

## **Development of Social Capacity for Environmental Management and Institutional Change**

Shunji MATSUOKA, Sara OKADA, Kensuke KIDO, Naoko HONDA  
Graduate School for International Development and Cooperation  
Hiroshima University  
1-5-1 Kagamiyama, Higashi-Hiroshima  
Hiroshima, 739-8529  
Japan  
Email: [smatsu@hiroshima-u.ac.jp](mailto:smatsu@hiroshima-u.ac.jp)

### **Abstract**

This article gives qualitative analysis of the development of Social Capacity for Environmental Management (SCEM). SCEM is defined as capacity to manage environmental problems in a social system composed of three social actors- i.e., government, firms and citizens - and their interrelationships. Each actor's capacity depends on three fundamental factors: (1) policies and measures, (2) human and organizational resources, and (3) knowledge, technology and information. The SCEM concept stems from capacity development discourse of international organizations such as UNDP and OECD, to achieve sustainable development.

Capacity is co-related with institutions, and SCEM can be understood in the dynamism of capacity development process and institutional change. Each episode in institutional change defines unique stages for SCEM, which have consequent effects on relations between social actors in terms of environmental management. This process is developed as "SCEM Development Model".

Analyzed from this viewpoint, development of SCEM is hypothesized to be in three stages: System-making stage, System-working stage, and Self-management stage. We call environmental management system that observes such development stages Social Environmental Management System (SEMS). This 3-stage approach is called "SEMS 3-stage Development Model".

The authors integrate the above two models to make clear the interrelationships between SCEM, SEMS and institutional change. Using the integrated model, the authors conduct qualitative analysis of dust and SOx pollution control policy of Ube City, Yamaguchi. There is apparent difference in institutions between the control policies for the two pollutants. The analysis shows the dynamism of formal and informal institutional changes and SCEM development in the transition process from dust control institutions to SOx control institutions.

### **1. Introduction**

Our research group defined the term Social Capacity for Environmental Management (SCEM) as social capacity to cope with environmental issues. The development of SCEM is the most important task in practicing environmental policy and international environmental cooperation in an efficient and effective manner. (Matsuoka 2000, 2002, Matsuoka et al. 2000, 2002, 2003; Evaluation Team on Environmental Cooperation, Japan Society for International Development 2003, Matsuoka 2003a, 2003b, Matsuoka & Kuchiki 2003.)

This paper aims to define SCEM -a new concept which we have been advocating- and to discuss the model of SCEM development correlating with institutional change. Furthermore, we adopt the analytical method using SCEM concept to the history of the pollution control

policy in Ube City, Yamaguchi Prefecture, to examine its methodological effectiveness. The structure of the paper is as follows.

In section 2, SCEM is defined by highlighting the importance of the concept, considering the development of the argument over capacity development in the history of development assistance. The difference between SCEM and two similar concepts of environmental governance and social capital is also mentioned here.

Section 3 unveils the relations among social capacity development, institutions, institutional changes and path dependency. It also theorizes the dynamic process of social capacity development and institutional changes, and presents a SCEM development model.

In section 4, for the sake of demonstrating the model of SCEM development, the theoretical development model explained in section 3 is applied to the case of Ube City in Yamaguchi Prefecture, a case in which air pollution was overcome. The model is verified through qualitative analysis of the relation between SCEM, institutions and institutional changes.

Finally, in section 5, speculation and future issues are noted as a conclusion.

## **2. Concept of Social Capacity for Environmental Management (SCEM)**

Here, a new concept called Social Capacity for Environmental Management (SCEM) is defined from two viewpoints; actor approach and factor approach. Subsequently, the historical origin of SCEM is traced through reference to the history of capacity building discussion in development assistance. Lastly, the necessity, usability and advantages of SCEM concept is brought out, pointing out the difference between the SCEM concept and the confusing similar concepts of environmental governance and social capital.

### **2.1 Definition of SCEM**

Among the preceding research which tried to understand environmental management capacity in concrete terms, targeting air quality management capabilities in cities, there was a study jointly conducted by UNEP and WHO<sup>(1)</sup>. (UNEP/WHO 1996, hereinafter called the GEMS report<sup>(2)</sup>.) It was the GEMS report that inspired us to come to address with the conceptualization and modeling of SCEM. This section introduces and critically analyzes the GEMS report and states the definition of the new concept, SCEM.

First of all, the GEMS report assumed that the capacity for air quality management is composed of the following four elements:

- (1) capacity to measure air quality
- (2) capacity to assess and make available data
- (3) capacity to estimate emissions and to trace their sources
- (4) capacity to devise and implement policies

It evaluated each capacity element with indexes such as the number of monitoring stations and measurement frequency of certain pollutants, making an attempt to quantitatively evaluate the capacity for air quality management (UNEP/WHO 1996, pp.27-33).

The theory of Capacity Development in Environment (CDE), proposed by several groups such as OECD<sup>(3)</sup> since the 1990s, could only discuss the capacity for environment generally as a principle. On the other hand, the GEMS report divided it into four main elements and went further to break them into middle-and-small items. This enabled it to set proxy indexes to attempt a numerical evaluation of capacity for environmental management.

However, the GEMS report's targets were limited to the capacity for air quality management of governments and administrations<sup>(4)</sup>. The 'capacity of firms' which actually reduces pollution and 'capacity of citizens' which puts social pressure on firms and the government were excluded from its targets. The social capacity to cope with environmental issues must not be discussed only in terms of 'capacity of government' but with 'capacity of

firms' and 'capacity of citizens'.

SCEM is the social capacity to cope with environmental issues. Our study group defines government, (private, profit) firms and (non-profit) citizens as the three social actors. The environmental management capacity stipulated by each set of capacity standards and the correlation of the three actors is SCEM (Matsuoka & Kuchiki 2003). These capacities are developed from both sides: one from the central government level, which institutes nationwide environmental policies and environmental laws, and the other from local level, which is made up of local governments, firms and citizens that actually implement them. Hence, the relation between the central entity and the local entities is an important factor in developing SCEM (See fig.1). We call these definitions the "actor approach to social capacity".

Suehiro, who discussed the social capacity for industrialization, discussed the 'capacity of firms' and the 'capacity of government' as components of the "catch-up type industrialization"<sup>(5)</sup>. He concluded that three elements are essential to develop social capacity; planning and implementing an efficient policy, skill acquisition and information sharing, and human resources that enable them to take place (Suehiro 2000, pp.60-79). Based on Suehiro's research, we set three factors as the basic elements of social capacity.

The first factor is policies and measures. With this factor, we see what kind of policy and measures each actor takes. The second factor includes human and organizational resources that stipulate the implementation of those policies and measures. The last one is knowledge, information and technology which realize the other two factors. Contrasted with the above-mentioned actor approach, we named the approach defined from the factors of social capacity as the "factor approach".

The combined use of the actor and factor approaches makes it possible for us to understand SCEM in a more concrete way.

## **2.2 Conceptual Genealogy of SCEM**

In the development assistance field, the idea to emphasize intangible aspects such as organization-building and institutional design is called the capacity development approach. The concept of SCEM could be positioned as an extension to the capacity development approach in the environment field<sup>(6)</sup>. The discussion on capacity development in development assistance studies started in the 1950s as an approach to strengthen a single system or organization in the public sector. In the 1960s, the necessity of an institutional accumulation approach, which not only looks into a single system, but comprehensively views the public sector, was recognized. Beginning in the 1970s, the method of capacity development was discussed, with a viewpoint expanded to include local governments and private sectors.

From the 1990s and later, those discussions came to emphasize the relation between sectors (social actors). This developed into a theory of capacity development aimed at human development based on the capability theory<sup>(7)</sup> of Amartya Kumar Sen. While the capacity development theory of UNDP embraces human development<sup>(8)</sup> as a strategic goal, SCEM theory targets the development of a social system (a bundle of institutions<sup>(9)</sup>) which realizes sustainable development, and a social capacity which controls such system, as well as human development.

Among numerous discussions of sustainable development, -another branch of the genealogical tree of social capacity theory- the following two are particularly important: the World Commission on Environment and Development (WCED) report in 1987, which advocates sustainable development<sup>(10)</sup>, and the 1992 discussion by OECD which covered Capacity Development in Environment (CDE)<sup>(11)</sup>, following the Rio Summit. CDE represents the ability of individuals, groups, organizations and institutions in a given context to address environmental issues as part of a range of efforts to achieve sustainable development. The

term Capacity Development in Environment (CDE) describes the process by which capacity in the environment and appropriate institutional structure are enhanced (OECD 1995, p.6). CDE theory had discussed the entity of capacity, elements and ways to resolve problems, but could not pull out a satisfying achievement as a whole. However, the discussion of CDE is valuable in bringing up the concept of social capacity for realizing sustainable development. SCEM can be seen as a theory that develops the CDE theory along a new horizon.

As mentioned, SCEM theory which we advocate, and capacity development, which UNDP supports are deeply related, though large differences exist between the two. UNDP (1994, 1998) understands capacity on three levels -individuals, organizations and society (institutions)- and considers that capacity is developed in the course of correlation of these three. This approach by UNDP lacks the middle system that connects organizations and the society, which might make it difficult to understand the dynamism of micro (individuals, organizations) and macro (society) and the mechanism of adjustment.

To conceptualize and theorize the development process of social capacity, it is necessary to clarify: the capacities and actions of various actors that make up a society, the factors that define them, and the social system (a bundle of institutions) which controls capabilities and actions. From this point of view, the theorization and modeling of the development of social capacity would be possible only when social capacity is defined from both the actor approach and the factor approach, so that the middle system that connects the capacity of social actors and 'a bundle of institutions' becomes clear.

### **2.3 SCEM, Environmental Governance and Social Capital**

SCEM is composed of the three social actors of government, firms and citizens. It also describes the relations among them. The process of social capacity development and institutional change are closely related to each other, as is explained in the next section.

Among the discussions of environmental management that use the term 'social actor' is environmental governance theory in the field of politics. Others include social capital theory, mainly discussed in sociology, and institution theory (new institutional economics) in economics, which study the relations among individual actors and institutions. North's theory, a representative theory of new institutional economics, will be examined in the next section, so we will discuss the difference among environmental governance, social capital and our theory, SCEM, to demonstrate the necessity, usability and advantages of the concept of SCEM.

Rosenau and Czempiel defined the term 'governance' as a political system that functions without centralized authority when coping with particular issues. The definition includes social systems such as general regulations and codes of practice, as well as regimes which stipulate multilateral cooperative relationships for certain issues (Rosenau and Czempiel 1992). There are various ideas of governance, though they have a common perception that the essential requirement for good governance is to incorporate various actors into the democratic decision-making process of policy setting, by focusing on the methods and methodologies of the policy<sup>(12)</sup>.

Governance theory that discusses how the social actors should approach the policy-making process ultimately could be thought of as discussing a broad meaning of 'institutions', a term used in the new institutional economics and our research group. North defines institutions as "rules of the game in a society or, more formally, the humanly devised constraints that shape human interaction"<sup>(13)</sup> (North 1990, p.3). The concept of governance is the institutions itself which provides actions of individuals, organizations and society.

The objective of this paper is to theorize the dynamism of social capacity development and institutional change. If it is possible to define environmental governance as a bundle of institutions that relate to the environment, it could be said that environmental governance

itself is institutions, and SCEM is its content, as they are complementary to each other.

It is highly important to take institutions into consideration when thinking about social capacity<sup>(14)</sup>. Recently, social capital<sup>(15)</sup> (Coleman 1988, Putnam 1993, Collier 1998, OECD 2001) is attracting attention as a theory that explains the functionality of institutions (as formal rules). Putnam considers social capital as an accumulation of trust, norms and human networks, which were built historically, and it determines the performance of institutions. However, if social capital could be recognized as a social norm or a custom, it is possible to consider it as institutions (as unspoken informal rules). If so, the relations between SCEM and social capital could also be inter-complementary.

All told, the discussions of governance and social capacity could be thought of as all focusing on institutions (a bundle of institutions -- whether formal or informal). It is important to understand and theorize the relation between social capacity as the content of institutions and institutional change.

In Section 3, we will theorize the relation between SCEM and institutional change, and demonstrate the model of social capacity building.

### **3. SCEM-Building and Institutional Change: Model of Social Capacity Building**

#### **3.1 Social Capacity Building and Institutional Change**

North, a representative scholar of new institutional economics described institutional change as follows: "(Institutional) change typically consists of marginal adjustments to the complex of rules, norms and enforcement that constitute the institutional framework. The overall stability of an institutional framework enables complex exchange possible across time and space" (North 1990, p.83).

Additionally, North features the process of institutional change in the following way. Institutions gradually change by factors such as changes in relative price. Formal institutions may change informal institutions. However, changes in formal institutions (official, formalized rules such as statute law) do not necessarily trigger changes in informal institutions (unspoken rules such as social norms and customs) at the same time. Instead, informal institutions may ruin formal institutions. Here, formal and informal institutions are distinguished relatively, and there is no absolute boundary between them (North 1990).

For an effective institutional change, it is necessary for both formal and informal institutions to change, because it is the informal institutions that provide people's behavior pattern (changes in awareness and attitudes). Suppose a new bill was enacted, but hasn't been enforced effectively - in other words, informal institutions has not change, therefore people's behavior will not change. If that is the case, the formal institution (the new law) will be a dead letter. As Aoki says, "[S]tatutory law and regulations per se are not institutions if they are not necessarily observed"<sup>(16)</sup> (Aoki 2001, p.13).

Then what gives rise to institutional change? North explains that it comes from changes in relative price triggered by technological innovation, and people's change of preference caused by the expansion of knowledge and information. North considers change in people's preferences as a factor of institutional change. Another possible important factor is the external shock which Aoki argues (Aoki 1996, 2001). Institutions are resistant to internal factors, but are vulnerable to external factors.

Nevertheless, as mentioned above, the normal process of institutional change is a slow and progressive flow. The feature of institutions lies in its durability and tenacity. In other words, institutions are unalterable and hard to change, because institutions exist as institutional framework (North 1990) or a bundle of institutions (Aoki 2001), and their existence is a mixture of various formal or informal institutions that has complementarity and dependency.

In addition, if we look at institutions as something powerfully ruled by history, institutions show path dependency, thus have difficulty in simply shifting to one path from another. New institutional economists have been often criticized as ‘historical determinists’ (who argue that past defines present), as they emphasize the path dependency of institutions.

Social capacity building is closely related to institutional change, and in a way, they define each other. But while institutional discussion often gets trapped into historical determinism, social capacity discussion intends to break away from it by theorizing the dynamic process of social capacity building and institutional change. Its dynamism can be theorized as follows.

First, technological innovation or creation of new knowledge by an entrepreneur causes a fluctuation in people’s sense of value. Together with a major change in international conditions, it may improve social capacity, and trigger changes in formal institutions. Changes in the formal institutions enable further improvement of social capacity and trigger informal institutional changes such as social norms and customs. On top of this, changes in informal institutions enable greater improvement in social capacity.

This process of institutional change and SCEM development is described in fig.2. The arrows on the top and the bottom describe formal and informal institutions, which indicate vectors of institutional change. The middle one represents SCEM, assuming that the capacity gets higher as it shifts to the right.

### **3.2. SEMS 3-stage Development Model**

Regarding the development stages of SEMS, our study group had already set out a development model composed of three stages, focusing on industrial pollution management (Matsuoka & Kuchiki 2003). The three stages are the (1) System-making stage, (2) System-working stage, and (3) Self-management stage <sup>(17)</sup>. The model is based on the discussion of the preceding studies by Imura and Katsuhara (1995), Harashima and Morita (1995) and Lee (1999).

The system-making stage is a phase in which the Social Environmental Management System (SEMS) - a bundle of institutions on environmental management- is built. In this period, building of “capacity of government (administration)” is important. Basically, there are three benchmarks in the process. The first step is the development of environmental laws such as the Basic Environment Law and the Environmental Regulation Law in each sector: development of laws. Secondly, the development of an environmental administration system: restructuring the ministry of environment. Lastly, the development of an environmental information system: revising pollution monitoring networks, collecting, utilizing and disclosing data. Regarding environmental information, not only the number of monitoring stations is important, but also revising information networks, fostering environmental awareness among citizens and establishing social pressure towards polluters (firms) become specifically necessary.

The system-working stage is a phase to reduce pollution in earnest. It is the period when the increased trend in pollution turns to a decreased trend, and the turning point could be observed on the Environmental Kuznets Curve (EKC) <sup>(18)</sup>. In this phase, it is most important to develop and spread technology and knowledge, and to accumulate human and organizational resources that enable firms to take measures for pollution control. Of course the precise environmental policy and its enforcement by the government, the awareness and eyes of the citizens toward environmental problems, and their support of the government are also essential.

The self-management stage is a phase when the relationships among the social actors - government, firms and citizens - become stronger. In this phase, social capacity develops in an autonomous manner, and comprehensive environmental management is practiced. It is also when the private sector (firms and citizens) takes the initiative in environmental management,

which makes it possible to flexibly address the newly emerging environmental problems. As for the methods of environmental policy, this is the period when the emphasis shifts to market methods or voluntary approaches from command-and-control approach. Within the developing countries, this is the time when they graduate from vertical cooperative relations with the developed countries, based mainly on traditional ODA assistance, and establish horizontal cooperative relations such as civil exchange.

### **3.3. Model of SCEM Building and Model of Development Stages**

In an attempt to clarify the relations between the 3-stage development model of SCEM and the social capacity development model, we have represented two examples of a model of SCEM development - sulfur oxide (SOx) emission control in China and in Indonesia- in fig.3 and 4<sup>(19)</sup>, respectively.

The system-making stage in China is assumed to have started from its enforcement of the Environmental Protection Law (Trial) in 1979. It is said to have shifted to the system-working stage in the mid-1990s based on the following points: the 1995 amendment of the Air Pollution Control Act, emphasis on the eco-policy in the ninth five-year plan in 1996, and the observing the peak of the SOx emission of the industrial sectors in 1996. In the coming years, China is expected to actively promote environmental management with the government, firms and citizens working together towards the Beijing Olympic games in 2008, and the World Exposition in Shanghai in 2010.

In Indonesia, the legal system and the administrative machinery regarding SEMS began from the formulation of the Basic Provision for Environmental Management Act in 1982 (the new Environmental Management Act was enacted in 1997), and was developed in the early 1990s. Concurrently, an air pollution control program was carried on; however, neither has been successful. Considering its nationwide monitoring network system remaining uncompleted, and its State of the Environment just having started to be issued (as of 2003), Indonesia could be assessed as still being in the final phase of its system-making stage.

China ended its system-making stage and shifted to the system-working stage in about 15 years. As for Indonesia, we need to consider its financial crisis in 1997 and the following collapse of the Suharto regime. However, we cannot ignore the fact that it has been unable to shift to the system-working stage, apparently staying at the same system-making stage for more than 20 years.

What does the difference between the developmental stages of these two countries result from? Both countries addressed common issues, such as forming an environmental administration, environmental laws and environmental information system expected in the system-making stage. But while China smoothly entered its system-working stage, and has been proceeding towards the self-management stage, Indonesia is struggling at its system-making stage to make a step forward to the system-working stage. These facts indicate that SEMS cannot function only by creating formal institutions.

As the shift from system-making stage to system-working stage occurs, there must be some kind of informal institutional change, such as a change in the actor's behavior. Conceivably in the case of Indonesia, it is possible that the country lacks the social capacity enough to make informal institutional change.

In the next section, the efficacy of the theoretical model of the SCEM development and institutional change is demonstrated by applying it to the case of the air pollution (dust and SOx) control in Ube City.

## **4. The Development of Social Capacity for Environmental Management and pollution-control measures in Ube City**

Using the development model of Social Capacity for Environmental Management, we analyze the policies for overcoming air pollution in Ube City. We especially look at dust control measures started in 1949 and sulfur oxide (SOx) control measures started in 1960. We also studied the relationship between the development of Social Capacity for Environmental Management and institutional changes historically. Local governments played a pioneer role in pollution control policy in Japan and we chose Ube City as a typical example. Moreover, it is important to analyze Ube City because the city experienced a significant institutional change from dust to SOx control.

#### 4.1 Social and economical background of Ube City

Ube City, located in southwest Yamaguchi Prefecture, faces the Sea of Suoh and is a coal and industry town where Ube Industries is a main company. The village, population 40,000, acquired city status in 1921<sup>(20)</sup>. The most significant point in the history of Ube is that the profits obtained from coal were reinvested in social welfare and public work projects, and utilized to maintain the regional social infrastructure<sup>(21)</sup>. The Ube Community (*Ube Kyoudou Gikai*), started in 1886, played the central role in this activity. The community consisted of only village people and the independent spirit of Ube was brought up in such a history. This spirit made people from the outside feel that Ube was being exclusive at times and it was occasionally called the Ube Monroe Doctrine (Ube City 2002, Nose 1969).

#### 4.2 Dust control measures in Ube City

The coal [Ube Coal] mined in Ube was low-grade (an ash content of 40%-45%, calorific values between 3,000kcal- 3,500kcal) in general and was not usable as fuel as is. After the introduction of a method that crushes, micronizes and combusts coal with air by jet was developed, Ube coal was utilized as a fuel (mainly for power generation) (Kadowaki 1992). Ube, being a town dominated by one company (Ube Industries) with 70% of the citizens having direct relations with affiliated companies, the increase of dust accompanying the industrial growth and coal consumption was accepted as an unavoidable event at the beginning (Nose 1969).

Dust control measures started in October 1949. The damage caused by falling dust in the rapid postwar recovery period became serious and Yoshikazu Yano, city council member, made an anti fallen dust motion in the city council in October, 1949. It was passed by common consent, and the Dust Fall Control Committee (chairman: Yano, city council member) was set up as a special committee of the city council (Tanimoto 1960).

The Committee requested that Prof. Yoshikatsu Nose at Yamaguchi Medical College (presently the Department of Medicine at Yamaguchi University) investigate the damage and actual conditions of the business districts from January to March of 1950. They measured falling dust at ten points in the city and surveyed the influence on the human body from May of the same year. After completing the monthly survey the results of the measurement of the amount of falling dust and the epidemiological survey data were published in the local newspaper and it had a big impact on the citizens of Ube. The average amount of dust that fell, especially in 1950 and 1951, was measured as 55.86 t/km/month and this was the maximum value out of 43 cities across the world that had been measured by that time. The newspaper announced, "The dust of Ube is the worst in the world," and the improvement of the citizens' awareness about information disclosure and dust measures were seen.

Three measures, (1) installation of the dust-entrapping devices at the factories, (2) purchase of sprinkler trucks to dustproof the streets, and (3) landscaping along the road to keep dust down, were submitted to the city council in March 1951. An ordinance was enacted in the council in June of that same year and "the Ube City Dust Fall Control Committee" was established. Notable characteristic of this ordinance is that it did not establish restriction



standards or penal regulation regarding air pollution. Moreover, committee members were composed of four classifications of representatives, such as; corporate representative (four people), administrative representative (two people), representative from the city council (two people), and academic expert (four people). This Committee aimed to solve the problem through voluntary approach by the local society without damaging the industrial characteristics of Ube City, and the system was called Ube model (Nose 1996).

Although the Ube City Dust Fall Control Committee requested that each company submit proposed dust prevention measures and a current survey report, there was a significant gap in opinions between the Committee and the companies that prioritized the industrial profit. There was even an incident that the dust measuring devices set up at ten places in the city were destroyed by someone. In reaction to the slow response by the company, the citizens held large-scale anti-dust pep rallies in 1952 and 1954. Such pressure by the citizens forced the corporate activity to change in 1953.

In 1953, Kanichi Nakayasu, vice president of Ube Industries, visited Pittsburgh City in the United States. The city had changed from a "smoggy town" to a "rich green town." He realized that dust control measures were indispensable for the development of the city and industry. After returning from the United States, he proposed strengthening of control measures to the Committee and started a positive pollution control policy in the company with the slogan, "Dust is Money". Ube Industries developed Ube Pozzoran Cement where the coagulation power and water resistance of cement was upgraded by mixing ash that was the main ingredient in falling dust in 1956. This new cement recorded sales of 1.5 billion yen over ten years and these sales became the money source for the dust collector. Other main factories in the city also installed new dust collectors. In all, factories in the Ube city area invested 1.13 billion yen in equipment for pollution control measures over 14 years from 1951 to 1964.

As a result, the mayor and main business owners set numerical targets for dust control measures (The efficiency of dust collecting in each factory should become over 97% and the density of dust in chimney exhaust gas should become 1.2g/m by 1960) at Committee in 1957. Moreover, each factory decided to make a plan including time limits and expenditures for accomplishment of the goal.

Under such measures, the amount of dust falling in 1961 became 16.0t/km/month. This meant a success through a sharp decrease in ten years to 1/3 or less compared with that in 1951, when the damage by falling dust was the largest. (Refer to Figure 5)

#### **4.3 SO<sub>x</sub> measures in Ube City**

Figure 6 shows the transition of the density of sulfur oxide (SO<sub>x</sub>) and the amount of crude petroleum use in Ube City. Along with other industrial cities, the amount of crude petroleum use and the resultant exhaust gas of SO<sub>x</sub> in Ube City increased from 1960 because of fuel conversion from coal to oil. The Ube City Dust Fall Control Committee was reorganized into the Ube City Air Pollution Control Committee in June 1960 because of the necessity for SO<sub>x</sub> control measures.

City representatives were removed from the Air Pollution Control Committee members and the Committee was composed of three parties, which was different from the Dust Fall Control Committee. However, the committee followed the traditional Ube model system and did not depend on ordinances or penal regulations. Their discussions were based on scientific research data and its release to the public (Ube City 2002).

SO<sub>x</sub> monitoring devices were set up (17 places) two months after the Air Pollution Control Committee started and continuous monitoring began in January 1962.

The factory area of Ube Industries was not included at first as a monitoring point. However, monitoring devices were set up at two points, on the roof of the Ube Industries headquarters

and the roof of the Ube mining office, in 1962. Ube Industries had been pushed by a strong demand from the city and SOx emission monitoring in the industrial zone was started<sup>(22)</sup>. The SOx density data of Ube City was widely available to the public through the public relations magazine of the city called 'The Pollution in Ube City'. Although a tree planting movement involving all citizens of the city began to blossom at this time, the recorded density of SOx increased every year after installing the monitoring equipment and the pollution control policy didn't make much progress.

While the approach to pollution control by Ube City began late, other local governments, such as Yokohama City, Yokkaichi City and Metropolitan Tokyo were advancing their pollution control policies based on pollution control agreements and ordinances. Encouraged by these early local examples, the country enacted the Basic Law for Environmental Pollution Control in 1967, abolished the former Law Concerning Controls on the Emission of Smoke and Soot in 1968, and enacted and began enforcing the Air Pollution Control Law instead.

Influenced by the change of external factors, such as the strengthening of environmental control by the country, the situation of Ube City changed. Yamaguchi Prefecture established an outline of urgent pollution abatement measures in 1969 based on the Air Pollution Control Law, and the first warning was announced officially in Ube City in that same year. The first air pollution alarm in Yamaguchi prefecture was announced officially in Ube City in 1970. The number of air pollution warnings and alarms in 1970 counted 12 times and Ube City had to take immediate pollution control measures. The industry was ordered to take measures to reduce the number of warnings and alarms and therefore had no other choice but to cooperate with Ube City. In addition, the Ube City Air Pollution Control Committee was reorganized into the Environmental Pollution Control Conference in 1970 and at the Conference meetings, active discussions about SOx measures involving civic groups took place.

Ube City concluded the pollution control agreement<sup>(23)</sup> with a total of 17 factories, 11 main factories in the city in April and 6 more factories in October 1971, and began to work on SOx measures on a full scale by concluding the enforcement details of the pollution control agreement in 1972. The content of the agreement was that the reduction ratio of SOx exhaust amounts was changed from 25% to 30%. After accepting these enforcement details, each factory seriously worked on SOx control and consequently the density of SOx dramatically decreased<sup>(24)</sup>.

#### **4.4 Development of social capacity and institutional change in Ube City**

The above discussion examined the historical progress of the pollution control policy of Ube with a central focus on the dust control measures in 1950's and SOx control measures in 1960-1970's. In this chapter, we will apply the development model of Social Capacity for Environmental Management to Ube City. Furthermore, we will analyze SCEM and institutional change in Ube City. In this paper, our analysis will focus on the System-making and System-working stages.

##### **(1) System-making stage**

The System-making stage of Ube City began with the formation of the Dust Fall Control Committee in the assembly in 1949. Shortly after this, the Ube City Dust Fall Control Committee, composed of representatives from "businesses, government, academics and citizens" was set up in 1951. These are formal institutions of environmental management for air pollution. This Ube model can be called "voluntary problem-solving institutions." It was a formalization of informal institutions made up historically in Ube City.

However, pollution control measures by industry did not advance as expected after the committee was established, and citizens requested immediate execution of dust control measures twice in 1952 and 1954. Considering Ube's problem-solving history through

discussions, such systematic citizen movement was unique. It can be thought that pressure from the citizens became a big factor in the pollution control policy of Ube.

The vice president of the Ube Industries, Kanichi Nakayasu, who returned from the inspection of Pittsburgh in 1953, declared a conversion of corporate activity under the slogan "Dust is money" and in 1956 they developed Ube Pozzoran Cement from collected dust. This meant that his company had developed a technical and managerial outlook regarding dust control measures. It can be said that the acquisition of knowledge and technology of dust control in the industrial sector at that time was a big factor in changing the action of the industry (change of informal institutions). Influenced by this informal institutional change, the mayor and the industry began setting up voluntary goals for dust control in 1957 and the dust problem started to improve in 1960. Considering the fact that the voluntary goals made up in Ube in 1957 were referred to when the national dust prevention law in 1962 was enacted, Ube City was a front-runner in dust control measures in Japan at that time.

On the other hand, SO<sub>x</sub> control measures were not that progressive. There was fuel conversion from coal to crude petroleum in 1960 in Ube City and the Ube City Dust Fall Control Committee was progressively reorganized into the Ube City Air Pollution Control Committee to advance pollution control measures including SO<sub>x</sub> reduction measures. However, the problem was not substantially solved until the conclusion of the pollution control agreement in 1971. The time period when the SO<sub>x</sub> density in Ube City began to decrease (after 1972) is the same as that of an average city in Japan. The next section considers why the Ube model, which had succeeded in the dust control, was not useful for the SO<sub>x</sub> control and how SO<sub>x</sub> control measures functioned after 1971, from the viewpoint of the development of social capacity and institutional change.

## (2) System-working stage

The SO<sub>x</sub> pollution in Ube City began to decrease rapidly with the conclusion of the pollution control agreement in 1971. In other words, before 1971 there was not an effective pollution control measures for SO<sub>x</sub> control. There are two possible reasons for this trend.

The first is the difference in character of the targeted pollutants. Accumulated know-how about the basic technology for dust control measures had already existed in Japan before the Second World War. On the other hand, the introduction of crude petroleum desulfurization technology was in 1967 and its commercialization did not start until the beginning of the 1970's. Moreover, although the dust was recyclable by collecting it as a material to be used in cement, it is believed that the ammonium sulfate and gypsum were obtained by methods that produced SO<sub>x</sub> pollutants as a by-product, which made it difficult for the process to become profitable.

The second is the character of the Ube model. As previously mentioned, it is believed that the spirit of the Ube model is created by formally institutionalizing the informal institutions based on the history of city. Decision-making was conducted in a conference composed of representatives of industry, administration, education and civilian without depending on regulations. The guiding principle of making decisions at a conference is unanimous approval, and a decision is made based on consensus was executed promptly. However, at the same time there is a possibility of venal behavior to reduce troubles with and save faces of each other.

The dust control was relatively easy to achieve based on social actors' consensus because it was technically not too difficult and collected dust sold well as by-product. On the other hand, industries did not seriously take actions for SO<sub>x</sub> control in the 1960s because they lacked enough technology and methods to utilize the by-product. Moreover, the strong influence of opposing industries in the committee might have stagnated proactive discussion of the meetings.

Here, the stagnation of social capacity development caused by the rigidity of institutions can

be observed. The dust problem was overcome promptly through the establishment of institutions of the Ube model. Oppositely, it can be said that the SOx problem ended in a stalemate because of the Ube model. Next, we explain how Ube City could escape from the standoff and overcome the SOx pollution.

Analyzed from a viewpoint of institutional change, 1968 to 1972 was a time when institutions changed rapidly. First of all, the Air Pollution Control Law was enacted as a national law in 1968. This could be explained as the starting point of institutional change in Ube City.

After receiving this external pressure, the outline of emergency measures concerning air pollution in Yamaguchi Prefecture was enacted in 1969 (formal institutional change) and the air pollution warning system was announced officially in Ube City. Responding to the introduction of the national law system for pollution control policy in the same year, a pollution control measures room was also newly established in Ube City. The air pollution alarm was officially announced in 1970 and factories were forced to cut operations. This was one of the main factors that made the industry to take SOx control measures (informal institutional change). The Ube City Air Pollution Control Committee was reformed to the Environmental Pollution Control Conference in the same year (formal institutional change), and a discussion about the necessity for an pollution control policy by civic representatives was activated in the conference (informal institutional change). During the 1970s a so-called "Pollution Diet" was held and nationwide public opinion concerning pollution control arose. With such national pollution control trend, Ube City strengthened their organization by upgrading the pollution control measures room to pollution control division (informal institutional change) in the same year. The rapid change of formal and informal institutions can be seen above. Ube City concluded the pollution control agreement with the industry the next year (formal institutional change) and the arrangement of particulars in 1972. Consequently the SOx problem in Ube City was greatly improved. Figure 7 showed this concept chart.

As for pollution control policy of Ube City, Ube model was formed as institutions for dust control and continued until 1968. However, Social Capacity for Environmental Management did not improve and the SOx pollution problem was not overcome. After all, both formal and informal institutions changed by various factors such as external pressure and the change in the people's awareness of the pollution. The SOx problem was overcome after the new institutions of pollution control agreement had been established in 1971.

North says that sometimes "formal rules are developed deliberately to overrule and supersede existing informal constraints that no longer meet the needs of newly evolved bargaining structures" (North 1990, p. 88). We can say that the informal institutions (the Ube model), which did not function for SOx control were replaced by new institutions (the pollution control agreement).

Figure 8 showed the concept chart of the institutional change of Ube City and the Social Capacity for Environmental Management. I1 and I2 show the ability curve of the Ube model and the pollution control agreement. The vertical line that shows the index of the Social Capacity for Environmental Management shows relative positions for both institutions (dust management capacity < SOx management capacity) in Ube City.

The pollution control policy concerning dust control, started in 1949 in Ube City, improved the social capacity through the establishment of the Ube City Dust Fall Control Committee as the Ube model (institutions) in 1951. However, since the Ube model did not function effectively for SOx pollution control measures which began after 1960, it caused institutions change, and social capacity improved after adopting the pollution control agreement in 1971. The process is shown in Figure 8.

## **5. Conclusion**

This paper defined the new concept of Social Capacity for Environmental Management as an operating capacity of the Social Environmental Management System that is formed by three social actors, the government, firms, and citizens and the interrelationship between them. Social Capacity for Environmental Management is also composed of three elements; policy and measures; human and organizational resources; and knowledge, technology and information that compose each actor's social capacity. The main conclusion of this paper is described as follows.

The Social Capacity for Environmental Management can be placed within the discussion about the capacity development approach and sustainable development that international organizations such as the UNDP and the OECD have addressed in development aid.

Social capacity and the institutions complement each other, and it becomes possible to model the development of social capacity in the dynamism of institutional change. Social capacity is formed from tacit informal institutions such as the social standards and customs formed through a historical course and the formalized formal institutions are created on the assumption of such informal institution. Formal institutional change prompts further development of social capacity and the improvement of social capacity prompts change of the informal institutions. Such informal institutional changes promote the formation of social capacity.

The above-mentioned dynamic process is an improvement process of social capacity and this can be shown as a capacity development model. When thinking within the framework of the Social Environmental Management System with respect to the pollution control measures for industrial pollutants, the development of the Social Capacity for Environmental Management shows the development model classified in three development stages; System-making stage, System-working stage and Self-management stage.

Thus, two models, the capacity development model that shows the relationship between the development of Social Capacity for Environmental Management and institutional change, and the 3-stage development model for the Social Environmental Management System, were presented. Stages of the Social Environmental Management System evolve as social capacity develops along with institutional changes.

We applied methodologies like the capacity development model and the 3-stage development model to the dust and SO<sub>x</sub> pollution control measures of Ube City, and verified the models. As a result, it became clear that the dust control measures were taken promptly and the problem was resolved because the informal institutions were formalized (Ube model) and social capacity was formed. However, the institutions of the Ube method did not function for SO<sub>x</sub> control measures, therefore social capacity didn't improve and sufficient pollution control measures were not taken. After all, institutional change in Ube accelerated under the external pressure of the strengthened restrictions at the national level. Also, the improvement of social capacity was done through the institutional change by the conclusion of the pollution control agreement in 1971, and the SO<sub>x</sub> control measures advanced.

We can clarify the process of pollution-abatement measures of Ube City by applying the capacity development model, such as, the Social Capacity for Environmental Management and institutional change, and the 3-stage development model of the Social Environmental Management System. However, the analysis in this text is qualitative and the development of quantitative analysis techniques concerning capacity development is an issue for the future.

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- (1) UNEP: United Nations Environment Program, WHO: World Health Organization
- (2) GEMS: Global Environmental Monitoring System
- (3) OECD: Organization of Economic Cooperation and Development
- (4) The GEMS report explains that it selected the minimum capacity required to generate air quality information useful for policy design when making the index (UNEP/WHO 1996, pp. 30-32). However, we would like to point out that there is a bias in the government.
- (5) "Catch-up type industrialization" is a pattern that developing countries try to and are obliged to take because they industrialize later than developed countries. The key feature is that they have to develop the production management system to use the technology system and knowledge which developed countries have already created and used, and have a policy system which includes export-led industrialization and promotion of the export industry connected with foreign capitals (Suehiro 2000, pp. 4-6).
- (6) Refer to Matsuoka and Honda (2002) for a detailed discussion concerning capacity development and the Social Capacity for Environmental Management.
- (7) Sen argued the importance of a social framework in which people can combine and choose various alternatives freely to achieve welfare (well-being), and explained the freedom of selection using the concept of capability. Refer to Sen (1985, 1992, 1997) for details.
- (8) According to the UNDP, human development is "the process to expand human's selection" (UNDP 1990). "Living long in good health", "obtaining knowledge", and "access to appropriate resources for a desirable living standard" are necessary for human development.
- (9) A bundle of institutions is an idea that understands the social institutions as a complex of various institutions (Aoki 2001, Matsuoka and Kuchiki 2003).
- (10) Sustainable development is defined as development that fills the present generation's needs without damaging future generation's ability to fill their own needs (World Commission on Environment and Development 1987, p. 8).
- (11) Details of the discussion over this concept are written in Matsuoka and Honda (2002).
- (12) Refer to UNDP (2002) and World Bank (1994, 2002) regarding the governance that emphasizes democracy, OECD (2002) about the relationship between governance and system, and Auer (2000) concerning the role of non-governmental organizations in environmental governance.
- (13) The Japanese translation of the quotation depends on the translation by Takeshita (1994).
- (14) While clarifying the complementarity of investment in capital to the environmental management culture and development of institutions, Nogami (2003) argued that it is necessary to form institutions to prevent environmental destruction in the development process of environmental management capacity. He also pointed out the importance not only of institutional change of individual organizations, but also the interaction between institutions in order to examine efficiency when we observe the individual organization and institutions that exist in society as a whole.
- (15) The social capital used here is different from "social capital" in the meaning of infrastructure that becomes the basis for consumption. Review of the concept of social capital is detailed in Shikage (2002), Miyakawa (2003), and Morotomi (2003).
- (16) The Japanese translation of the quotation is from the translation by Takizawa and Taniguchi (2001).
- (17) Details concerning the development stage are written in Matsuoka (2003).
- (18) Refer to Nogami (1997) and Matsuoka et al. (1998) concerning the view of the Environmental Kuznets Curve and the economic growth and environmental problems of developing countries.

<sup>(19)</sup> Refer to Evaluation Team on Environmental Cooperation of the Japan Association for International Development (2003) for a detailed explanation of the development stage in China and Indonesia.

<sup>(20)</sup> About 300 years ago coal was discovered around the Tokiwa pond and began to be used as a fuel, and many collieries were established after the Meiji era. However, they were swallowed by Okinoyama colliery Ltd. in 1928 and it developed into Ube Industries.

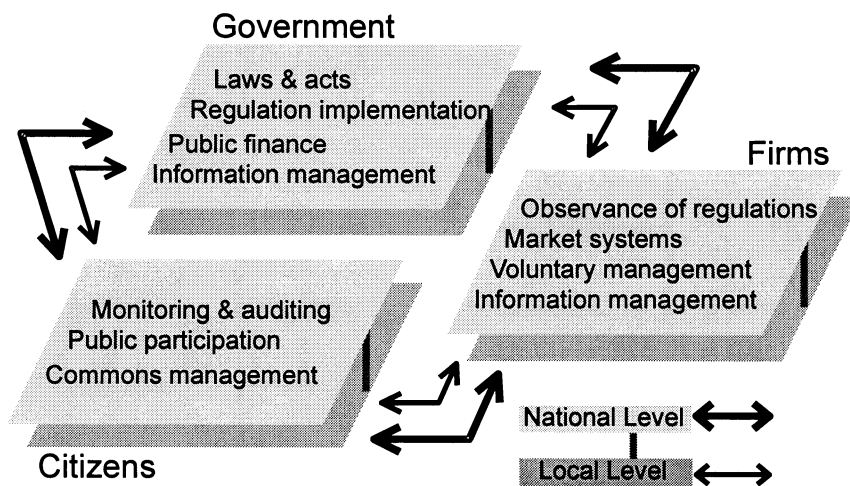
<sup>(21)</sup> It was not only used for projects like the construction of the village-owned junior high school and the attracting of the Prefectural Ube Industrial High school, but also for the installation of the police station and post office, the maintenance of Tokiwa Park and the construction of the library.

<sup>(22)</sup> The monitoring points increased to 26 points in 1971.

<sup>(23)</sup> In this agreement, the target value of SO<sub>x</sub> for environmental preservation was decided to be 0.034ppm (the national standard is 0.05ppm) average per hour in a year (the target year is the end of 1974).

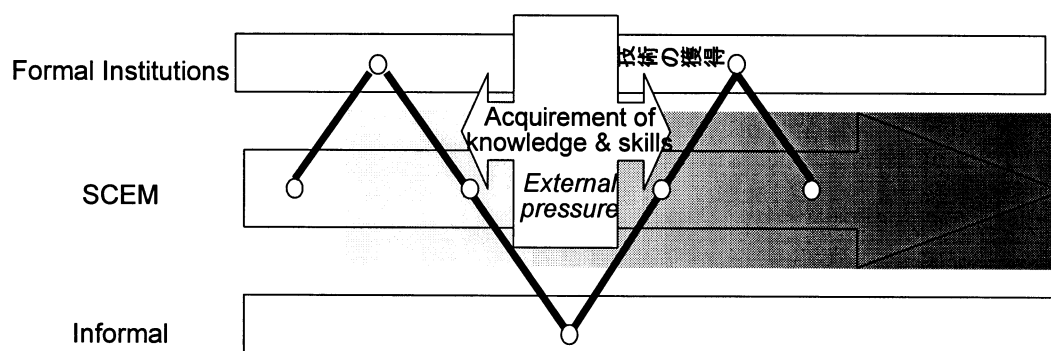
<sup>(24)</sup> Afterwards, following the improvement of the situation with the environment, revisions of the pollution control agreement were done in April 1975, in September 1976, in October 1978, in August 1982, and in September 1984.

Figure1 Social Environmental Management System (SEMS)



Source: Matsuoka, 2002

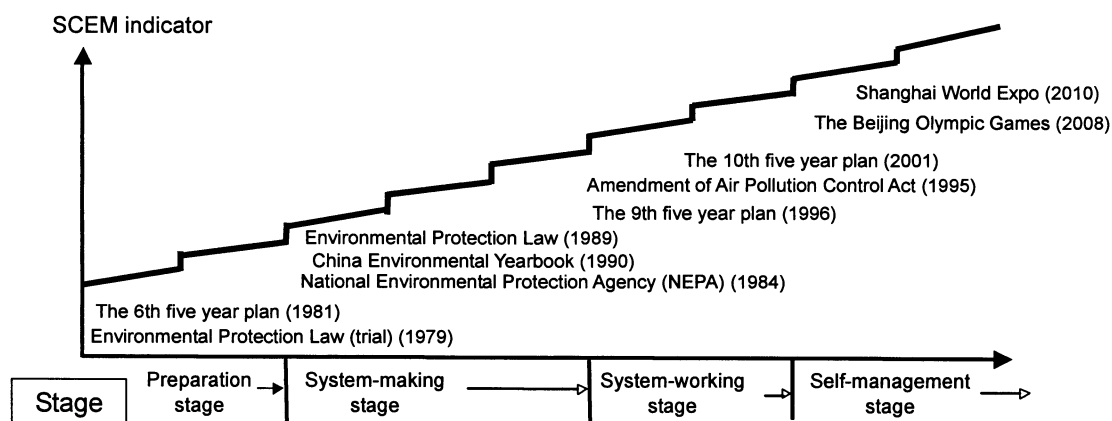
Figure 2 SCEM and Institutional Change: Capacity Building Model



Drawn by Author

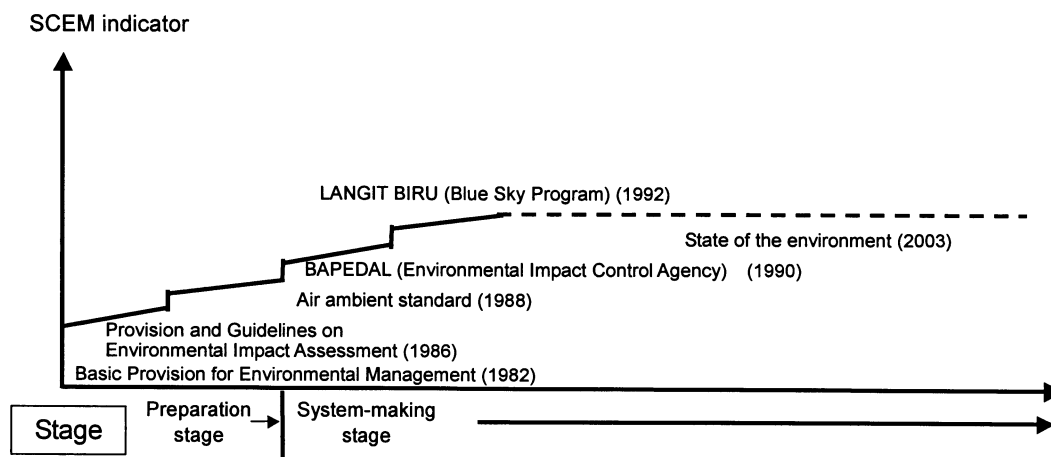


Figure 3 Development Process of SCEM in China



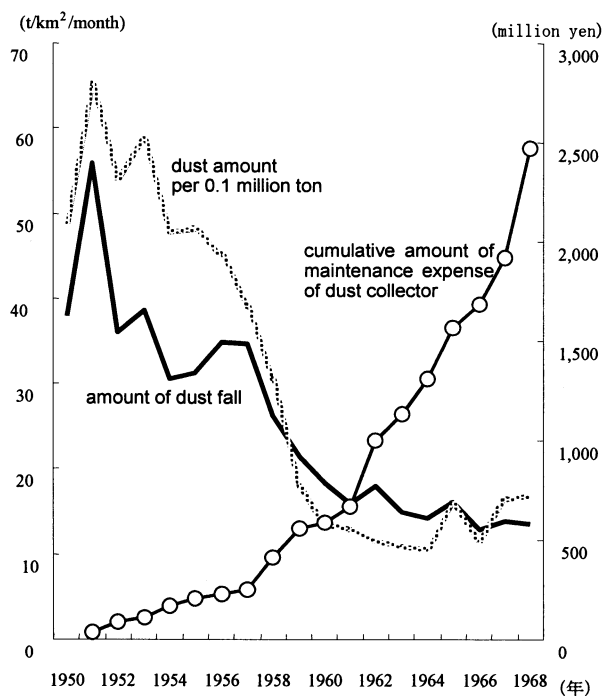
Source: Evaluation Team on Environmental Cooperation, JASID, 2003

Figure 4 Stage Model of SCEM Development in Indonesia



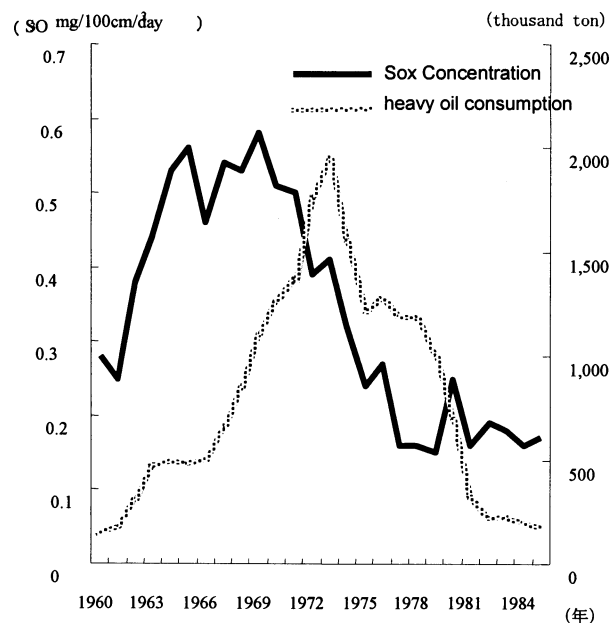
Source: Evaluation Team on Environmental Cooperation, JASID, 2003, Modified by Author

Figure 5 Shift in Dust Fall Amount and  
Maintenance Expense of Dust Collector  
in Ube City



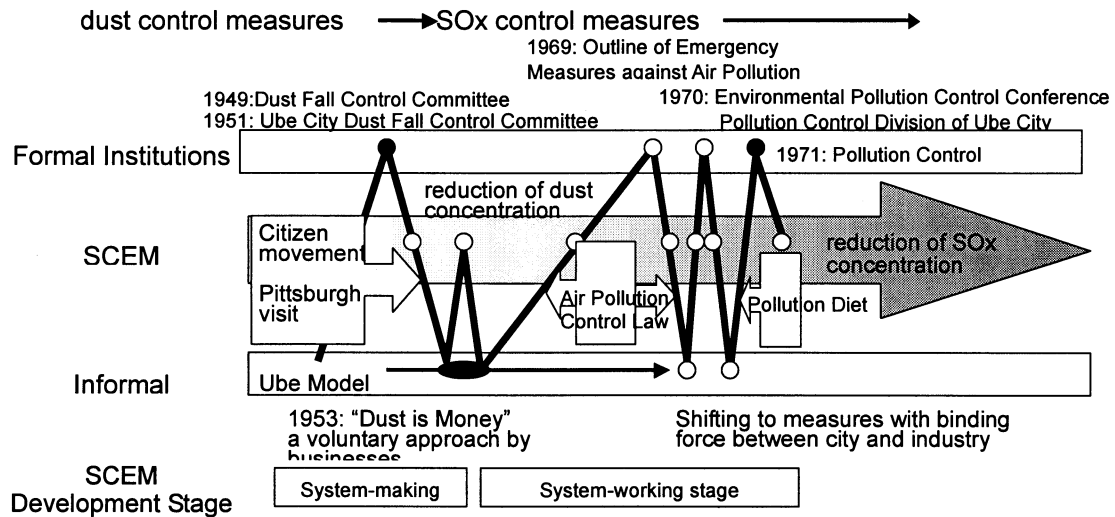
Based on the Data from Ube City, 1971,  
Created by Author

Figure 6 Shift in SOx Concentration and Heavy Oil  
Consume in Ube City



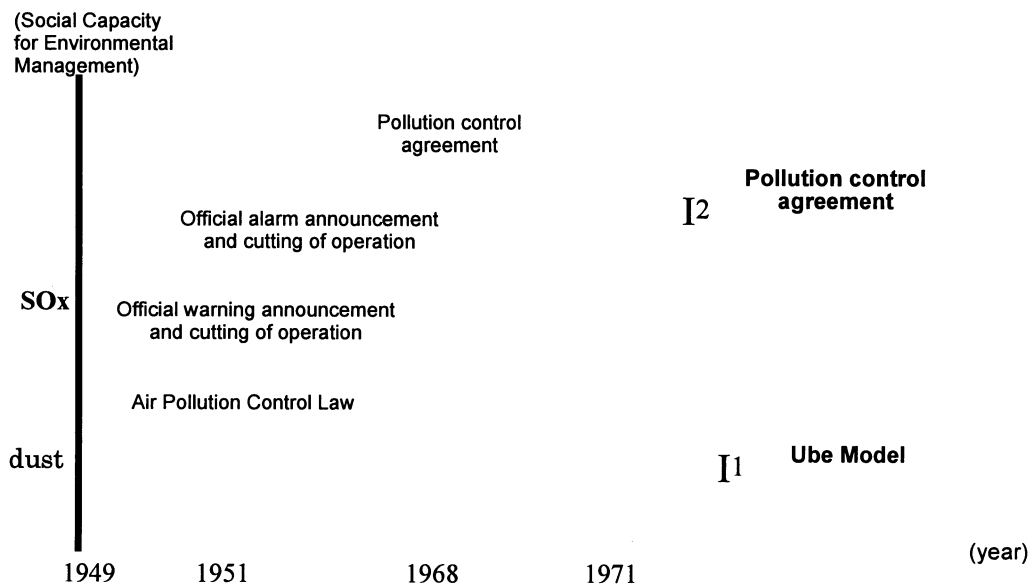
Based on the Data from Ube City  
Created by Author

Figure 7 Institutional Change and SCEM of Ube City



Drawn by Author

Figure 8 System change and Social Capacity for Environmental Management in Ube City



Drawn by Author

## Reference

- 青木昌彦・奥野正寛編著、1996、『経済システムの比較制度分析』、東京大学出版会。
- Aoki, Masahiko. 2001. *Toward a Comparative Institutional Analysis*. Cambridge: The MIT Press.
- 青木昌彦、2001、「比較制度分析に向けて」、NTT 出版。
- Auer M R. 2000. “Who participates in global environmental governance? Partial answers from international relations theory.” *Policy Sciences*. Vol. 33, Issue.2. pp. 155-180.
- 井村秀文・勝原健編著、1995、『中国の環境問題』、東洋経済新報社。
- Coleman, James S. 1988. “Social Capital in the Creation of Human Capital.” *American Journal of Sociology*. Vol. 94. Supplement. pp.95-120.
- Collier, Paul. 1998. *Social Capital and Poverty*. Social Capital Initiative Working Paper No.4. Washington, DC: The World Bank.
- 原嶋洋平・森田恒幸、1995、「東アジア諸国の環境政策の発展過程の比較分析」、『計画行政』、第 18 巻、第 3 号、73-85 頁。
- 門脇重道、1992、『技術発達のメカニズムと地球環境の及ぼす影響』、山海堂。
- 鹿毛利枝子、2002、「ソーシャル・キャピタルをめぐる研究動向（一）（二）」、『法学論叢』、第 151 巻第 3 号、101-119 頁、第 152 巻第 3 号、71-87 頁。
- 国際開発学会環境 ODA 評価研究会、2003、『環境センター・アプローチ：途上国における社会的環境管理能力の形成と環境協力』、国際協力事業団。
- 松岡俊二、2000、「途上国における環境政策の効率的実施とは何か？ -規制の諸手段と効率性-」、『国際開発研究』、第 9 巻、第 2 号、17 - 37 頁。
- 松岡俊二他、2000、「東アジアにおける社会的環境管理能力の形成に関する比較研究」、『東アジアへの視点』、秋季特別号、76-231 頁。
- 松岡俊二、2002、「国際資本移動と途上国の環境問題 -持続的発展と直接投資・政府開発援助-」森田恒幸・天野明弘編、『地球環境問題とグローバル・コミュニティ』、岩波書店、125 - 155 頁。
- 松岡俊二、2003、「社会的環境管理能力の形成：評価の方法論」、松岡・朽木編、『アジアにおける社会的環境管理能力の形成 -ヨハネスブルグ・サミット後の日本の環境 ODA 政策-』、アジア経済研究所、9-31 頁。
- Matsuoka, Shunji. 2003a. “Social Capacity Development for Environmental Management: International Cooperation toward Social Capacity Development for Environmental Management.” *Proceedings of International Workshop on Social Capacity Development for Environmental Management and International Cooperation in Asia* (January 27 and 29 in Hiroshima and Tokyo). pp.3-33.
- Matsuoka, Shunji. 2003b. “Social Capacity Development for Environmental management.” Matsuoka, Shunji and Kuchiki, Akifumi (eds.) *Social Capacity Development for Environmental Management in Asia: Japan's Environmental Cooperation after Johannesburg Summit 2002*. Institute of Developing Economies. pp. 7-21.
- 松岡・朽木編、2003、『アジアにおける社会的環境管理能力の形成 -ヨハネスブルグ・サミット後の日本の環境 ODA 政策-』、アジア経済研究所。

- 松岡俊二、松本礼史、河内幾帆、1998、「途上国の経済成長と環境問題：環境クズネッツ曲線は成立するか」、『環境科学会誌』、第 11 巻、第 4 号、349-362 頁。
- 松岡俊二・本田直子、2002、「環境援助における能力開発とは何か -環境管理能力の形成 (CDE)概念のレビュー-」、『国際開発研究』第 11 巻、第 2 号、149-172 頁。
- 宮川公男、2003、「ソーシャル・キャピタル論の背景と基礎」、『麗澤経済研究』、第 11 巻第 1 号、15-25 頁。
- 諸富徹、2003、『環境』、岩波書店。
- 野上裕生、1997、「東アジアの環境問題における環境クズネッツ曲線 -後発性の利益と不利益-」、『環境経済・政策学会 1997 年大会報告要旨集』、371-377 頁。
- 野上裕生、2003、「アジア諸国の経済発展と社会的能力の形成」、『アジアにおける社会的環境管理能力の形成 -ヨハネスブルグ・サミット後の日本の環境 ODA 政策- 』、アジア経済研究所、33-42 頁。
- 野瀬善勝、1969、「啓蒙活動」、佐藤仁・西原道雄編、『公害対策 I 』、有斐閣、第 3 章第 2 節、pp. 228-235.
- 野瀬義勝、1996、『エコロジカルな地域づくり：21 世紀に向けて公衆衛生学者の果たすべき役割』、近代文芸者。
- North, C. Douglass. 1990. *Institutions, Institutional Change and Economic Performance*. New York: Cambridge University Press.
- ダグラス・C・ノース、1994、『制度・制度変化・経済成果』、晃洋書房。
- OECD. 1995. *Donor Assistance To Capacity Development in Environment (Development Co-operation Guidelines Series)*. Paris: OECD.
- OECD. 2001. "The Well-Being of Nations: the Role of Human and Social Capital." *SourceOECD Social Issues/ Migration/ Health*. May 2001, vol. 2001, no. 7. pp. 1-121.
- OECD. 2002. *Governance for Sustainable Development: Five Case Studies*. Paris: OECD.
- Putnam, Robert D. 1993. *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton: Princeton University Press.
- ロバート・D・パットナム、2001、『哲学する民主主義-伝統と改革の市民的構造』、NTT 出版。
- 李志東、1999、『中国の環境保護システム』、東洋経済新報社。
- Rosenau, James N. and Czempiel, Ernst-Otto. 1992. *Governance without Government: Order and Change in World Politics*. Cambridge: Cambridge University Press.
- Sen, Amartya K. 1985. *Commodities and Capabilities*. Amsterdam: Elsevier Science.
- Sen, Amartya K. 1992. *Inequality Reexamined*. Oxford: Oxford University Press.
- Sen, Amartya K. 1997. "Quality of Life and Economic Evaluation." *Academia Economic Papers*. September 1997, v. 25, iss. 3, pp. 269-316
- アマルティア・セン、1999、『福祉の経済学 -材と潜在能力- 』、岩波書店。
- 末廣 昭、2000、『キャッチアップ型工業化論:アジア経済の軌跡と展望』、名古屋大学出版会。
- 谷本信、1960、「宇部市に於ける大気汚染防止活動：特に煤塵対策委員会活動の在り方に就て」、『山口医大産業医学研究所年報』、山口医科大学産業医学研究所、第 8 巻、 pp. 69-95。
- 宇部市、1971、『大気汚染対策 20 年のあゆみ』宇部市。
- 宇部市、2002、『宇部方式』、宇部市。
- 宇部市、各年、『宇部市の公害』、宇部市。

- UNDP. 1990. *Human Development Report 1990*. New York: Oxford University Press.
- UNDP. 1994. "Capacity Development: Lessons of Experience and Guiding Principles." UNDP. <http://magnet.undp.org/cdrb/CDPRIN1.htm> (April 19, 2002) .
- UNDP. 1998. "Capacity Assessment and Development: In a Systems and Strategic Management Context." UNDP. <http://magnet.undp.org/docs/cap/CAPTECH 3.htm> (April 14, 2002) .
- UNDP. 2002. *Human Development Report 2002*. New York: Oxford University Press.
- UNDP and ESCAP. 2002. *Environmental Governance for Sustainable Development in Asia and the Pacific*. New York: United Nations.
- UNEP /WHO. 1996. *Air Quality Management and Assessment Capabilities in 20 Major Cities*. London: MARC.
- World Bank, 1994, *Governance: The World Bank's Experience*. Washington D.C.: The World Bank.
- World Bank. 2002. *World Development Report 2002: Building Institutions for Markets*. New York: Oxford University Press.
- World Commission on Environment and Development. 1987. *Our Common Future*. New York: Oxford University Press.