

Policy Instruments for Environmental Management: A Trans-Boundary Perspective

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Abstract: The performance of any policy instrument varies depending on the context of their use and on the nature of the problems. Therefore, governments of different countries have to deal with environmental problems differently depending on the prevalent situation and context. In this paper, we will try to synthesize an overview of policy instruments used and their performances in some of the selected countries of the world.

Keywords: Environmental Management; Command-and-Control; Economic Instruments; Tradable Permits.

I. INTRODUCTION

The experience of environmental policy framework of different countries suggests that, the specific context in which environmental policy framework has to designed and implemented not only affects the choice of policy instrument(s), but also the performance of that policy instrument subsequently, in tackling the targeted problem of pollution. While some of the countries are remain wedded to the command-and-control system, which has described as being cost inefficient in economic theory, nevertheless has served many government as a mean of redressing the worst environmental problems. Simultaneously, there is growing experimentation with new instruments, especially based on the polluters pay principle in a number of countries. In this paper we attempt to provide a comprehensive view of the experience of environmental management in the major countries of the world in order to understand the dynamics of this widely debated issue.

II. THE EXPERIENCE OF EAST ASIA IN ENVIRONMENTAL MANAGEMENT

The sustained and rapid economic growth of Japan and the newly industrializing economies of Asia i.e. Singapore, Hong Kong, Taiwan and Korea have generated interest among economists. This rapid industrial growth in all five countries has resulted in almost similar sort of environmental problems. As in most of the countries of the world, the environmental management of all five countries of the world, the environmental management of all five countries has relied mostly on CAC at the initial stage. Japan's experience has been especially influential on the other countries in the region to tackle environmental problem. Still there are some variations in the choice of policy instruments, reflecting the regional needs and context of environmental policy in these countries. The environmental policy framework of these countries like Japan, Korea, Taiwan, Indonesia and Thailand in brief is as follow.

(i) Environmental Policy Framework in Japan: Japanese policy could be best described as one of "growth first"; so the early industrialization during 1868 to 1945, when mining activities caused widespread damage to farmland created environmental problem for this country. The environmental implications of this industrialization became evident in the 1960s with the widely publicized outbreaks of Minamata disease and Itai-itai disease. Japanese government response, though not immediate, was the enactment of Basic Law for Environmental Pollution Control (1967).

During the seventies Japanese National government introduced some of the strictest environmental standard in the world, backed up by strong regulatory enforcement. These CAC measure have resulted in rapid and sustainable decrease in ambient levels of many pollutants by the late seventies and early eighties in some cases. The remarkable aspect of the Japanese environmental policy is that, the economic growth continued at respectable 4.1 percent a year over the decade of the 1980s down from 6.4 percent in seventies but still well above the OECD averages. It posed a challenge to the

conventional wisdom, which presumes a trade-off between environmental and economic performance. Due to the close coordination between government and industry, Japan's regulatory approach is effective, dynamic and oriented towards cleaner technology rather than to conventional end-of-pipe treatment.

Other policy instruments used extensively by the Japanese government are (a) an environment fund created by Health Damage Compensation Law (1974) financed by fines on polluters and used to compensate victims of environmental pollution; and (b) the pollution control agreements between industry and government or local communities. These agreements are not legally binding; but provide an incentive to voluntary compliance. There were about 37,000 such agreements in force by 1991, with 259 of them being reached without local government's involvement, which indicates the effectiveness of such a policy instrument.

(ii) Environmental Policy Framework in Korea: The nature and performance of environmental policies in Korea is almost same as Japan. Korea has also relied primarily on CAC approach and with close government industry co-ordination like Japan, facilitates the adoption of dynamic process-oriented technology reform, rather than just relying on end-of pipe treatment.

Korea has also an Environment Pollution Prevention Fund partly financed by Government and from pollution charges levied on firms violating emission standards. This fund is administered by Environment Management Corporation and used for providing low interest loans for installation of pollution control device as well as for compensating the victims. The penalty rates in this taxes-and-standard system are not high enough to serve as a strong deterrent. In some cases, fines are not collected because firms plead financial hardships. Korea has also introduced a deposit-refund scheme for a number of products, which contribute to waste disposal problems; which includes food and beverages containers, pesticide containers, batteries, tires, lubricant oil and plastics etc.

(iii) Environmental Policy Framework in Taiwan: Taiwan enacted Public Safety Law in 1971, which culminated in the Environmental Protection Fundamental Law (1988), after a revision in 1982. But for water pollution and its control, Taiwan introduced a Water pollution Control Act (1974), revised twice thereafter and the latest being in 1991. This Act calls for ambient environmental quality standards based on technology and economic feasibility and the enforcement & monitoring of these standards and awarding of punishment for non-compliance. Apart from this regulatory framework for the control of environmental pollution, Taiwan is more inclined to experiment with the use of economic instruments.

Economic Instruments used in Taiwan mainly consist of (a) import duty exemptions for imported pollution control equipment; (b) tax reduction on investment in automated facilities for technology, pollution control technology, research and development and training cost; (c) enhanced depreciation on pollution control equipment; (d) encouragement to relocate industries to better-planned industrial zones; (e) low interest for the installation of pollution control devices within the private sector.

Like Korea, again there is no tradable permits system in Taiwan and voluntary agreements on pollution control are also very limited.

(iv) Environmental Policy Framework in Indonesia: Indonesia has initiated the environmental pollution control regulatory framework in late eighties. In 1989, a comprehensive environmental bill was made into a law, which established a national policy for maintaining reasonable standards of purity for the air and water of the country. National Pollution Control Commission is primarily responsible for pollution control in Indonesia. The government of Indonesia initially concentrated on monitoring and enforcement of quality of environment before considering the use of economic instruments. Indonesia has assigned more important role to economic instruments such as effluent charges. The regulatory framework with respect to water pollution is mainly concerned to industrial water effluents, which is implicitly addressed by Ministry of Industry while issuing licenses to the factories. Enforcement is quite low, despite substantial penalties and even prison sentences in the case of non-compliance of the order of Ministry. The Ministry of Population and Environment gives subsidies on import of wastewater treatment equipment and on installation of wastewater treatment facilities for certain industrial sectors.

Although there are no marketable permit schemes in Indonesia, there is widespread use of pollution control agreements between industry and the government like Japan. There are two well-focused programs known as PROKASHIH and PROPER (means Clean River Programmes in Indonesia), to clean up the most heavily polluted rivers. Major polluting sources along 20 dirtiest rivers were originally targeted; later the scope was expanded. The government also publishes

regularly information on environmental ratings, drawn upon the basis of environmental standards. Those industries, which meet international standards effluent discharges, are labeled 'GOID' industries, while those, which meet national standards, are termed 'GREEN'. Industries performing poorly to control pollution are termed as 'BLUE', 'RED' and 'BLACK'.

(v) Environmental Policy Framework in Thailand: Like other Asian countries, Thailand has also regulatory framework pollution control and is in the process of experimenting with economic instruments. Thailand's industrial structure like Taiwan is markedly different, with many small and medium size enterprises that tend to be geographically dispersed. A straight CAC approach would not be practicable given the circumstances. Economic incentives currently being offered is discount on the standard tariff on imported capital equipment for end of pipe treatment technology by the Ministry of Finance. In addition, the Industrial Finance Corporation of Thailand (IFCT), a semi-government organization, offers concessional financing for purchasing of anti-pollution equipment purchases through Environment Portfolio.

As in Japan and Korea, in October 1991, Thailand also launched an Environment Fund, with an initial capital contribution made by government of about US \$20 million to be supplemented by a levy on oil consumption of 0.10 baht (roughly 0.4 US cents) per liter.

Thailand has been one of the first countries to privatize the environmental services. In this system, a private contractor on a five-year-lease from the government operates the treatment plant. This private company collects, transport, and disposes the wastes after treatment and recovers its operating costs by imposing a waste treatment fee on the industrial units. The fee varies depending upon the type and quantity of wastes to be treated and the distance over which wastes must be transported.

III. ENVIRONMENTAL POLICY FRAMEWORK IN USA

Since the Earth Day in 1970, a host of environmental laws and regulations have been enacted (like Water Pollution Act 1956, Amended in 1972, Safe Drinking Water Act, 1974 etc.) and substantial gains have been made in environmental protection. However, the United States and World at large, still facing major environmental threats-both ongoing such as ground water pollution, air and acid rain etc. and newly recognized problems including threat of global climate change. During the last decade, political leadership of United States is recognizing the potential role of market forces in achieving sustained environmental quality.

President George Bush (1989) proposed a *tradable permit system* for acid rain control and vehicle emissions as a beginning of incentive-based strategy to control environmental pollution. These innovations in environmental policy represent a departure from CAC regime to market-based environmental protection, though economists have recommended such approach to US administration over thirty years back (J. Dales, 1968). Most of incentive-based instruments USA fall within one of these major categories such as pollution charges (taxes), marketable permits, deposit refund system, market barrier reduction and government subsidy elimination. Out of these five categories we will present in briefly the experience of pollution charges and marketable permit approach.

(a) Pollution Charges: charges have not been widely adopted in United States for controlling water quality. Although the scattered use of charges gave initially positive sign of the effectiveness of fees for reducing municipal and industrial wastewater pollution level.

(b) Marketable Permits System: Permit system have been used primarily in United States, which includes the famous Tradable Discharge Permit (TDP) scheme for controlling water pollution on the Fox River in Wisconsin. The permit system was applied to cover 10 paper and pulp mills and 4 Municipal waste-treatment plant discharging waste into Fox River flowing from lake Winnipeg to Green Bay. In March 1981, permits were made transferable first and safe trade was made. However, U.S. has had very limited experience with tradable permit programs for controlling water pollution from non-point sources, particularly agricultural and urban runoffs. The programme to protect Dillon Reservoir in Colorado shows how difficult it is to control non-point source water pollution. In view of this, point/non-point source trading plan began in 1984. It allowed publicly owned sewage treatment works to finance the control of non-point source in lieu of upgrading their own treated effluents to drinkable water standards. Environmental Protection Agency (EPA) estimated that the plan could save over one million dollars per year. Although the structure of this trading programme is in place, so far no trading has occurred.

IV. ENVIRONMENTAL POLICY FRAMEWORK IN EUROPE

Almost all of the OECD countries initiated the environmental protection programme within a regulatory framework. Incentive-based instruments have been used at a later stage. The experience of policy framework of most of OECD countries exhibits that effluent charges approach have been more popular as an economic instrument than marketable permits. Though countries like USA are relying more upon tradable permits, Germany and Netherlands are also weighing the performance of US emission trading programme as a possible replacement for the existing CAC approach. The experience of some of the selected OECD countries (France, Germany and Netherlands) to control water pollution is discussed below in brief.

Policy Framework in Germany: Germany environmental policy dates back to nineteenth century when environmental policy was known as 'air and water hygiene'. In 1901, the first river authority (Genossenschaft) was organized along with the Emschen River in the Ruhr valley to treat industrial waste, financed by effluent charges on their members.

The German water pollution charge system was introduced to reinforce the water quality in competence of the German Lander. The system contains incentive elements like reductions for best available technology and lowered rates in the expectation of investment for water pollution abatement. German effluent fees like in Europe, are not primarily intended to regulate industrial discharges, but rather to raise funds to finance projects for water quality management. The charge rate is calculated against the background of marginal abatement costs of different industrial sectors. But the rate is set to limit the financial consequences for the charge. The German charge system is probably best rated as an incentive charge, when it came into effect from 1981 onwards. It may be characterized as an earmarked charge. The German Government also provides subsidies to facilitate the implementation of environment programmes and to help small industrial units to install pollution control equipment.

Policy Framework in France: The purpose of the French water pollution charge approach is to provide incentives and partly subsidies the installation of wastewater treatment plants operated by municipal and industrial discharges. Polluters are themselves responsible for purification of wastewater but they pay for it if they discharge to open water and are supported financially if they undertake treatments measures. The charge system is administered by six Agencies del'Eau.

The fees is charged on basis of COD, SS, nitrogen, phosphate and toxic materials in the effluents. In areas where pollution problem is acute, the charge is increased by multiplying it by a coefficient. Though charges are modest, still the amount of wastewater treated in public purification plant rose from 30 percent of total wastewater emission in 1980 to 42 percent of total emission in 1992. The charge rate has also never been related to the marginal cost of abatement and appears to be much lower than the average cost of pollution control. The French charge system is described as best earmarked.

Policy Framework in Netherlands: The Dutch Water pollution charge system is primarily geared towards financing collective wastewater abatement plants. It was introduced in 1970 with the enactment of Act on Pollution of surface water in order to facilitate the building of wastewater treatment capacity for discharges into large water bodies managed by the state. The charge rates, as far as the non-state part of the system managed by the Water Board is concerned, is calculated on the basis of funds required for the expenditure for investment in and running of the plants in the coming period. The average charge rate in Netherlands is only slightly lower than average pollution abatement costs. The charge system accompanies a system of permit giving.

Since 1970, there is a considerable improvement in the environmental quality. Treatment capacity has increased from 52 percent in 1975 to 95 percent in 1992, in terms of households connected with a public sewage treatment plant. Voluntary agreement with industry, where industry volunteers to reduce emission and is made to stick to that agreement, is an area of environment policy in Netherlands, which has had significant effect on pollution levels.

Policy Framework in United Kingdom: Pollution regulation has a fairly long history in the United Kingdom when city of London passed a measure to control smoke. Disputes regarding pollution were subject to nuisance law for centuries, and in the early nineteenth century, a parliamentary committee was convened to examine the problem of urban smoke. More problematic for many in the last century were the "noxious vapours" arising from chemical works, particularly the hydrochloric acid fumes given off in the manufacture of sodium carbonate. In 1863, the Alkali Act became law with the express purpose of controlling these emissions. The innovation of the Alkali Act was to set up the quaintly named Alkali Inspectorate, a set of experts with power to mandate emission control. The Alkali Inspectorate eventually metamorphosed

into Her Majesty's Inspectorate of Pollution in the 1970's, which was subsequently absorbed into the Department of the Environment, Transport and the Regions. The Alkali Inspectorate was only permitted to regulate certain "difficult" pollution processes- "scheduled processes". The list of scheduled processes started with hydrochloric acid from sodium carbonate manufacture but was slowly expanded over time. Eventually, in large part due to the deadly London smog's of 1952, nearly all-potential sources of air pollution, including generators of smoke, came under the authority of the Alkali Inspectorate (in the 1956 clean Air Act). Despite this, "routine" pollution problems were specifically delegated to local authorities. The idea was that when abatement presented no particular technical difficulties, responsibility was to be transferred from the Inspectorate to local authorities.

The Alkali Act set the stage for how pollution would be regulated in the UK. One of the important clauses in the Act as amended was the scheduled sources shall use the "best practicable means" (BPM) of pollution control. Here practicable means not only technically feasible but also economical, including justifiable on the basis of the damage from the pollution. This approach has long been favored over specifying particular emission limits. The thought is that not only is BPM more flexible, but also is more likely to encourage innovation than fixed emission limit. Thus the regulatory approach is that polluters must be registered and requirement for registrations the use of BPM. The government has prepared "Notes" on what constitutes BPM for various industrial facilities. These guidelines are used in the source-by-source negotiating process over the required registration and re-registration process.

Although the UK is not a federal system, there are different levels of government, ranging from local to national. In the environmental area, there are clear distinctions regarding which responsibilities reside at the local level and which at the national level. As the discussion of the Alkali Inspectorate indicates, certain scheduled sources of pollution are subject to control at the national level. These are typically the sources of pollution that are the toughest to control. Small-scale sources of pollution, including municipal solid waste, are typically the responsibility of local authorities.

Water pollution regulation is the responsibility of the National Rivers Authority, though this body has been merged into the Environment Agency within the Department of the Environment, Transport and the Regions. The regulatory approach is similar to that used for air pollution control in that polluters must register, and by doing so are subject to requirements regarding pollution control technology.

V. ENVIRONMENTAL POLICY FRAMEWORK OF THE RUSSIAN FEDERATION

Russia has been a country in transition and that applies as much to environmental regulation as to any other aspect of the economy. Thus elements of the current Russian approach to environmental protection will undoubtedly change as the country's institutions adjust to a new economic environment. Furthermore, simply having a regulation on the books does not necessarily mean that the regulation is fully implemented and enforced.

Much of the Russian approach to environmental protection has its origins in the Soviet Union. The 1970s was the beginning of significant Soviet actions to protect the environment. Both water pollution and air pollution controls were instituted in this period, along with the establishment of the country's basic framework of pollution regulation. The then Soviet and now Russian regulatory approach relies on health-based ambient standards for a wide variety of pollutants. These standards are developed at the national level for use throughout the country. The standards are not absolute but depend on the nature of the use of the ambient environment. For instance, ambient standards for air depend on whether the point of application is a residential or an industrial area. Ambient standards for water depend on whether the water is used for recreation, fishing or drinking.

Ambient standards are generic federal standards that apply throughout the country. They are used to establish source-specific emission limits. These emission limits are embodied in the pollution permits each significant source of pollution must possess. The procedure is that new sources of pollution must submit an application for a pollution permit containing a technical analysis of the effect of emissions on ambient concentrations, at the boundary of a specified zone around the source. Background pollution concentration levels must be taken into account. This application is the basis for establishing an emission limit for the source. Thus this is source-by-source procedure that is driven by ambient standards, not by a consideration of best available technology or costs. Sources that existed prior to the regulations must follow a similar procedure existed prior to the regulations must follow a similar procedure to obtain an emission limit as well as permit.

As might be expected, some pollution sources have difficulty meeting the permitted emission limits. In these cases, temporary emission limits are issued, with the idea that over time, the temporary limits become increasingly tighter until they equal the emission limit. The rate at which these temporary limits are tightened is apparently somewhat negotiable.

The regulatory authority responsible for implementing these laws at the national level is the State Environmental Protection Committee. In addition, there are nearly a hundred regional environmental protection committees, roughly one for every member of the Russian Federation. There are also local environmental protection committees in some of the major cities. These committees (primarily the regional committees) are responsible for implementing the environmental laws. Thus if a new source of pollution wishes a pollution permit, application is made to the regional environmental protection committee.

One of the major differences between environmental regulation in Russia and the rest of the world is the use of the "environmental fund." The environmental fund is a major financial resource to be used to help clean up the environment and finance pollution control measures. Funds (pots of money) are associated with each level of environmental regulation—federal, regional, and local. The existence of such funds can probably be best understood in the context of the centrally planned Soviet Union. In the Soviet Union, the major stationary sources of pollution were state-owned enterprises. Resources were needed to pay for pollution control. Some of these resources were to come from the budgets of the enterprises. Resources were needed to pay for pollution control. Some of these resources were to come from the budgets of the enterprises but that was not considered to be sufficient. (For example, one might expect the Ministry of Steel to put environmental protection investment funds.) Funds were also needed to clean up environmental accidents and other problems for which responsibility could not easily be assigned. The funds were also used to finance public environmental projects such as sewage and drinking water treatment. An interesting additional use of the funds was to pay compensation for environmental damage. In the post-Soviet era, the environmental funds have been a major source of funding for environmental protection. The funds are used for direct grants for pollution control as well as subsidized loans. As might be expected, resources are limited in the funds. Polluters can make application to the fund for a direct grant or a loan or anything in between. The fund allocates resources on a case-by-case basis.

The focus in the above discussion is on air and water pollution from major sources. Automobile emissions are not regulated to any significant extent. Moscow bans leaded gasoline, but that is an exception. However, automobiles must undergo periodic checks on their emission rates for carbon monoxide. Nevertheless, it is not clear how strictly these limits are enforced.

VI. APPLICATION OF ECONOMIC INCENTIVES IN PRACTICE

Perhaps surprisingly, Russia makes extensive use of emission fees (as do many other countries of Eastern Europe and the former Soviet Union). In the late 1980s the Soviet Union was experimenting with emission fees and Russia embraced these in the early 1990s. The original intent of the emission fee was to finance the environmental funds. If the environmental funds were in turn to pay for environmental protection, it seemed logical that polluters should contribute to the fund based on their emission levels. Consequently, each source of pollution is required to pay a fee into the environmental funds per unit of emissions. Most of the payments go to local or regional funds. There are two levels of the fee, a base level, for emissions under the emission limit for the facility (described above), and a level five times greater for the emission over the limit. Although substantial revenues are collected with these fees (in 1993, nearly \$100 million), the individual fee levels are modest. In 1995 the sulfur dioxide base fee was 5610 Rubles (US\$1.22) per ton. This is significantly lower than the marginal cost of even modest pollution control, at least in the West. Several studies of the emission fee system report that the fee levels are too low to provide much of an incentive for pollution control. Despite these findings, the fee system will be important to monitor as Russia's market economy evolves in the coming years.

VII. CONCLUSION

The experience of environmental policy framework of different Countries suggests that, the specific context in which environmental policy has to be designed and implemented not only affects the choice of policy instrument subsequently, in tackling the targeted problem of pollution. Thus, while some of the governments remain wedded to CAC system, which has been described, especially in economic theory for being cost inefficient, but has served many governments as a mean of rapidly redressing the worst environmental problems. Simultaneously, there is growing experimentation with new

instruments in a number of countries. CAC approach versus economic instruments dichotomy do not always fit neatly for innovations in environmental policy design. Moreover, there is huge scope for experimentation with new economic instruments.

REFERENCES

- [1] Arrow, Kenneth J., *Social Choice and Individual Values* (Wiley, New York, 1951).
- [2] Boumol, W. J. (1972): 'On Taxation and Control of Externalities', *American Economic Review*, Vol. 42, No. 3, pp 307-22.
- [3] Boumol, W. J. and Wallace E. Oates, *the Theory of Environmental Policy*, 2nd ed. (Cambridge University Press, Cambridge, England, 1988).
- [4] Chopra, K., G. K. Kadekodi and M. N. Murty (1990): *Participatory Development People and Common Property Resources*, *Studies in Economic Development and Planning*. No. 52, Institute of Economic Growth, Sage Publications, Delhi.
- [5] Coase, Ronald H., "The Coase Theorem and the empty Core: A comment," *J. Law Econ.*, 24:183-187 (1981).
- [6] Coase, Ronald H. "The Problem of Social Choice," *J. Law Econ.*, 3:1-44 (1960).
- [7] CPCB (1989): *Pollution Control Acts and Rules with Ammendments*, Central Pollution Control Board, Government of India.
- [8] Dasgupta, A. K. and M. N. Murty (1985): 'Economic Evaluation of Water Pollution Abatement: A Case Study of Paper and Pulp Industry in India' *Indian Economic Review*, Vol. 20, No. 2, pp 231-66.
- [9] Goel, M. M., Ashok Chauhan and Jaikishan, *Some Issues in Environmental Crime and Corruption in India*, Annual Conference Volume of Indian Economic Association held in Jammu in December 2000.
- [10] Jaikishan (2002): *Environmental Policy Framework in India: Shortcomings and Alternative Strategies*, A Pare Presentaed in World Environment Foundation (WEF), Delhi.
- [11] Jaikishan (2007): "Water Pollution Management: An Economics Way, Shakti Book House, New Delhi.
- [12] James, A. J. and M. N. Murty (1960): 'Water Pollution Abatement: A Taxes-Standards Approach for Indian Industry', Working Paper No. E/177/96, Institute of Economic Growth, University of Delhi, Delhi.
- [13] Kolstad, Chales D., "Empirical Properties of Economic Incentives and Command and Control Regulations for Air Pollution Control," *Land Econ.* 62:250-268 (1986).
- [14] M. N. Murty, Surender Kumar and Mahua Paul, "Environmental Regulations, Productive Efficiency and Cost of Pollution Abatement: A Case Study of Sugar Industry in India", IEG, Delhi, Working Paper Series No. E/213/2001.
- [15] Meade James E., *The Theory of Externalities* (AW Sijthoff. Leiden, The Netherlands, 1973).
- [16] Mehta, S., S. Mundle and U. Sankar (1993): *Incentives and Regulations for Pollution Abatement with an Application to Waste Water Treatment*, National Institute of Public Finance and Policy, Delhi.
- [17] Misra, S. and M. N. Murty (1995a): 'Collective Action in the Industrial Water Pollution Abatement: Conceptual Issues and Empirical Analysis', Working Paper No. E/166/95, IEG, Delhi.
- [18] Murty M. N. (1994b): 'Optimal Control of Water Pollution: Pigouvian Tax Versus Coasian Free Market', IEAS International Conference, Economic Perspective for Pollution Controls in the Pacific Rim Countries, 18-19 March.
- [19] Murty M. N. (1995c): 'Use of Economic Instruments for Controlling Pollution in India', Working Paper No. E/169/95, IEG, Delhi.
- [20] Tietenberg, T. H. (1991): 'Economic Instruments for Environmental Regulation', *Oxford Review of Economic Policy*, Vol. 6, No. 1, pp 17-33.
- [21] World Bank, *World Development Report 1992: Development and the Environment* (OUP, New York, 1992).
- [22] Xu (2001), "Pollution Control Policies for China's Paper Industry", Downloaded from the website.