "Seken" and interpersonal trust are different and that "Seken" negatively affects open sources while interpersonal trust positively affects them. This paper will examine this belief. (The examination of this paper will reveal that the effects from these two types of relations are somewhat more complex.)

To examine the aforementioned belief, the second section of this paper will discuss the previous studies about the Network Society, which studies assert the problems of Western individualism. The third section will deal with the "Seken" analysis and it's importance in the philosophy of science. The fourth section will consider the research questions that examine the influence of Japanese character on open source movements in Japan and the sharing of information. Then, in the fifth and sixth section, the results of the research will be checked.

2. Importance of Collectivism in the Network Society

This section looks at previous studies about the Network Society. The pioneers of research on the Network Society have already asserted the importance of community-based associations to a democracy in the information society (Bell 1960). (This paper considers recent researches on the Network Society to be successors of researches about the information society.) Besides, researches after the 1990's also maintain that traditional Western individualism cannot meet the needs of the modern Network Society (Fukuyama 1995).

First, we introduce the research of Bell. According to Bell (1960), collectivism in American communities must be evaluated in the context of the modern society, because such communities may be the uniting force behind people's taking a stand against centralized national government or the mass media. Traditional activities in communities, which are often based on a religious system such as the church, can organize people and enable them to criticize power. Bell's study is based on traditional research about politics in America as was Lazarsfeld's (1948), which pointed out the importance of local communities for American democracy. From Bell's point of view, collectivism in American communities continues, though many researchers are worried about the disappearance of such important collectivism because of the spread of urbanization.

After the emergence of the real Network Society, that argument which insists on the importance of community and collectivism is still influential. F. Fukuyama, for example, also pointed out the important role of traditional American communities in undergirding American democracy. Besides, his study revealed another side of collectivism i.e. its influence on technology and industry. In Fukuyama's opinion, the

advantages of the Network Society cannot be enjoyed without social trust, which is realized by collectivism. A network organization's flexibility, which is a significant characteristic of the Network Society, is supported by our trust in other members of society. If there is no such trust, our society must depend on inflexible regulation, which can be a major obstacle to innovation.

In this situation, Fukuyama (1995) focuses on two interesting models. One is that of the Japanese culture and the other is that of the Hacker culture. In his opinion, both cultures bear the characteristics of modernized collectivism that renders them suited to the Network Society. Further, many researches, which are influenced by Fukuyama's study, reinforced his argument. Many of these studies are concerned with the economy. However, many sociological and ethical studies also deal with this argument. Sennett (2008), for example, focuses on Japanese culture and Hacker culture as models of ethics put into practice by scientists, engineers, and ordinary people in the Network Society.

Actually, many developers of open source software assert the importance of collectivism for open source activities. For example R. Stallman, who is a pioneer of open source software, often points out that acquiring a reputation and credit is the motivation of open source developers. Besides, reciprocal help is needed in open source activities. Hence, other-directed collectivism is usually found in open source communities. We can find a similar argument of L. Torvalds. In addition, Lessig (2004), who researched open source movement and licensing, has evaluated positively Japan's flexible system.

Open source movement is characterized by productive, open scientific communication in the Network Society. This open scientific communication was once considered an unrealistic ideal. For example, K. R. Popper's theory, which maintains the importance of such open scientific communication, had often been criticized as unrealistic. However, the success of the open source movement has great importance for this series of discussions on the philosophy of science. Further, collectivism, which is an important foundation for the open source movement, could have meaning also for scientific development in the Network Society.

Many studies evaluate Japanese culture as a model of innovation with regard to the Network Society and so do many Japanese researchers. Hamaguchi (1996), for example, who is influenced by Fukuyama (1995), has done some surveys and asserts the benefit of collectivism based on these surveys. Hamaguchi (1996) distinguishes positive collectivism from totalitarianism and names positive collectivism "Kanjin." Despite many researchers' positive evaluation of Japanese collectivism, a few Japanese researchers have taken a negative view of it.

3. Criticism to Japanese collectivism, "Seken" analysis

Having considered studies that positively evaluate Japanese collectivism, this section will consider the opposite viewpoint. The "Seken" analysis by Abe, who studied the history of medieval Germany, is considered in this section. "Seken" analysis by N. Sato, who has studied criminal law in Japan, is also considered as it supports Abe's analysis. Abe and Sato emphasized that Western individualism is an important precondition of modern systems, though individualism in Japan has not matured. Especially, Abe asserts

the need for individualism in science. This paper introduces their arguments and criticizes their position. Their characterization of Japanese “Seken” is problematic, because the “Seken” characteristics in their researches seem to exist also in Western society. Instead of such overgeneralizations, this paper seeks to emphasize what is especially pertinent to Japan. This section focuses on the characteristic decision and discussion processes that pose a problem in Japan. When we compare those processes with Popper's theory, which asserts the need for open discussion if scientific development is to take place, we can then show the negative effect of "Seken."

Abe (2001) criticized Japanese culture, especially Japanese universities, while there were many influential researches that evaluated Japanese collectivism positively. Abe (2001) maintained the importance of individualism, which idea is based on the Western dualism of society and the individual. In his opinion, such dualism is also a precondition of science. He points out that Japanese people do not realize the concept of individualism, though they do use the words "society" and "individual." The translation of “society” and “individual,” i.e. “shakai” and “kojin,” are not usual terms in Japan. Instead of them, people often use the word “Seken.” “Seken” is a kind of association of people and the major basis for Japanese collectivism. In contrast to “society,” which people cannot actually touch or feel directly, “Seken” refers to concrete relationships between people. “Seken” is the foundation for reciprocal help, but excludes outsiders (we can find similar characteristics also in local communities in the West). Logical speech is often not necessary in "Seken." Also people in the West don't need clear, expository, or coherent language when they communicate with friends. Such a situation is more widespread in Japan because of “Seken”(This property may contribute to the flexibility highlighted in the studies about the Network Society). Further, speaking logically is sometimes avoided, even in official discussion. According to Sato (2008: 19-27), “Seken” has four important characteristics “potlatch,” “hierarchy,” ” sharing time,” and “superstition.” The first characteristic, “potlatch,” is premised on the tacit rule that members of “Seken” must exchange presents with each other. If one breaks this tacit rule, the reputation of the person is often harmed. According to Sato (2008), “potlatch” results in frequent networking. For example, e-mail exchanges between Japanese are often meaningless and done with persons who one sees often in person. Sato (2008) says that they are forced to send back messages because of “Seken’s potlatch.” However, even though Japanese network frequently, we seldom find open productive discussion in Japan. Secondly the influence of older people is very strong in Japan's hierarchical society. Thirdly Japanese people often feel like “sharing time.” Japanese people are often conscious of living together for a long time, even if they do not actually associate with each other. According to the “Seken” analysis, Japanese are often very superstitious, because of the influence of "Seken."

Abe (2001) said that, there were systems like "Seken" in the West before the Middle Ages. Such systems disappeared because of the church’s influence. Because such systems also certainly existed in the West, we can still find fragments of such systems in the West today. So we can sometimes find the four characteristics of "Seken" in the West also. But according to Sato (2008), “Seken” in Japan functions as a total system, while its four characteristics are fragmented in the West.

According to Abe (2001), the dualism of the individual and society is a necessary condition of modern science and academics. But Japanese researchers, especially social

and human scientists, often have serious problems because they do not recognize that dualism and are strongly influenced by "Seken." This poses a serious problem requiring theoretical analysis.

Abe himself noted that, "Seken" had existed also in the West. And we can find the fragments of such a system today. Thus, many of the problems associated with "Seken" may not be peculiar to the Japanese. This aspect is important to our research of the issue, because studies about the Network Society often maintain the significance of Japanese culture (collectivism) in the Network Society. So it is important that we clarify which characteristics promotes the flexibility and productivity noted in Japanese society and what is the problem that results from such Japanese characteristics. We then have to find a way to prevent such problems while we accept the productive Japanese culture. So we must define wherein Japanese collectivism does the problem lie.

Iitaka (2008) tried to clarify the problem of collectivism by using "Seken" analysis, Popper's theory, and Lakatos' theory. From their point of view, scientific theories should be dissected and criticized. They deny the cumulative development of scientific knowledge. In their opinion, science should develop not from adding new theories to old ones but from replacing old theories with new ones that incorporate old theories that have not been proven false. Scientific theories have to build in this way. In another word, people have to learn from failure in scientific progress. In Popper's and Lakatos' opinion, the development of science is like an evolution by natural selection. And scientific theories are selected by open discussion. The comparison of the Open Model of scientific development and the Cumulative Model is shown in Figure 1.

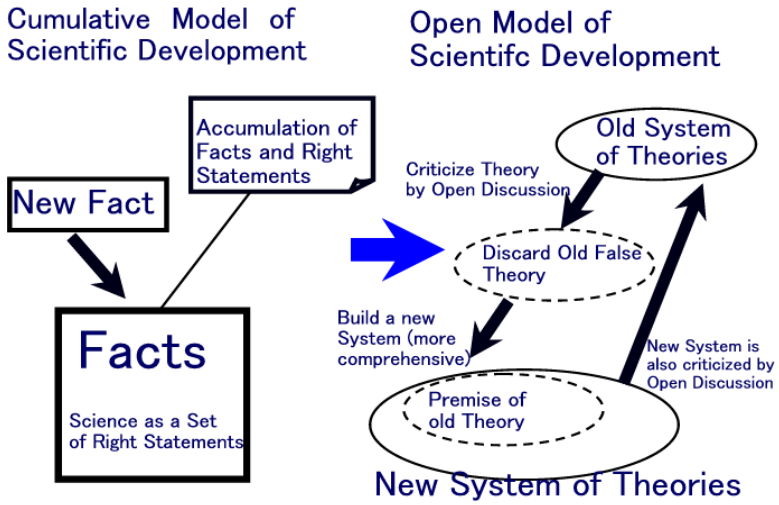

Figure 1. Comparison of Open Model and Cumulative Model.

They had pointed out the importance of openness to science before the genesis of open access or open source knowledge. Their theories have withstood scrutiny and the test of time and so these can be meaningful for research into the Network Society.

Popper himself evaluated Japanese culture positively. In his opinion, the politeness of Japanese, which probably comes from collectivism, would facilitate open scientific

discussion. Politeness is necessary in such discussion, especially when we criticize others. Impoliteness sometimes makes open discussion impossible. However, Abe said, “Seken” can obstruct open scientific discussion, because logical open discussion sometimes makes people in “Seken” uncomfortable. So from my point of view, “Seken” analysis provides a meaningful basis for criticizing philosophical or sociological theories that evaluate Japanese collectivism positively. After such criticism, we can better investigate individualism and collectivism and build a better Network Society theory; such exploration is valuable since many of the researches about the Network Society consider Japanese collectivism as a model for the coming global Network Society. But, as this paper has already indicated, many "Seken" characteristics are too universal to aid in the identification of problems with the model of collectivism in the Network Society.

Iitaka (2008) tried to identify the serious problems in Japan that can adversely affect innovation in the Network Society. Iitaka (2008) focused on Sato's “Seken” analysis, which is mainly about crime in Japan. According to Sato, Japanese criminal law, which is based on German criminal law, was reformed because it did not fit the Japanese “Seken” system. People are usually under the influence of "Seken," and some serious crimes that would be capital offences and are often premeditated in the West, are frequently committed without premeditation in Japan. Such a criminal is under the influence of "Seken." So we cannot interpret the motivation for Japanese crimes according to the Western standard. "Seken" influences other decisions such as marriage or divorce. Japanese people often think that collectivism like "Seken" no longer exists in modern Japan and many senseless brutal crimes are based on egoism and the lack of collectivism; such crimes often seem to have no real reason behind them and we usually think that people cannot commit such brutal crimes if the criminal cared about other people. However, such crimes often happen under the strong influence of "Seken." "Seken," which tends to exclude communication by logic and language, forces the criminals to commit such crimes. Such crimes seem to be irrational and egoistic to us, since we are not in “Seken” to which the criminals belong. So "irrational and egoistic" crimes are increasing because "Seken" has become less widespread but more intense recently. From Sato's analysis, we can identify an important characteristic of "Seken." "Seken" can be at the root of an irrational decision. Besides, Abe is of the view that such “Seken” influence does also exist in academic groups or universities.

This characteristic of "Seken" is of significance to scientific research. If decisions in scientific research (especially when we are deciding which theory is better) are made in the "Seken" manner, the reason for selecting theories would be hidden. In such a case, we could not understand why an old theory was selected. Then, the new theory could not comprehend the premises upon which the old theory was based. So scientific development becomes theoretically impossible when scientific theory is decided upon in this way. We can say the same thing in the case of systems development, because we have to understand what led to the creation of an old system before we can replace it and build a new one.

On the other hand, the demand for a clear decision making process is obviously stronger in the West. The difference in criminal laws is evidence of that. This paper indicated that at the root of this difference is the tradition of confession in the West. According to Abe (2001) individualism and dualism of individual and society originated

from the tradition of confession. So people in this tradition have to explain the reason for their decision (to sin) linguistically. People became conscious of self because they had to explain their position for someone (God or priest) who is out of their "Seken". So people in this tradition have to explain the reason for their decision (to sin) linguistically. On the other hand, it is natural that people not belonging to this tradition do not feel strongly the need to explain logically the reason for their decisions and can easily make a decision without thinking of the reason. If so, people would tend to follow their "Seken" mood and, consequently, one could not find any logical or linguistically plausible reason for their decision. Then people could not learn from failure(bad decision). Therefore, this paper considers the traditional confession model of decision making as a prototype of the open scientific discussion.

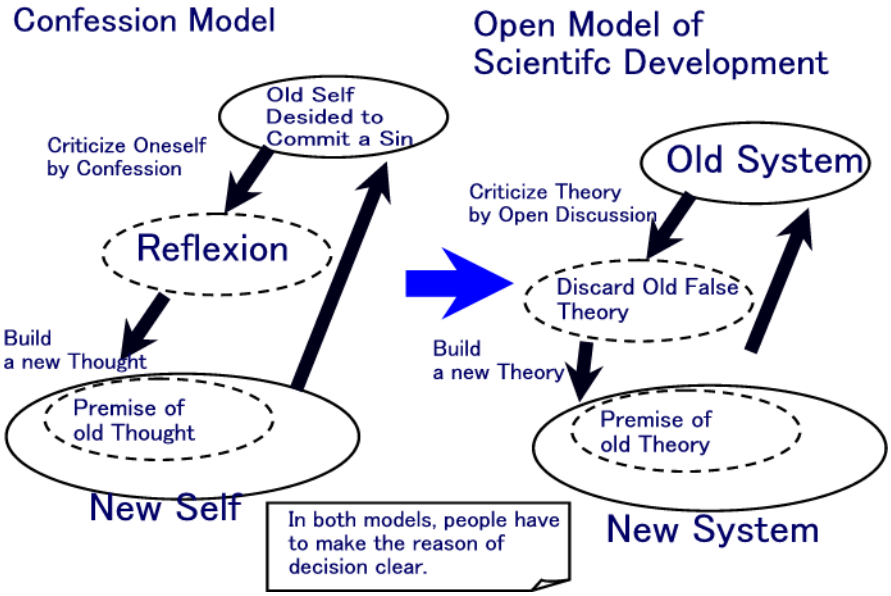

Figure 2. Comparison of Open Model of Scientific Development and Confession Model.

When we define scientific development according to the "Open Model" in Figure 2, the theory that individualism based on the “Confession Model” enables the emergence of modern science is convincing. In my opinion, the "Open Model" based on individualism must be maintained, even if we have to accept collectivism in the Network Society.

As this paper has pointed out, many influential researchers are saying that Japanese collectivism is a model for the sharing of information and innovation in the Network Society. This means that the problems of Japanese collectivism can pose future serious problems for the global Network Society. So this paper will also focus on these problems and look at the various aspects of collectivism. As described in the last section, the open source community is also a model of innovation in the Network Society. So it is meaningful to analyze the influence of the different characteristics of collectivism on open source communities in Japan.

4. Research Questions

The second and third section discussed why it is meaningful to study open source communities and Japanese culture in order to investigate a better system for the Network Society. To investigate such a system, questionnaire surveys were sent to Japanese software engineers and researchers in March 2006. The surveys had two main aims. The first aim was to make sure that collectivism really exists. The second aim was to see if such collectivism can influence innovation in the Network Society. Besides, this paper focuses on open source communities and so this paper also has two research questions. The first research question is "Do Japanese online communities of developers and researchers have the characteristics of collectivism, which we have discussed in the second and third sections of this paper?" The second question is "If Japanese open source communities have such characteristics, do they really influence innovation or open source movement?"

When we consider the first research question, we can expect to find various types of collectivism and individualism. Japanese collectivism may have many effects, as may be seen from previous studies. Besides, "Seken" analysis provided us with a meaningful avenue for exploration i.e. the decision-making process. If we observe collectivism from this aspect, we can find two types of collectivism. Some collectivism may coexist with individualism and have positive effects on innovation. On the other hand, other types of collectivism cannot exist with individualism and may have negative effects on innovation. The former collectivism is what Popper positively evaluated. It is characterized by politeness, open discussion, criticism, and a clear decision-making process. These characteristics improve sharing of information and innovation, which is probably what we need in the Network Society. This paper calls this property "Criticism and Politeness." This may coexist with individualism and have a positive effect on innovation. The latter collectivism is characterized by irresponsibility and a vague decision-making process. This paper calls this property "Seken," which may not coexist with individualism. This survey used original questions in order to capture these properties. However, other properties are needed to test the validity of these properties. So this survey uses questions from a previous study by Hamaguchi (1996), which was itself influenced by Fukuyama's research.

On the other hand, the second research question investigates the influence of collectivism on innovation. However, innovation is too vague to check using a questionnaire survey. We need a clear standard for innovation. To get a clear standard, Castells (2004) and the CMM (Capability Maturity Model) are helpful. According to Castells (2004: 54), the sharing of information is crucial to innovation in the Network Society. Castells (2004) asserts that a typical example of information sharing in the Network Society is the open source movement. Sharing of information is also an important factor for CMM (Level2), which surveys the maturity of developers' groups. According to CMM, a developer group at a certain level has to share information about a project. CMM has certain items for checking the degree of information sharing. So the questions for evaluating research question 2 come from CMM level2.

5. Survey

We use the data of a survey performed from 2006/3/8 to 2006/3/10 to formulate the research questions. The targets of this survey are software engineers and researchers. This section shows how the survey was performed.

This survey was conducted by a research company with about 2,940,000 samples at its disposal. The company selected 20,000 samples randomly from all the monitors and asked these samples to participate in the survey. Those selected included programmers, systems engineers, students of computer engineering, and researchers of computer engineering. The total sample size was 503 and the survey itself was carried out on a Web site.

Among the samples, there were many more males than females and more who were in their 30's than any other age group.

The answers to the following four groups of questions in this survey were used. The first group of questions was about "what the monitors are doing, when they participate in a project." These are partly based on Castells (2004) and selected from CMM level 2, while some items are based on "Seken" analysis. The second group was about "criticism and debug in a project." These questions are based on Popper (1994) and "Seken" analysis. The third group was, about "relationship with friends." Items for this group of questions are taken from Hamaguchi (1996), which was influenced by important studies on the information society such as Fukuyama's (1995). The frequency of participation in OSS communities is asked in these items.

Table 1. Items.

	Text	Abbreviation	Group
Question1	Not to ask anything and to pretend to agree is a good way to avoid trouble.	Not to ask	1st
Question2	It is burdensome to answer the question about a project.	Burdensome	1st
Question3	If I do not work hard, other members will cover for me.	Cover for me	1st
Question4	I think explaining a project to a nonprofessional is unproductive.	Unproductive to explain	1st
Question5	My program is reused by other members of the project	Reuse by members	1st
Question6	I deliberately write documents about the project that are easy to understand.	Write document	1st
Question7	My program is reused by other people outside of my group	Reuse by outsider	1st
Question8	I am an instructor in the group.	Instruct	1st
Question9	I explain the project to outsiders.	Explain to outsiders	1st
Question10	I try to make plans and progress clear.	Clear plan	1st
Question11	When nonprofessionals ask me many questions, it is because they do not trust me.	Distorted professionalism	2nd
Question12	To explain the reason for failure in detail is irresponsible.	Explaining irresponsible	2nd

Question13	The damage to my reputation because of failure is more important than damage to the project.	Too much regard for reputation	2nd
Question14	To evade dealing with failure brings us problems later.	Not to evade	2nd
Question15	If someone asks me some important questions, I always answer in detail.	Answer in detail	2nd
Question16	Even if one has to say something frankly, he may not be impolite.	Polite criticism	2nd
Question17	If I have to reprimand someone, I have to show consideration for his reputation and reprimand him when no one else is there.	Not to reprimand publicly	2nd
Question18	We have to confront problems all together as group members.	With group members	3rd
Question19	I think, friends must be together in any situation	Together	3rd
Question20	I think, friends must remain friends, even if they live far apart.	Remain Friends	3rd
Question21	I think, life without close friends is empty.	Close Friend	3rd
Question22	I think, it is important for friends to see each other's point of view.	Point of View	3rd
Question23	I think, association with friends is important by itself	Association essential	3rd
Question24	I associate only with helpful people	Only helpful	3rd
Question25	I don't want anyone to understand me	Understanding unnecessary	3rd
Question26	Even if others fail and are experiencing hardship, it is none of my business	None of my business	3rd
Question27	I look after myself	Look after myself	3rd
Question28	I think, my own identity is needed in order to get on in world	Own identity	3rd
Question29	Others must not interfere in my life	Not interfere	3rd
Question30	Start up OSS project	Start up OSS	4th
Question31	Write or modify document and source code of OSS	Modify OSS	4th
Question32	Report on the bugs etc to the OSS forum or ML	OSS bugs	4th

The responses to all questions were measured on a four or five-point scale. Besides, skewness and kurtosis of each item were between –2.0 and 2.0 (calculated by SPSS). So the distribution is normal enough that the data can be presented on an interval scale.

6. Examine Research Questions

6.1. VALIDITY AND RELIABILITY (RESEARCH QUESTION 1)

First of all, we want to check if collectivism, which is dealt with in previous studies, really exists. The use of factor analysis is the best way to test the validity and reliability

of research question 1 and to create the independent variable for research question 2. So firstly, factor analysis is done. Then, the reliabilities of each factor are measured. Finally, the correlations of each factor are measured in order to measure the validities of scales. Because previous studies have already handled the third question group for examining collectivism, we can use the correlation between factors from the third question group and factors from other groups to examine the validities of factors.

First of all, we examine the factors from the third group, which are taken from Hamaguchi (1996). We expect to find the factor of collectivism (Kanjin), which has a positive effect on innovation, from this group. Besides, we also expect to find the individualism factor from this group. If we read the texts, we expect to find two different factors i.e. Individualism in a positive sense and "Egoism." The result of factor analysis is just what we would have expected. Three factors are found, namely, "Kanjin," "Egoism," and Individualism in a positive sense (we name it "Independence"). Besides, when we examine reliabilities by measuring Cronbach's coefficient alpha, sufficient reliabilities are confirmed: Kanjin (alpha=0.792), Egoism (alpha=0.664) and Independence (alpha=0.648). Based on this analysis, the average of "With group members," "Together," "Remain Friends," "Close Friend," "Point of View," "Association essential" is dealt with as a variable of "Kanjin." This paper refers to the average of "Only helpful," "Understanding unnecessary," "None of my business" and "Not interfere" as a variable of "Egoism." The average of "Look after myself" and "Own identity" is dealt with as a variable of "Individualism."

Secondly, we want to check collectivism from Popper's and a "Seken" analysis' point of view. Many of the questions in group 1 and group 2 are intended to measure two different other-directed traits. Each question is to distinguish the other-directed traits by examining if the samples have vague reasons for making decisions or not, if they consequently make scientific theories or systems impossible to comprehend or not and if they aim primarily at productive communication or not. One of the factors can be an obstacle to innovation. The other contributes to innovation (open critical discussion). As we expected, we found two different factors of collectivism by factor analysis. The first factor seems to be a tendency to avoid logical communication and to make decisions for vague reasons. We name this factor "Seken." The second factor seems to be politeness in order to realize productive communication as identified by Popper. We name this factor "Criticism and Politeness." When we examine reliabilities by measuring Cronbach's coefficient alpha, sufficient reliabilities are confirmed: Seken (alpha=0.769), Criticism and Politeness (alpha=0.724). To create the variable of "Seken", we calculate the average of "Distorted professionalism," "Too much regard for reputation," "Explaining irresponsible," "Not to ask," "Burdensome," "Cover for me" and "Unproductive explanation." The average of "Not to evade," "Answer in detail," "Polite criticism" and "Not to publicly reprimand" is dealt with as a variable of "Criticism and Politeness."

Validities of the original variables i.e. "Seken" and "Criticism and Politeness" can be confirmed by examining their correlation with variables in previous studies. So we have to check the correlation between variables from Hamaguchi (1996) and original variables. Table 2 shows correlations between these variables.

Table2. Correlation between Original Variables and Variables of Hamaguchi (1996).

		Mean	SD	Collectivism			Individualism
				1	2	3	4
Collectivism	1. Kanjin	3.521	0.372				
	2.Seken	2.56	0.381	-0.089*			
	3.Criticism and Politeness	3.965	0.405	0.384***	-0.268***		
Individualism	4.Egoism	2.742	0.41	-0.289***	0.416***	-0.204***	
	5.Independent	3.735	0.522	0.304***	-0.198***	0.472***	0.027

* p <. 05, *** p < .001

According to "Seken" analysis, "Seken" is against individualism, which differs from egoism and is a precondition of modern scientific discussion. As we expected, the correlation coefficient between "Seken" and "Independence" is negative and statistically significant(r=-0.198, p<.001). Besides, "Seken" is expected to conflict with "Criticism and Politeness" from the viewpoint of open scientific discussion. And there is a negative correlation between "Seken" and "Criticism and Politeness"(r=-0.268, p <.001). On the other hand, as we have seen in the third section, a person who is under a strong "Seken" influence often seems to be an egoist. So there is correlation between "Seken" and "Egoism"(r=0.416, p<.001). By checking these correlations, we can confirm the validity of the "Seken" scale in this survey to some degree.

Then we check the validity of the "Criticism and Politeness" scale. This scale measures the trait of Japanese collectivism, which aims to realize open scientific discussion. This scale must, of course, conflict with that of "Seken" which is an obstacle to open scientific discussion. As we have seen, there is negative correlation between these scales. Besides, "Criticism and Politeness" is also based on "Seken" analysis, which maintains the importance of Western individualism in scientific discussion. So "Criticism and Politeness" must have positive correlation with individualism, which contributes to open discussion. As we have expected, there is positive correlation between the "Criticism and Politeness" scale and the "Independence" scale (r=0.472, p<.001). And as we have seen in the second section, Hamaguci intended to measure the collectivism needed in the Network Society by the "Kanjin" scale. There must be a trait similar to "Criticism and Politeness." So "Criticism and Politeness" is expected to have a correlation with "Kanjin." As we expected, there is correlation between the "Criticism and Politeness" scale and the "Kanjin" scale(r=0.384, p<.001). So the validity of the "Criticism and Politeness" scale is confirmed.

We have seen the validities of original scales in this section. The result of this analysis makes it possible to deduce that there are various collectivisms, which have previously been indicated. Now we can examine the influences of these collectivisms on innovation.

6.2. INFLUENCE OF COLLECTIVISM ON INNOVATION (RESEARCH QUESTION 2)

Section 6.2 examines Research Question 2, i.e. the influence of various collectivisms on innovation. According to Castells (2004), the sharing of information is an essential precedent to innovation and open source movements are good examples of such innovation. So this section deals with sharing of information and participation in open source communities as dependent variables. Therefore, we check the influence of independent variables identified in the last section on the dependent variable "Sharing of Information." Firstly, this paper examines the reliability of "Sharing of Information." Secondly we see the correlation between dependent variables and independent variables; the influences of independent variables on dependent variables are examined by multiple linear regression analysis.

The questions from 5 to 10 are designed to measure the extent of information sharing. When we examine reliabilities by measuring Cronbach's coefficient alpha, sufficient reliabilities are confirmed (alpha=0.773). The average of answers to questions 5-10 is considered to be the "Sharing" scale and the distribution of "Sharing" does not differ much from normal distribution (Mean=3.415, SD=0.428).

Then the correlations between independent variables and dependent variables are examined. The correlations are shown in Table3.

Table 3. Correlations between independent variables and dependent variables.

	Kanjin	Egoism	Independent	Seken	Criticism and Politeness	Sharing	Start up OSS	Modify OSS
Sharing	0.259**	-0.121**	0.321**	-0.210**	0.409**			
Start up OSS	-0.049	0.234**	-0.122**	0.277**	-0.215**	0.125**		
Modify OSS	-0.075	0.203**	-0.145**	0.239**	-0.185**	0.130**	0.898**	
OSS bug	-0.094*	0.137**	-0.153**	0.220**	-0.195**	0.149**	0.749**	0.763**

* p <. 05, *** p < .001

When we consider only the correlations between "Sharing" and independent variables, the tendency seems to be just what we had expected. As we have seen in section 2, positive collectivism or "Kanjin" is estimated to have a positive influence on innovation. And the "Kanjin" scale positively relates to the "Sharing" scale(r=0.259, p<.001). As was analyzed in section 3, individualism is an important condition of innovation. So it is natural that "Independence" positively correlates to the "Sharing" scale(r=0.321, p<.001).

Then we check the influence of original scales. Firstly, there is negative correlation between the "Seken" scale and the "Sharing" scale(r=-0.210, p < .001). Based on the result of multiple linear regression analysis, we can deduce that the "Not to Ask" of the "Seken" scale has a negative influence on "Sharing." "Not to Ask" is a typical others-directed behavior, which consequently hides the reason for a decision. On the other hand,

"Criticism and Politeness" are positively correlated to the "Sharing" scale(r=0.409, $p < .001$). The multiple linear regression analysis on these scales shows that "Answer in Detail" has a positive influence on "Sharing." This result is natural, because "Answer in Detail" is directly related to open critical discussion.

When we focus on dependent variables about open source, the relationship between dependent variables and independent variables becomes complicated. The correlation coefficients between the "Sharing" scale and frequency of participation in open source communities are all positive. This is just what Castells (2004) and this paper expected. However, the relationships between open source and independent variables are all contrary to what we had expected. "Seken" relates positively to open source movement. But "Seken" also relates positively to other frequent use of networks. This tendency is what Sato (2008) predicted. Besides, the multiple linear regression analysis on "Seken" and open source proves that "Distorted professionalism" and "Cover for me" have consistent influences on open source. Especially "Cover for me" can indirectly represent the reciprocal help, which Stallman (2002) refers to as an essential factor of open source. But "Not to Ask," which is a clear obstacle to open critical discussion, does not have an influence. So this result does not directly contradict previous studies. On the other hand, "Independence" and "Criticism and Politeness" tend to relate negatively to open source. Among the components of the "Independence" scale, "Look after Myself" is proven to have a negative influence on open source. When we think of the "reciprocal help" characteristic of open source, this tendency is understandable. Further, among "Criticism and Politeness," only "Not to evade" is proven to have a negative influence on open source. According to developers of open source software, one of the essential characteristics of open source is that distribution of software with bugs is allowed (Raymond 1999). The productivity of open source communities is partly supported by this characteristic. This characteristic can be contradictory to that of "Not to evade." Though allowing distribution of software with bugs is actually different from ignoring bugs or failures and avoiding criticism, we may sometimes confuse allowing distribution with ignoring failure. The same tendency may exist in open source communities. When this interpretation is correct, it is critical to overcome this tendency if creative communication in networking is to be realized.

After examining research question 2, we can determine the influences of independent variables. Having determined the influence of independent variables on "Sharing," the effects of independent variables on innovation can be estimated. But these independent variables have a negative effect on frequency of participation in open source movements, which are thought to be an important method of innovation in the network society. So this contradiction should also be eliminated, if we want to build a more creative network society.

Conclusion

This paper researches Japanese collectivism in the Network Society. Firstly, we have seen theories about the influence of collectivism on innovation. Many of these previous studies such as those of Fukuyama (1995) and Hamaguchi (1996) evaluate Japanese collectivism. Flexibility based on trust is said to be especially necessary for innovation

in the Network Society, because this flexibility makes sharing of information possible and sharing of information is an important condition of innovation. Besides, open source movements are dealt with as a good example of an innovation method. However, Japanese collectivism is criticized through "Seken" analysis. Yet, the criticism of "Seken" analysis is often too general. So this paper focuses especially on the "Seken" characteristic of hiding the reasons for decision making. If we do not agree with the opinion that scientific theory develops cumulatively, we would define the development of science as a process of building new more comprehensive theories. However, the characteristic of "Seken" where the reasons for decisions in selecting theories are hidden can be an obstacle to scientific development and innovation. This paper examined these different influences of collectivism. From the result of the survey, we can determine that these different influences actually exist. The survey shows that the sharing of information and participation in open source communities are correlated. So participation in open source communities can really be a good example of innovation. But "Seken" has a negative effect on sharing of information and a positive effect on open source. In contrast, collectivism, which must coexist with open discussion, has a positive influence on sharing, but a negative influence on open source. Resolving this contradiction is vital to realizing a better method of innovation in the Network Society. To have found this problem is one of big meaning of this paper.

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