Environmental Management Systems for Public Sector

Kayo Ito[1]

Abstract

International interests in improving environmental management practices in both the public and private sector have increased. Many surveys relating to environmental management systems (EMS) in particular have been conducted, but these have focused primarily on the private sector, especially in manufacturing. While the surveys and questionnaires explain the standard itself and how to implement EMS, few comparative analysis have been made that exceed specific economic region and/ or country.

This paper focuses on the public sector. The objective is to assess the social meaning of EMS for the public sector. The information presented in this paper is comprised of an empirical survey in Japan as compare to the EU and United States. It includes environmental reports, government material and field survey information.

Public sectors with EMS in these regions not only succeed in controlling environmental impact (including daily activity, public works and procurement), but may improve the sustainability of the production and consumption behavior of other economic sector by applying EMS in their policy. These activities may serve as a model for other regions.

Key Word: Environmental Management Systems (EMS), Environmental Policy, Public Sector, Cross-country comparison, Sustainable Production and Consumption

1. Introduction

Recently, as a mean to control environmental effect of the daily economic activity, many private and public sector implement Environmental Management Systems: EMS[2]. Existing surveys related to EMS focus on the private sector especially manufacturing.

[1] Chiba University, Center of Public Studies for Sustainable Welfare Society
kayoito@restaff.chiba-u.jp

[2] Environmental Management Systems (EMS) is defined by ISO14001 as “part of the overall management system which includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resource for developing, implementing achieving, reviewing and maintaining the

While the surveys and questionnaires explain the standard, and describe how to implement EMS (Ishitani and Kayak 2002, Yoshizawa and Kayak 1999, Doboku Gakkai 1998). Moreover, existing research focuses a certain specific region and country and few comparative analyses made that beyond economic bloc to figure out common feature and difference point of activities (Baumast 2002, Hibiki and Arimura 2004, Renning etc 2004). As to existing surveys on public sector, mostly questionnaires for EMS certified site, analyze how to implement EMS, reason of implementation and focuses on direct environmental aspect of energy, materaial, and cost saving (Kokyo Shisetsu ni okeru Kankyo Management System Gijyutsu Senmon Iinkai 2001, Emilsson and Hjelm 2002, Kitamura 2003, Chiho Kokyo Dantai ni okeru Kankyo Management no Suishin Hosaku ni kansuru KentoKai 2004). Public sector can control environmental impact of own activity by EMS. Moreover, its activities and policies influence other sectors of society in their environmental practices. Therefore, this analysis viewpoint is extremely important.

This paper focuses the movement of public sectors that took EMS certification in EU, Japan, and U.S.A and analyze how their activities influence other economic actors. It comprised of three main sections. Section 2 provides basic information of EMS. Section 3 explores current movement of public sector towards EMS and show background in each area. Section 4 provides social meaning of EMS for public sector. It includes analysis of environmental reports, government material and field survey information.

2. Environmental Management Systems (EMS)

Regional differences regarding EMS certification are predominantly that Europe and the Far East experienced very significant growth compared to the other regions. Large-scale businesses in Japan and Europe took the initiative in the beginning to obtain certification. The movement gradually expanded to other areas over time. Major regional differences exist between regions with advanced EMS and those that do not.

As to the number of ISO 14001 certification by country in 2003, Japan is the largest in number, followed by UK, China, Spain, Germany. Germany is largest in Eco Management and Audit Scheme (EMAS) and followed by Spain, Italy, Austria, and Denmark. Total number of site of EMS in the world is 78728(ISO14001:74902, EMAS:3826)[3] Japan is the

environmental policy"(ISO1996.2004: ISO14001.4.3.5).

[3] As of January 2005.

largest in number. (ISO 2003, European Commission 2005, Japanese National Committee for ISO/TC207 2005).

Table 1 ISO14001 and EMAS Certification by Country

		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
ISO14001	Europe	226	948	2626	4254	7365	11021	18243	23316	31997	
	Far East	25	419	1356	2532	4350	7881	12796	17744	23747	
	North America	1	43	117	434	975	1676	2700	4053	5233	
	Australia/ New Zealand	1	56	163	385	770	1112	1422	1563	1405	
	Africa/West Asia	1	10	73	138	337	651	923	1355	1997	
	World Total	257	1491	4433	7887	14106	22897	36765	49449	66070	
	# Countries	19	45	55	72	84	98	112	117	113	
	Japan	4	198	713	1542	3015	5556	8123	10620	13819	17441
	%	1.6%	13.3%	16.1%	19.6%	21.4%	24.3%	22.1%	21.5%	20.9%	
EMAS	Europe	103	507	1269	2140	2775	3417	3912	3797	3748	
	Outside Europe	0	0	0	0	0	0	0	0	10	

Note: From 1995-2004, data is as of Dec 31

Source: ISO 2003, EMAS Helpdesk, Japanese National Committee for ISO/TC207

Note: (1) Eco Management Audit Scheme (EMAS) is a European EMS standard.

3. EMS Implementation in the Public Sector

This chapter shows current movement of public sector towards EMS in the world and show EMS background information on public sectors in EU, Japan, and U.S.A.

3.1 EMS movement of public sector in the world.

Table 2 shows worldwide data of EMS certification number in public sector. Some countries have list of EMS certification. Author uses these data and confirms on homepage of each listed site to check information of EMAS or ISO14001 certification. About the country where there was not a list, author did Internet search and check information in same way. 918 public sectors took certification of EMS. Japan is the largest (57.8%), followed by Germany (11.4%), UK (5.7%).

Table 2 EMS certification number in public sector by country

	EMAS	ISO14001	Total
Japan	-	531	531
Germany	90	15	105
UK	14	39	53
Denmark	7	24	31
Sweden	3	23	26
Hong Kong	-	23	23
U.S.A	-	23	23
Switzerland	0	20	20
China	-	19	19
Italy	10	4	14
Canada	-	12	12
Belgium	3	9	12
Australia	-	11	11
Spain	9	1	10
Austria	5	0	5
France	2	2	4
Netherlands	0	3	3
New Zealand	-	3	3
Norway	0	3	3
Ireland	-	2	2
Korea	-	2	2
Thailand	-	2	2
China Taipei	-	1	1
Finland	0	1	1
Greece	-	1	1
Philippine		1	1
Total	143	775	918

Note: (1) Eco Management Audit Scheme (EMAS) is European EMS standard.

Source: EMAS: EMAS Helpdesk (March 2005); ISO14001: ISO (2004), *Belgian*: Ecogestion.be (June 2004). *Canada*: City of Calgary, City of Hamilton, City of Toronto, Halifax Regional Water Commission, Municipality of Hamilton-Wentworth, Municipality of Peel, Public Works and Government Services, Regional Municipality of Durham, Regional Municipality of Waterloo, Regional Municipality of York, The Canadian General Standards Board. *China Taipei*: Kaohsiung City. *Denmark*: Data of EMAS and check condition of ISO14001 in each place. *Finland*; Tampere City. *Germany*: Data of EMAS and check condition

of ISO14001 in each place. *Greece*: Hersonissos Municipality. *Hong Kong*; the Government of the Hong Kong (March 26, 2003). *Ireland*: Environment, Heritage and Local Government, Cork City Council. *Japan*: National Committee for ISO/TC207 (January 2005). *Korea*: Daegu City, Jeju City, Masan City. *Netherlands*: Ministerie van Defensie, Ministerie van Buitenlandse Zaken, Den Bosch municipality. *New Zealand*: Auckland City, North Shore City, Hamilton City. *Norway*: Larvik Kommune, Oslo City, Municipality of Fedje. *Philippines*: Department of Environment and Natural Resources. *Sweden*: environcert.com (November 2004). *Switzerland*: University St. Gallen, IWOE (June 2004). *Thailand*: Industrial Estate Authority, Klaeng Sub district Municipality. *U.K*: EMAS Organization UK, ISO 14001databases (the end of November 2004). *USA*: Public Entity EMS Resource Center (November 2004).

3.2. EMS certification of public sectors in EU, Japan, and U.S.A (background information)

Local Authorities of the UK start program of LA-EMAS in 1995, which is, adopt EMAS for local authorities to control environmental impact by EMS. After LA EMAS, Euro-EMAS projects start from 1988[4]. Euro EMAS applied Peer Review system. Peer Review was held at eight cities that joined the program. And some public sectors of Eastern Europe joined since. The areas that participated in a project of Euro EMAS did environmental audit at other place with public sector that already implement EMAS. Therefore, this Peer Review becomes good opportunity for them to learn about EMS knowledge[5]. The European Commission has been taking expansion strategy of an area and enlarged strategy of an area region regards to EMAS. They published revised edition EMAS in 2001. EMAS was originally restricted to companies in industrial sectors but this revision open EMAS to all sectors including public and private services. To promote EMS construction of a public sector, EMAS local authority corner started in 2001 in homepage.

Moreover, European Commission itself applies EMAS. Start from Department of

[4] Euro-EMAS project aims to demonstrate the pan European applicability of LA EMAS established in the UK as conceptual framework for managing and improving local environmental performance. This project was held in Athens, Newcastle, Birmingham, Helsinki, Leipzig, Gothenburg, Stockholm, Malmo, and Palermo. These regions aimed for an improvement in environmental performance of 33% over the three-year period of the project(EURO-EMAS Final technical report October 2001, Retrieved on April 30 2005, from http://euronet.uwe.ac.uk/emas/outputs.htm

[5] Final report of Peer review concluded the outcome of Euro-EMAS was talk with stakeholder and progression in quality of service. In short term, effect of saving material and energy, waste reduction, cost saving by risk management, training and education, change of behavior have noticed. And in middle or long term, goal setting and practice of monitoring, influence to regional economy, Compliance with legislation, incentive of the staff was noticed (Euro-EMAS: 2001,Normman, T: 2004).

Environment, which is secretariat of EMAS and will expand in all section of commission. The European Commission plays an important role in local expansion. It encourage introduction of EMAS for EU new member nations such as Turkey, Bulgaria, Romania after 2000 by offer forensic maintenance related to EMAS, the establishment of certificate body, and provide technology and information (European Commission: 2003). Furthermore, European Commission takes an enlarged strategy of EMAS for a country outside EU. EMAS is legislation only apply for EU. However, 10 companies that locate outside EU took certification of EMAS based certification called Quasi-EMAS. [6] Furthermore, EU start a system enable for the company locate in sister city to get EMAS certification by utilizing sister city system between EU and others economic area, (Bakon M 2004, Hutter C P 2004, European Commission 2005). Recent trend of EMAS acquisition and shift from EMAS to ISO 14001within EU can be regard as background of its enlargement activity. The European Commission is going to carry out a local expansion strategy besides EU, especially in Asia that has strong interest in fulfill international standards.

In Japan, ISO 14001 certification movements among public sectors began in 1996 when ISO 14001 published. Some officers visit U.K for to learn about LA EMAS. The public sectors, which had severe environmental problem in 1970s, played an essential role especially first years and the movement spread nation wide. 531 public sectors that equal to total 14% of nationwide already have ISO 14001 certification. Category by the types of site is as follows: Main office and related facility (42 prefecture, 13 ward, 237 city, 169 town, 12 village), Water facility (24 prefecture, 16 city), Waste plants (26 prefecture, 23 city), Industrial technological center (12 prefecture), Agriculture research center (5 prefecture), Public Health and Environmental Science (14 prefecture), Port (1 prefecture, 1 city), Research center of science and technology (2 prefecture), Enterprise bureau (1 prefecture), Transport (1 prefecture), Police (1 prefecture), Fire dept (1 prefecture)[7]. The reason of EMS implementation in public sector is to promote environmental preservation by introducing environmental consciousness into every daily activity. And handle EMS

[6] Among certified companies, electronic equipment industry occupies 9, and remainder 1 is a textile. Geographical locations are United States 4, Singapore 2, Morocco 2, Malaysia 1, China 1, Chile 1, and Switzerland 1.

[7] As of January 2005

according to their strategy. Some use EMS to check and control environmental policy, and other use EMS to expand its activity for local area as a whole by providing knowledge for other economic sector (Ito 1999).

In the U.S.A, Environmental Protection Agency and Global Environment Technology Fund, started program of the first EMS Initiative for Government Entities from 1997-1999, attended by nine public sectors. Participation increased to fourteen in the second EMS Initiative for Government Entities (2000-2002); and nine have currently been participating in the third EMS Initiative for Public Entities (2003-2005) (Global Environmental Technology Fund 2000, 2002).

4. **Social meaning of EMS for public sector-Comparative analysis**

The differences between private and public sector EMS can be understand in terms of who benefits from the EMS ('Stakeholders' in other words). It is necessary to analyze it from a point of view that who is the stakeholder of organization and what kind of accountability does organization has for stakeholders especially when discuss about social meaning of EMS. If we define central (key) stakeholders of organization as a person who burden the environmental cost of organization directly, consumer, stockholders, employee, and residents are central stakeholders of private sector. As for public sector, residents and company that locate in area are the one.[8]

Economical activity of organization was made by input material, energy from the environment (source) to make product or service. During the process, emission (to the air, water, and soil) and waste also produced. Some have been reused or recycled but rests have been output to the Environment (sink). Most of the organization have target reduces consumption of energy, material, water and control, waste, and chemical substance by EMS. These environmental aspects directly related with organization's daily activity. The category of energy and material saving can easily achieve in first year especially if the organization did not do any act before, but further reduction becomes difficult afterwards. Public sector has role of doing policy on be half of citizens and policy itself have

[8] From 2001, ISO start discussion about making international standard on Social Responsibility. Safety and the employment becoming inapplicable in EMS are included in SR, and but EMS can utilize EMS as an effective tool of SR promotion because EMS include a general idea of risk management and stakeholders within organization.

significant environmental impact. Therefore, public sectors that manage environmental policy in EMS increased. This section reviews public sectors with EMS in Japan, EU, and USA about green procurement, public works, practical use of EMS in environmental policy to support company and residents, and shows a common point and a difference while comparing the action.

4.1 Green procurement

Green procurement is purchasing preference to products and materials, service that have environmental impact and/or choosing suppliers by considering their environmental activities. Select suppliers that have environmental management system also included in the movements of green procurements. Public sector takes the lead by promotes green procurement and opens a ring of an action to the private sector which is bigger economic agent, and that they bring the ripple effect that is shift of demand to entire environment goods in a market is expected. However, as mentioned by Harro van Asselt (2003), greening of public procurement may possibly conflict with international trade rules on government procurement on the other hands.

EU: 14 % of EU wide GDP had spent by public sectors across the EU in public procurement. EU considers these purchases could contribute to sustainable development as well as economic and social renewal in the Union. The Sixth Environment Action Program promoting a green public procurement policy, allowing environmental characteristics to be taken into account and the possible integration of environmental life cycle, including the production phase, concerns in the procurement procedures.

Commission issues guidelines for environment-friendly procurement. Under this action program, European Commission and ICLEI (International Council for Local Environmental Initiatives) did RELIEF (Environmental Relief Potential of Urban Action on Avoidance and Detoxification of Waste Streams through Green Public Procurement) research project on green purchasing from 2001-2003. Moreover, from 2003, LEAP (Local Environmental Management Systems and Procurement) started to examine how the management and implementation of green purchasing can be improved through integration with environmental management systems. Lead by Leicester City Council and the other 11

local authority partners[9] participated in this program. According to the survey conducted by LEAP Task 1 in 2003, 73% among 40 had an environmental policy, objectives, or targets related to procurement of goods and services. 40% had references in environmental policy, objectives, or targets to the management of contracts awarded. 38% had management of the supply chain. 23% had performance targets for the environmental improvement of the supply chain (Cockrean B etc2004). The Council and the European Parliament adopted new public procurement Directives on 31 March 2004. It contains environmental selection criterion, enabling contracting authorities to request from bidders that they prove their capacity on operating environmental management measures during the contract. Furthermore, the directives refer to EMAS as a "preferred" way of proving compliance with this selection criterion[10]. However, ICLEI (2003) pointed that although green procurement is highlighted as a possible tool for achieving EMAS objectives, there is no obligation on EMAS registered local authorities to implement any measures aimed at sustainable consumption. Hence, green purchasing should be obligatory element for achieving certification to foster green purchasing (p14).

Japan: Based Law concerning the Rational Use of Energy, the Top Runner method was adopted for home electrical appliances. It sets the standards of consider the functions of currently available products that are the most energy efficient, and evaluate the prospect of further technological development. The locus that public sector in economic activity, central government occupy 4.3% of gross domestic expenditure, local government occupy 12.4%. Therefore, they perform about a quarter economic activity of Japan. Central government has obligation of doing green purchasing while local government does not have obligation[11]. Hence, percentage of doing green purchasing of product or service in local level is not 100%. Differentiation by the size exists (See table 5). ISO14001 sites with

[9] United Kingdom (London Boroughs of Lewisham, Southwark and Sutton, Sandwell Metropolitan Borough Council), Greece (Municipalities of Holargos, Amaroussion and Kalithea/Rhodes), Sweden (City of Göteborg), Spain (Barcelona Provincial Council) and Portugal (City of Almada). ICLEI(2004) Retrieved on April 30 2005, from http://www.iclei-europe.org/index.php?id=569

[10] EU Interpretative Communication on environmental considerations in public procurement. COM (2001) 274.

[11] Law Concerning the Promotion of Procurement of Eco-friendly Goods and Services by the State and Other Entities. Environmental Ministry did survey in 2005 to figure out the green purchasing rate of each product, service, and public works. The result was paper (93.3%), stationary (98.2%), machinery (99%), OA (98.6%), household appliance (98.5%), air-conditioner (96.4%), car (99.5%), fiber product (95.6%), facility (solar energy system: 100%), service (printing etc: 100%), and public works (92.5%).

in local authorities, having some measure for green purchasing and/or sustainable consumption and control it by EMS. Since the ISO14001 requires compliance of law and having system for it.

U.S.A: Federal government is the single largest consumer of goods and services spending more than $200 billion annually on goods and services. On September 14, 1998, President Clinton signed Executive Order 13101, entitled "Greening the Government through Waste Prevention, Recycling and Federal Acquisition". Executive Order 13101 supersedes EO 12873, "Federal Acquisition, Recycling, and Waste Prevention," issued on October 20, 1993. Under these Executive Orders and Resource Conservation and Recovery Act: RCRA, EPA doing Environmentally Preferable Purchasing (EPP) program that encourages and assists federal agency to purchase environmentally preferable products and services. As to purchasing product of Office Automation, public sectors have to choose from one joined Energy Star Program.

Table 3 Rate of Green Procurements in Japanese Local Authority

	Total	Whole organization	Specific section	Not doing	Other	No Answer
Prefecture	59	56	0	0	3	0
	100%	94.9%	0%	0%	5.1%	0%
Ward, City	551	255	263	3	25	5
	100%	46.3%	47.7%	0.5%	4.5%	0.9%
Town Village	1534	195	1164	109	48	18
	100%	12.7%	75.9%	7.1%	3.1%	1.2%

Source, Environmental Ministry (2004)

4.2 Public Works

Government (central and local) performs a public works project for public interest and the welfare. It has big influence in national economy. Use of material or the construction machine that constant environmental load reduction effect, and choose design / method of construction that environmental considered can contribute to discharge restraint of indirect greenhouse gas. Moreover, recycle construction waste generated from public works contributes for waste reduction and utilization of resources.

***EU*:** Leeds City (UK) collected 40000 tons of construction waste, reused as material for construction. And manages by the EMAS. Cost reductions became 50000 ponds. Moreover, Leeds city provided preferential treatment on financial aspect for company that use recycled material (Harbidge J and Tinker H 2004, Leeds City Council 2001, 2002, and 2003). Warner and Ryall (2001) pointed out that there are a small number of local authorities, which have specified suppliers with EMS certification.

Japan: The Construction Material Recycling Law (2002) requires to contractors to sort out and recycle wastes generated in demolition work of a building that the specified construction materials. To comply with the law, most of public sectors with EMS include public works, utilize recycled materials, and minimize construction waste. Moreover, some required its suppliers to have ISO14001certification. By article 167-5 of Local Government Law, local authority can establish the qualification for bid participation in public works. Examination of a bid qualification combined the subjectivity point of orderer (public sector that use original standard together with objectivity point asking about management which is nation wide standard (article 27-23 of Contractors Law). Public sector which adds points in ISO14001 certified companies at subjectivity point are as follows: Prefecture: Akita, Ishikawa, Iwate, Ehime, Kanagawa, Okinawa, Gifu Prefecture, Saitama, Saga, Shiga, Shimane, Tokyo, Tokushima, Toyama, Tottori, Nagasaki, Fukui, Mie, Miyagi, Yamaguchi, City: Aomori, Akita, Izumisano, Utsunomiya, Oogaki, Kanazawa, Kameyama, Kitakyuushuu, Kuwana, Kurume, Kobe, Sabae, Joetsu, Sendai, Nagoya, Matsusaka, Matsuto, Hasaku, Tajimi, and Yokkaichi (as of the March, 2005). Recent remarkable growth in construction industry ISO14001 certification was a result of a movement by public sector that obtained certification[12.]

4.3 Practical use of EMS in Environmental Policy

Implementation and check condition of Local Agenda 21 is important task in Johannesburg Summit. Some public sectors utilize EMS for control progress of it.

EU: Parma (Italy) EMAS and Local Agenda21 and evaluate progress process of local agenda by EMAS (Impattoe S 2002, Provincia di Parma 2004)

[12] The number of ISO14001certified site of general contractor increased rapidly from seven cases (0.8% of overall industry) in 1997 to 1258 (7.5%) in 2004.

Japan: Minamata city was the first public sectors that use EMS as tool to Basic Environmental Plan, which is similar plan of Local Agenda 21. Although there is difference in local agenda and environmental basic plan, EMS inflection as a practice tool of an environmental policy spreads among local authorities. In national level. Government decide to continue leading action plan of green government and clarify development, evaluation /checking department and introduce a plan-do-check-action cycle of EMS.

U.S.A: Wisconsin Department of Natural Resources' (WDNR) using an EMS as a tool to define public policy and regulatory program implementation within a state agency (Bangart S 2005)

3.4 Support Industry

Public sector can support information-sharing concerning environmental management practices amongst firms through networks and other related schemes. Many public sectors are offering technical assistance, recognition, financial and regulatory benefits to firms that implement an EMS.

EU: Regional differentiation exists. Incentives for private sector to encourage EMS certification are divided by regulatory and administrative incentives, economical incentives, and information. As to regulatory and administrative incentives, Austria, Germany, Italy, Luxembourg, Malta, Norway, Portugal, Slovak Republic, and Sweden has system of reducing inspection in national level etc. These policies consider compliance of law and risk management of EMS. As to economical incentives, UK reduces the tax on energy consumption by 80%, Denmark reduce Supervision fee by 50%, Finland reduce permit fee. As to grant, Austria provide 21800euro/site from 1995 and result in 80% of EMAS certified company are SMEs. Bergium, Greece, and Latvia does not charge EMAS registration fee. As to information, central governments providing information relates to EMS. However, in countries those have large certified number in private sector, local government plays role of providing knowledge for local company.

Japan: Regulatory and administrative incentives, central government is not reducing the frequency of regulatory inspections. Only couple of cases can be found in local level. As to economical incentives and information, numerous policies exist nationwide among local authorities. It is not only Prefecture level, but also Municipality and Town have support system for local company. Most of companies that took ISO 14001 are large

enterprise[13], and they requires environment consideration that equal to ISO14001 for dealing company that exist the upstream or downstream of their production or service[14]. Although EMS is voluntary tool, it has become an inevitable for business. Small and mid-sized companies (SMEs) have difficulty due to the costly acquisition of EMS and maintenance fee. To fulfill needs SMEs, a significant amount of local authority with EMS helps local company to provide financial support, information about EMS, technical assistance as well as of special recognition or awards on the condition of green procurements. Moreover, some local governments have simplified EMS program for local company[15]. Participants of these programs can build EMS by getting technical support from local government. In national level, The Ministry of the Environment formulated the Eco Action 21(EA21) program in 1996 aimed at encouraging all businesses, including SMEs to undertake voluntary environmental measures. In 2003, the number of registered businesses exceeded one thousand. MoE revised EA21 in 2004 to introduce a certification/ registration system that enables external assessment[16.] Simplified EMS has superiority for ISO 14001 on a cost side[17], but possibility becoming dominant on business side only in a simple version is low. Because it reliability is inferior in comparison with ISO. It is necessary to inspect the effectiveness of the simplified EMS include evaluation to relate to

[13]Author derived the number of employees from a company profile in hp about 5338 Japanese sites that acquired ISO14001certification by January 2001, did classification according to scale that noticed in division of fundamental law of small and medium enterprises. The result was big companies 68%, medium and small-sized companies 10% and others 22%(Ito:2001)

[14] Toyota has Expanded Environmental Purchasing Guidelines to related suppliers, regarding acquisition of ISO 14001 and management of substances of environmental concern. Matsushita Electric has supplier selection standards that set priority to suppliers who are positively practicing the environmental preservation strategies (precondition that they have obtained the ISO14001 certification) (Toyota: 2003, Matsushita: 2003).

[15] Iwate Prefecture (IES), Kyoto Prefecture (KES), Tottori Prefecture (TEAS), Iida City (Iimusu), Kobe City (KEMS), Sabae City (ecoporation SABAE).

[16] Moreover, Eco-stage program exists. Five phase of evaluation included in this program. (1) Introduction level of environmental management, (2) Improvement of EMS, (3) Performance evaluation, (4) Evaluation of cost price improvement (5) Information. Participants have to burden cost of evaluation but it is cheaper than that of ISO 14001 external audit. Retrieved on April 30 2005, http://www.ecostage.org/

[17] Author made questionnaire survey to figure out how much the organization spent for ISO14001 implementation. Each organization describes the expense. Calculate the median. As a result, organization spent 2,000,000 yen for registration cost, Consultant fee; 3,399,960 yen, Training cost; 855,000 yen, purchasing expense with EMS implementation; 999,960 yen (Ito2003). When SMEs participate in simple EMS program of local authority, registration cost, consultant fee become almost zero in most of the case.

an effect of an environmental aspect / economic aspect.

***U.S.A*:** Regulatory and administrative incentives EPA started The National Environmental Performance Track ("Performance Track") in 2000. More than 351 members in 46 states participate in this program. Facilities applying to the program should have an EMS that has been in place for at least one full cycle. Performance Track also requires an independent assessment of an applicant's EMS. EPA provides incentives of lower priority for routine inspection for the facilities in Performance Track[18]. Routine inspections comprise the majority of EPA inspections, and generally occur when there is no specific reason to believe that a violation exists at a specific facility. Moreover, 8 states governments agree on reducing program's member's administrative burdens such as reduced reporting and expedited permitting, where feasible in recognition of their high levels of performance[19] (Environmental Protection Agency 2005).

As for economical incentives and information, 27 State government providing technical assistance and referral services[20].

Table 4 EMS support for local company

		Regulation		Economical method						Info	Tech assist	SME	
		1	2	3	4	5	6	7	8			9	10
AU	C		+				+			+			
BE	C								+	+			
	L				+							+	
CY	C									+			+
CZ	C				+					+			
DK	C							+					
ER	C									+			+

[18] Routine inspections comprise the majority of EPA inspections, and generally occur when there is no specific reason to believe that a violation exists at a specific facility.

[19] EPA have agreements on Performance Track with following States: Colorado Department of Public Health and Environment, Georgia Department of Natural Resources, Environmental Protection Division and Pollution Prevention Assistance Division, Maine Department of Environmental Protection, Massachusetts Executive Office of Environmental Affairs, the Massachusetts Department of Environmental Protection, Tennessee Department of Environment and Conservation, Texas Natural Resource Conservation Commission Utah Department of Environmental Quality, Virginia Department of Environmental Quality.

[20] For further information, see GETF National Directory of EMS technical assistance providers. http://www.sectorstar.org/taps/

FI	C							+		+		+	+
FR	C									+			
GE	C	+	+							+	+	+	
	L									+	+		
GR	C						+		+	+			
HU	C									+			
IT	C	+				+				+	+	+	
	L					+				+	+		
LV	C						+		+				
LU	C	+								+			
MM	C						+						
NO	C							+			+		
PL	C									+			
PR	C	+					+						
SP	C									+	+		
	L	+					+						
SW	C	+								+		+	
UK	C			+						+	+		
	L						+			+			
XO	C		+					+					
JP	C									+	+	+	
	L	+			+	+	+			+	+	+	
US	C	+								+	+		
	L	+					+			+	+		

C=Central government, L=Local government, + Program Exist.

1 lower priority for routine inspection 2 other regulatory incentive, 3 Tax, 4 Subsidy, 5 Loan, 6 Grant ,7 Reduce fee, 8 No EMAS registration Fee, 9 Simplified EMS,10 Training and Pilot Project

Made by Author by referring European Commission (2005), Environmental Protection Agency (2004),

3.5 Support Residents

How to shift sustainable consumption pattern is important issue. Public sectors provide example for citizens by applying EMS and provide knowledge by the policy. This section analyzes two types of EMS for residents (EMS for home and EMS at school) of each area.

EU: As to apply EMS at school level, leading example is City of Heidelberg, which

applies EMS for controlling energy use of whole region and has been doing school energy saving activity, called E team project. 18 schools have been participating in this project. E team bonus system[21] is the key of success. It encourages students to doing competition of saving energy. Over 1500 tones of carbon dioxide have been saved since the introduction of the E-team project (10 years). Savings in energy costs totaling Euro 300,000. Moreover, three participating schools took EMAS certification (City of Heidelberg 1999, 2004, Wurzner E 2004). The movements that use EMS for education in elementary school can be found in Leicester (UK). Furthermore, Eco School program exist in 27 countries of EU that mix EMS and environmental education since 1994. Italy has program for university degree graduates called "Italian school for EMAS environmental consultants and auditors: procedural scheme for the proposal of local school project" Participants learn general theory, EMS in specific industrial sector, and practical working experience within SMEs of the selected field and receive a certificate.

***Japan*:** There are two types of simplified EMS exist. One is connect movement of EMS for home that utilizes existing program of environmental housekeeping book and the other is EMS for school. Both simplified EMS for residents started in Minamata City in 1998[22]. As to EMS for school, after 2003, when Law concerning the Enhancement of Willingness for Environmental Conservation and Promotion of Environmental Education enacted, school edition EMS is practiced in many areas from kindergarten until high school level. Children encourage their parents at home to do sustainable consumption as they are doing at school in daily life. Moreover, Kids ISO14001 program of Artech have been spread with support of local governments.

Furthermore, by increase of the certified sites among private sector and practical use of EMS in an environmental policy, the number of residents, who have knowledge of EMS increased. Therefore, after update of 6 years, Iida City and Minamata City shift to self-declaration and start use citizen as auditors. Self-declaration of conformity can avoid the costs of third-party assessment. Residents are central stakeholders of public sector and their audit not only judge conforms to the requirements of EMS standard, but also judge environmental performance and social meaning for the region. Therefore, content itself is

[21] Schools are given 40% of the energy costs they save to invest in energy-saving measures and another 40% to use as they wish.

[22] As to EMS for Minamta and their policy that apply EMS for region, see Ito(2003a) for further information

severer than examination of certification/registration body.

5. Conclusion

At preliminary stage, many public sectors gave priority to the management of the direct environmental effects caused by the daily activity such as energy, resources, wastes, and chemicals. However, some had priority to the management of indirect environmental aspects including public works, green procurement, transportation, and the environment policy for private sectors and households. The latter gradually spread lately. This article analyzes public sector's movements on EMS in EU, Japan, and U.S.A. Try to figure out common and different aspects of each region, focus on this indirect effect. Table 5 indicates finding from this analysis. Summary of finding is as follows:

Green procurement: EU, Japan, and U.S.A are practicing green procurement and expecting affect on national economy is large. However, percentage of green procurement in Japan, especially central government is higher than other area because of the obligation of law existing.

Recycle of construction waste: Japan faces severe problem of limited area of final disposal so as Europe, therefore these country are comparatively advanced in recycling of the construction waste than U.S.A.

Public Works: Japan has numerous cases that preferential treatment of EMS in bid and it strongly affects on construction company's movements toward EMS.

EMS support to private sectors: every region doing both provides information and economical incentives. Regulatory incentives, which reduce frequency of regular check for the facility that took EMS certification, are popular in EU and U.S.A but not in Japan. Japan thinks much of economical incentives and providing information than incentive on regulation. Content of support in each region is differing but local authority plays crucial role for encouraging local company to implement EMS in Japan, Germany, Italy, and U.S.A. In these areas, local authorities that have knowledge of EMS provide technical assistance for SMEs.

EMS support for residents: Japan is advancing in home program. Both EU and Japan have program for school. U.S.A, program for residents is not recognized.

Shift of the mass production, mass consumption, and mass waste to sustainable society with sustainable production and consumption pattern is important task of our generation.

This analysis shows that public sector in these regions are itself large economic actor. EMS enables to control their direct environmental aspect. Moreover, indirect effect of EMS in public sector is large as well since public sector can influence people's behavior of consumption by using EMS in their environmental policy. Public sectors exist everywhere and its role is same. Therefore, leading activities of these regions may serve as a model for other area.

This article provides trends of each country but not included detailed comparison of cases of public sector in similar size or economic condition of each area. Therefore, the author should make further analysis in future research.

Table 5 Common and differentiation by the region

	Procurement	Public Works		Policy	Support Industry			Support Residents	
		waste	supplier		Regulation	Finance	Information	Home	School
EU	+	+		+	+	+	+		+
Japan	+	+	+	+		+	+	+	+
U.S.A	+			+	+	+	+		

+ Program exists

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