FES 838b Urban Environment and Management in Asia, Professor Bai Xuemei
April 26, 2003

How Real Are Latecomer Advantages?

Huan Gao
(International Relations, M.A. 2003)

The concept of latecomer advantages has been much discussed in terms of economic development and environment protection of developing countries. Often it has become a heart-warming assumption in dealing with the complexity of problems in these countries. However, more often than not, these latecomer advantages remain at the level of possibility. What can be perceived as latecomer advantages is easily offset by some accompanying disadvantages. Therefore, more scrutiny is needed in understanding the limitations and implications of these so-called latecomer advantages so that we can get a better grasp of the picture and find more effective solutions.

Latecomer Advantages Defined

In the context of East Asia, latecomer advantages often refer to the advantages presumably enjoyed by the late industrializers in the region in contrast to Japan. However, in a broader context globe-wise, latecomer advantages can refer to the advantages of any individual country or group of countries in the later stage of development.

Roughly speaking, there are 6 categories of latecomer advantages although they are very closely related and sometimes overlapping. We will examine them one by one and find out how real these advantages are and what are the potential obstacles to their realization.

1. Opportunity to learn from predecessors' experience;
2. More technology options available;
3. Less polluting industries;
4. Lower unit abatement costs;
5. Reduced uncertainty about absolute & relative magnitudes of environmental risks;

6. Increased exposure to international environmental incentive/pressures. [1]

Latecomer Advantage 1: Opportunity to learn from predecessors' experience

Learning from predecessor's experience is the main aspect of the latecomer advantage concept. Other advantages are more or less connected to it. Learning means drawing lessons from others' success and failure stories and subsequently carrying out their own activities with less detour. Using mature technologies developed by others and bypassing the costly R & D stage can also be part of this learning process. In a word, this advantage is conceived as a shortcut to success. Empirically there are evidences indicating this learning has indeed shortened the period and lowered cost for the latecomers in their economic development and environment protection.

Positive Cases

The early 1970s saw a very serious condition of air pollution in Japan as a result of rapid economic growth. Since the late 1960s, civil movement had significant impacts on the government policy in the form of lawsuit etc. As a response, the Environment Agency was established in 1971. From 1968 through the 1970s, there had been a number of environment laws and regulations such as those about SO_2 and NO_2. Since pollution that caught the public's attention was usually concentrated geographically, the local government also took an initiative to push for environment abatement. On the other hand, the oil crisis in 1970s and the hiked oil price which called for an effort to save energy also contributed to the improvement of SO2 pollution. In Japan, the main policy tool of pollution abatement was direct regulation even though this instrument was weak in providing incentives to decrease emissions beyond the imposed maximum limit. The market mechanism such as tax-cut and special loan was partly employed as well. Technology-wise, SO_x reduction was achieved with improved desulphurization technology and the switch to fuel with lower sulfur content although the latter approach brought up the problem of NO_2 abatement. In comparison, the air-pollution in large cities in Southeast Asia is in better situation than the Japanese counterparts as of the early 1970s. The explanation to this includes the administrative authorities' earlier initiative for environmental

protection and firms' success in reducing SO_2 emission through energy efficiency and partly shifting energy sources. There is evidence that they have indeed learned from developed countries such as Japan. While in Japan, the energy-efficiency increase was induced by the external shock of oil crisis whereas in these countries, such capability has been attained more naturally. [2]

A comparative study in Japan, Korea, and China has found that the environmental policy development processes in China and Korea were quite similar to those of Japan, except for a certain time-lag. This time-lag between Japan and China is 21-24 years, and 12-14 years between Japan and Korea. Furthermore, environmental policies in these three countries, in the long run, have been converging. Another finding is that the environmental policy development processes in these three countries were closely related to each country's economic growth. However, when compared to Japan, the tempo of environmental policy development in China and Korea has been faster than that of their economic growth. For example, the Korean Pollution Prevention Act of 1963 was modeled on a Japanese legislation. Ever since, the Korean government has consciously sought to examine the experience in other countries, especially Japan and USA. For China, the Environmental Protection Law (in Trial Implementation) of 1979 provided several advanced policy responses such as pollution discharge fee system and environmental impact assessment system similar to those adopted in developed countries. [3]

In the first case, observed fact is used as evidence of latecomer advantage and in the second, environmental policy per se is examined to show a deliberate effort to learn from predecessors.

Obstacles: Negative Cases

In spite of the foregoing discussion on learning, we still see many cases in which lessons are not well learned and unfortunate history repeats itself. The prominent cases of Minamata Disease in Japan, the Onsan Disease in Korea, and similar problems in Songhua River of China and Jakarta Bay in Indonesia did not happen at the same time. If the latecomers have been able to learn lessons well,

such tragic events might not have occurred, or at least not to such a severe extent. Therefore, there have been obstacles that we need to note.

Minamata is a disorder of the central nervous system with various signs and symptoms. It was first discovered in 1956 around Minamata Bay in Kumamoto Prefecture, and then in 1965 in the Agano River basin in Niigata Prefecture. [4] But it was not until 1965 that Showa Denko., Ltd. stopped manufacturing of acetaldehyde and not until 1968, after 12 years of investigation, that the government announced that Minamata Disease was caused by the consumption of fish and shellfish contaminated by methylmercury compound discharged from chemical plants. Ever since 1971, there have been numerous lawsuits by the victims and they have been compensated financially. In 1974, the Pollution-related Health Damage Compensation Law was enacted and dredging of the polluted bottom sediment of the Minamata Bay began. Since 1992, there have been many international symposiums and workshops discussing the causes, solutions and implications of this disease. In 1995, "Prime Minister's Announcement for the Settlement of the Problem of Minamata Disease" was authorized at the Cabinet meeting. [5] One thing worthy of special note is that the time span between the discovery of and the solution to this disease has been shockingly long. Because of slow reaction to the problem, the number of the victims have been huge (Merely according to the official account, as of March 2001, 2,955 Minamata Disease patients have been certified.) and the psychological impact is profound as seen in the photography of William Eugene Smith. [6]

In late 1970s, the **Songhua River** in the Northeast China suffered from the waste water with high mercury content from the chemical plants along the river (20-25 tons of mercury in 1 year from a single factory at its peak.) [7] The local population was found to have 16.5 mg of mercury per 50 kg of body weight, exceeding the limit of 10 mg/50kg. Related symptoms were also discovered. Although in the 1980s the chemical plants changed their production processes and stopped discharging mercury under a government directive, now there is still several hundred tons of mercury in the Songhua River

sediment, which poses a long term threat to human health. [8] Indeed, China has been experiencing a water shortage crisis exacerbated by pollution for long.

Onsan Disease was discovered in the Onsan Industrial Area in Korea in 1984. It is caused by the compound toxic wastes discharged by the local nonferrous industrial complex. According to the investigation by the Korean environmentalist Choi Yul and the Japanese doctor Harada Masazumi, who identified the cause of Minamata disease, the Onsan disease was far worse than Minamata disease. [9] When this news received much public attention, the Korea government denied any connection between the disease and industries' activities, and simply suggested people living in this area resettle elsewhere. [10] This happened 16 years after the Minamata Disease was officially recognized by the Japanese government as a result of industrial pollution (not to say 28 years after the Minamata Disease's first discovery.)

In Indonesia, Jakarta's Office of Urban Environmental Study reported in 1997 that the heavy metal content (copper, lead and mercury) in **Jakarta Bay** waters had been increasing since 1983. Hutagalung (1987) and Mahbub and Kuslan (1997) showed that this pollution is a result of industrial waste. [11] In the Angke estuary, the mercury content in commercial fish species far exceeds World Health Organization guidelines for human consumption. [12]

Obstacles: Possible Reasons

The disheartening facts of bad history repeating challenge the assumption of latecomer advantages in terms of learning from experience. In general, some possible common causes are:

1. "Growth First" national strategy: The East Asian countries discussed here tend to have a strong government. Therefore, when the national government decided to pursue a certain strategy, the whole country is mobilized. Although study has shown that that countries that invested early in environmental improvements experienced virtually no tradeoff in slower growth, [13] the competition

between economic growth and environment protection is still an idea deeply entrenched in the mind of many policy-makers. As a result, when the government decides that economic development is the top priority, environmental protection is expected to serve this purpose. It must be recognized that on different levels and in different scopes, cost and benefit are viewed differently. Generally speaking, the overall benefit of environment protection is more manifest in the long term and on a more macro level. If the government is relatively focused on short term where the danger of backward economy is fairly imminent and geographically concentrated, the government has more incentive to allocate the limited resources to economic development rather than environment protection. When no sudden severe environmental disaster occurs, such policy usually goes well with the pubic, especially if the public do not have high level of environment awareness yet the financial improvement as a result of economic development is much more obvious. In more extreme cases, governments can go as far as ignoring public concerns. In the 1960s, the Korean leaders viewed industrial smoke as a symbol of its economic development. Under that authoritarian political regime, anti-pollution movements were regarded as anti-government movements. [14] Even after the Onsan disaster went public with solid evidence, the government still denied it and only took relocation measures. Apparently, industrialization was the government's top priority at that time and nothing else should challenge it.

2. Too many things to take care of on the agenda of the national and local governments: Developing countries are in the process of change on their path of development. Therefore, the problems they face in such a transition at the backdrop of globalization are many and multifaceted. Furthermore, even inside the same country, different regions face different set of problems. Therefore, the governments, both at the national and local levels have to handle complexity with less than satisfactory institutions and mechanisms. Take China for example, although efforts are being made to clean the Songhua River, Northeast China, the region where the river is located, has a serious problem of unemployment, which can translate into social instability, an issue of utmost importance to China. In such a situation, the governments probably have to devote more energy in providing social security and creating new jobs. When environment agencies do not receive enough of municipal/central

government's commitment, there is limitation on what they can do. Even though they are all aware of the importance of environmental protection, some other problems which seem more imminent simply occupy them.

3. Information Dissemination and Absorption Problem: Looking at the chronology of these environmental disasters, we get the impression that the intervals are quite a few years, if not even longer. It took so much time for the Japanese government to make a final decision on Minamata disease after its first discovery. Probably since there had been no such precedent in history so the Japanese government needed time to understand this and used some caution in handling it. But even internally, there was 9 years between the first discovery around Minamata Bay (1956) and the discovery in the Agano River basin (1965). The Onsan disease was also many years after the Minamata disease became known. It is not an exaggeration to say that the slow response has helped kill/harm more people. Given what happened long time ago elsewhere, the latecomers could have enough time to make sure their factories do not do similar damage to the environment and human health at the start of production or make them stop such production. Even if the disaster has happened, it should have taken shorter period of time for the government to rise to their feet and take effective actions. Besides other important factors, information failure shall be held responsible, both at the disseminating end (predecessor) and receiving end (latecomer).

First, internally, for both the predecessor and latecomer, there is a lack of efficient channel for information to flow freely and quickly and in turn to be used effectively. Problems rise locally in bottom-up manner yet the government response is top-down. There seems to be a similar pattern: the problem was first discovered, and then scientists came in to investigate. Then it somehow became public and out of pressure, the government started to do some remedy. Because of the many bureaucratic hierarchy and agencies, information might well stay at a certain level for an unnecessary long period of time, unintentionally or intentionally (because of some parties' private interests.) There can also be loss or distortion of information before it reaches the powerful decision-maker. On

the other hand, when the decisions come down for execution, similar thing will happen, too. Therefore, a possible solution is to streamline and formalize the structure of information and decision making flows. One way to tackle this problem is to increase the role of the local government. The local government and relevant agency shall be given more discretion to generate more local responsiveness to problems. If there is a more formal mechanism so that a problem can receive due attention from the local government at its onset instead of only after the media has exposed it and exerted pressure on the government, and if the local government is able to do something in a timely manner, the hassle involved will be greatly reduced. However, in these cases, the institutional lesson has not been picked up by latecomers.

Second, the information sharing inside the country and across borders has not been satisfactory, either. One reason for this is still probably the concern over the authority of the government industrialization policies. Admitting to the terrible consequences of such a policy or even publicizing them is sensitive and requires courage and will on the part of the government. The Korean government's attitude was apparently not responsible and transparent. However, on the receiving end, there is also problem of lack of awareness and sensitivity. Even if information has been made available, if the mind of the government and relevant agencies simply do not reach out to get it and internalize it, the information is still equal to nothing. We have also seen a lack of alertness to relate local cases to similar cases of the predecessors. To raise their awareness level, the exposure to the expertise from academia and the field will be important so that the governments to make informed decisions.

One more related issues to information problem can be said of the general low level of environment awareness of the public and the subsequent low level of participation. The public tend to recognize the problems when they are very obvious and/or when their own health and life are seriously threatened. Complaints about noise are disproportionately high in ratio in China yet far more serious problems attack after years of unnoticed accumulation. The role of NGO is negligible in some countries such as China. The point is that only when all the stakeholders are aware of their stakes can

they learn from predecessors' experience and act accordingly. As a result, the externality and moral hazard (on the part of the polluters) can be better straightened out.

The three categories of obstacles above have something to do with the political institution and grand strategy of the countries. Therefore they often go beyond the scope of environment protection and become sensitive. The lessons from predecessors are out there, but the latecomers sometimes are unable to see them. Or even if they see the lessons, as they sometimes perceive something else even more demanding and urgent, they will choose not to give priority to environment situation. In these cases, the experience from predecessors is just unrealized opportunities.

On the other hand, even if there is great political will and good information, there are still many difficulties that limit the capability of the latecomer to learn from experience and utilize the latecomer advantages:

4. The first of such obstacles is lack of financial resources: It is in fact the fundamental constraint on the attempts at most of the development problems in the world. Developing countries already have many existing environmental problems as a result of ongoing development and/or historical issues. Probably many projects were badly planned from the very beginning and should not haven taken place at all but since they are already in existence, measures must be taken. If merely installation of anti-pollution facilities is needed, the question is still relatively simple since it mainly means added investment. But if the polluting operation is so serious that it needs to be stopped or basically transformed, the issue becomes more complicated. Much investment and many people have already been involved. If this would cause the sunken investment to be largely forsaken and many people unemployed, which are part of the social problems, the decision to combat the pollution will become more difficult to make. If these developing countries have more financial resources and better social safety net which often comes together, it would have been a lot easier for them to make such decisions.

Because of lack of financial resources, latecomers sometimes can only tolerate the current environmental problems with the knowing that they are time bombs.

Although sustainable development is a powerful concept, it does not come cheap, either. It is often in the form of projects supported by international organizations yet the technology and financial resources from them are not limitless. And since these pilot projects are not an intrinsic part of the national strategy blueprint, sustainable development is carried out in an ad hoc and case-by-case manner. Apparently that is not sufficient. Only when sustainable development mode of production and consumption is internalized in the national strategy, and more importantly, with substantial financial resources to back it up, can sustainable development become real. Otherwise, sustainable development is still something beyond reach as the startup funding can still be prohibitive for some developing countries.

As D. O'Connor has pointed out, financing of environmental improvement is among the biggest challenges facing a country whose per capita income is still below that of the World Bank's middle income economies. Even relatively wealthy developing countries like Korea and Mexico are still in the process of investing in expensive environmental infrastructures and pollution technologies, which are beyond their own means. [15] Multilateral institutions are not the only direction to look to but other alternative ways of financing such Build-Operate-Transfer and joint ventures shall also be explored. However, these are not always working. Not every country is equally attractive in obtaining foreign direct investment because of different prospects and risks. Then for some countries, it would be a lot harder to obtain funding from outside sources, private or public, for its environment improvement and sustainable development projects.

5. Although latecomers can learn from the laws, regulations and standards of predecessors, there are still questions about adjustment and implementation. Written laws, regulations and standards are easily copied, but they are created in different context of institutions and development

stages. Therefore, adjustment must be made to make sure these laws, regulations and standards are appropriate to the local soil. However, implementation is more important. In developing countries, not only the regulations are looser but also the implementation is far from satisfactory. Again a whole set of mechanism of implementation, commitment and capability both in manpower and technology are needed to put what is built on others' experience into practice.

Latecomer Advantage 2: More technology options available

In terms of technology, innovation has been moving in the direction of greater energy efficiency, greater materials recovery and lower emission/waste generations. Therefore, the technology available to the latecomer will be less material-, pollution- and energy-intensive. End-of-pipe abatement technologies have been giving way to waste-minimization or in-line environmental control technologies. The latecomer has the possibility to use the state-of-the-art technology, bypassing the transitional technological solutions and leapfrogging to clean process innovations. [16] With the fast development of technology, some become more affordable with a fuller range of options for the latecomer to choose from.

However, we need to note that these are still possibilities. Technologies transfer costs money yet the latecomer has limited financial resources. Technology development is fast, which in a sense means that some technologies become outdated and depreciate quickly. With a wider range of technology options, the latecomer needs to find out which one is the most suitable and cost-effective. There is a view that Asian governments tend to prefer the most "advanced" technology in the new manufacturing plants of the "national prestige". Such an example will be Bao Shan Iron Plant in Shanghai in 1985. With the technical support from the Nippon Steel Corp, both the manufacturing process and the environmental protection measures were as advanced as in Japan. [17] While such technologies may reduce emissions per unit of output, they are designed to be profitable under conditions of high-cost labor and low-cost capital, so they are poorly suited to countries with reversed relative prices. If this mismatch is ignored, the transfer of inappropriate technologies, even at concessionary price, may

further reduce employment and intensify resource depletion and environmental degradation. [18] Here, the equipments stand far above the needs of the receiving country. Although there is always a time lag due to the time required for planning and construction, when the receiving country actually has that need, presumably the technology has already become cheaper or some even better alternatives have become available.

Whether or not the technology is successfully transferred also depends on the **human capital** of the receiving country. Human resources with comparable capability are needed to utilize the technology otherwise technology is just a set of manuals and equipments. Moreover, management expertise is also needed to make sure these projects work well. Therefore, it is very important that when latecomers access the technology from the predecessors, they should also obtain training so as to master the technology and reap the benefit.

Lack of capable human capital is indeed one more obstacle to latecomer advantages. It is not limited to the technology and management scope. Apparently, the implementation of the environmental standards, regulations and laws, the making of national/local sustainable development blueprint, the land use and industrial planning all need committed and capable human capital. To generate such human capital, education, training and financial resources are indispensable.

Latecomer Advantage 3: Less polluting industries

As mentioned above, technologies are becoming more and more environment-friendly. Also because of increased productivity in general, there is less pollution per unit of output. So it follows that in their process of industrialization, the latecomers' industries will be less polluting. However, we must keep in mind that the so-called comparative advantage of developing countries entails not only lower labor and material cost, but also lower environment cost because the environmental protection enforcement there is looser, even though a study shows that the cost differentials in environmental regulations alone are not large enough to promote a shift of factories to less regulated countries. [19]

From the global perspective, the manufacturing sector has shrunken while information/service has become more prominent. But with a closer examination, we are to find that there is a new international division of labor in which developed countries become an importer of manufactured goods and developing countries as an exporter. While developed countries have a larger and larger share in information/service sectors, developing countries' role as a manufacturing base has increased. Even if the new technology is more environment-friendly and energy efficiency is greater, the absolute increase in size of the industrial base and energy consumption in the latecomer developing countries still means more pollution. Therefore, although this trend arguably contributes to the economic development and employment of latecomer developing countries, environment-wise, this export of pollution is indeed latecomer's disadvantage.

Latecomer advantage 4: Lower unit abatement cost

According to O'Connor, one factor working to the advantage of "late abaters" is that the unit costs of pollution abatement should generally fall over time with technological innovation. [20] It seems a justification that developing countries can concentrate on economic development first and then clean the environment later since it will be cheaper at that time. However, the environment damages are cumulative. The longer the environment protection is postponed, the serious the environment situation becomes. There can be a point when things become irreversible. Also, there is a moral problem about who to shoulder the benefit and damage. If the growth first/clean later policy is adopted, the current generation will be mainly taking the material advantage of economic development and the future generation is to endure the damage, bear the cost to clean the environment, if cleanable. If the sustainable development approach is adopted, environment investment has to be made for the current period and the future generation stands to gain more than the current one as such environment improvement takes a long time to be seen. Although there is little argument that the overall benefit in the long run is higher with the second approach, since different generations have different valuation of the present and future, they do no necessarily all focus on the long run. Rather the short-sightedness in some countries still to a large extent exist. Therefore, although the lower unit cost of abatement is

an advantage to the latecomer, when more factors are taken into account, this advantage becomes dubious.

Kuznet curve hypothesis predicts that the environmental quality initially deteriorates with the rising income, but later, after the income reaches a certain level, it rather improves. Therefore, with income level on the horizontal axis and the environment on the vertical axis, it forms an inverted U shaped curve. [21] The reason to the reversal of the environmental deterioration at the threshold income can be the structural change and rising environment expenditures. This is in fact a rationale of the grow first/clean later strategy. However, in spite of much empirical evidence (which also includes a lot of exception), this Kuznet curve is still a hypothesis. If we take environment as an intrinsic factor in production, it can be damaged and/or depleted so early that the threshold income can never be reached then no environment improvement is possible anymore.

Latecomer advantage 5:

Reduced uncertainty about absolute & relative magnitudes of environmental risks

According to O'Connor, latecomer is able to benefit from reduced scientific uncertainty about health and environmental impacts of certain pollutants. Those countries in the vanguard of environmental regulation had to introduce exposure limits to specific pollutants on the basis of far-from-complete information about the severity of health and other environmental risks. If the policy makers are risk averse, they tend to introduce very strict limits, which can turn out unnecessarily costly. When the latecomer is about to regulate similar pollutants, the experience from the predecessors and the new scientific findings might help it ascertain the actual severity of the risks and make informed decisions, saving the unnecessary cost. This latecomer advantage seems real enough. However, this again relates to information access, implementation issues that are closely connected with other latecomer advantages and obstacles.

Latecomer Advantage 6:

Increased exposure to international environmental incentive/pressures.

International influence is considered as one of the important factors contributing to the environment protection in latecomers. Environment friendliness has been the trend of the era. Early US environmental initiatives played an important role in catalyzing Japanese policy makers into action. At various times, OECD-issued principles and policy guidelines have also shaped the direction of Japanese environmental policy. International donors have also become more and more sensitive to the environmental impacts of their assistance programs in recent years—a sensitivity which in turn has spilled over to aid recipients. Also, as the market demands products friendly to environment in their usage and even production processes, the export-oriented late industrializes will have to comply with it. The classic example is that the Japanese automobile makers which, in response to the introduction of strict domestic auto emission standards modeled on the 1970 amendments to the US Clean Air Act, succeeded in overtaking the US automobile industry. [22] All these are the positive pressure and incentives to the latecomers. However, it must be noted that they largely come from the developed predecessors such as US and Europe. The undesirable legacy of colonial exploitation, unfair trade, failed institutions still remain bitterly in many developing countries. Some of the developing countries are simply not able to meet the new demands if local capacity is not built with necessary outside aid. In the worst case, they could become the victims excluded from globalization. Therefore, pressure and incentives are not enough. The capacity building to accommodate them is essential.

On the other hand, it is interesting to note that when there is a major international event that relates greatly to the prestige of the host country, the country tends to make a great effort toward the environment betterment. In 1979, the air pollution reached its worst level in Seoul. And in 1981, it was decided that the 1988 Olympic Games will take place in Seoul. Then we see a series of measures taken to combat the air pollution. In the same year of 1981, the Korean government arranged for the use of lower sulfur content oil. And in 1987, more stringent vehicle emission standards were imposed. In 1988, i.e. the year of the Olympic Games, the use of clean fuels (e.g. LNG) was required in large

cities in Korea. Not coincidentally, Japan reduced its air pollution and improved the Sumida River's water quality just before the Tokyo Olympic Games in 1964. [23] Similar things are happening in China because of the 2008 Olympic Games in Beijing. Certainly it is very good that the governments, after all, did take the massive initiative and mobilize the countries for the improvement of environment. However, it leaves the impression that "face" matters more than environment per se. Apparently such major events do not happen all the time everywhere. We cannot count on them for environment protection. In a sense, it implies that the governments have yet to appreciate the urgency of environmental problems. Rather, more constant commitment and better-planned steps integrated in the grand strategy are needed.

Conclusions

In this article, we have examined the 6 main categories of latecomer advantages and related obstacles. Latecomer advantages do make sense; however, they are not automatic. Essentially they are at the level of possibility. To learn from predecessors' experience will require commitment and capability, somehow related with the political institution, information channel and national strategy of the country. One very important factor is always the lack of financial resources that can be obstacle to the realization of most advantages. To translate technology transfer into cost-effective development and environment protection, latecomer has to take into account the applicability and human capital capability. The arguments that industries are less polluting and unit abatement costs are becoming lower are weakened by the fact that in broader context, the overall pollution is increasing. As for reduced uncertainty about certain environment risk, it is real. But the international pressure and incentives can be a double-edged sword in some extreme cases. Also it reflects that there is still a lot to improve in terms of the strategic motivation on the part of the latecomer governments.

In summary, we can say the latecomer advantages exist. However, how real they are is subject to interpretation and execution, depending on the angle we view them, the will and capability to utilize them and the offsetting disadvantageous effects.

References

[1] David O'Connor. *Managing The Environment With Rapid Industrialization*. Paris: OECD. 1994. P. 11-12

[2] Toru Iwami. *"Advantage of Latecomer" in Abating Air-Pollution: Experience in East Asia*. 2001. P.1 http://www.e.u-tokyo.ac.jp/cirje/research/dp/2001/2001cf133.pdf accessed on April 26, 2003

[3] Yohei Harashima, Tsuneyuki Morita. *Comparative Study on Environmental Policy Development Processes in The Three East Asian Countries of Japan, Korea, and China*. 2001. P. 28 http://www.ias.unu.edu/binaries/IASWorkingPaper95.pdf accessed on April 26, 2003

[4] Summary (of Minamata Disease), Ministry of Environment, Government of Japan. http://www.env.go.jp/en/topic/minamata2002/summary.html accessed April 26, 2003

[5] Chronology (of Minamata Disease), Ministry of Environment, Government of Japan. http://www.env.go.jp/en/topic/minamata2002/refer.html accessed on April 26, 2003

[6] http://www.geocities.com/minoltaphotographyw/williameugenesmith.html accessed on April 26, 2003

[7] http://hgyymzk.51.net/plbb/yszn/9_2.html accessed on April 26, 2003

[8] http://www.wzepb.gov.cn/seagull/book/for_life/fl_2_17.htm accessed on April 26, 2003

[9] http://english.kfem.or.kr/aboutus/secretary.htm accessed on April 26, 2003

[10] Yohei Harashima, Tsuneyuki Morita. *Comparative Study on Environmental Policy Development Processes in The Three East Asian Countries of Japan, Korea, and China*. 2001. P. 9-10 http://www.ias.unu.edu/binaries/IASWorkingPaper95.pdf accessed on April 26, 2003.

[11] http://www.unesco.org/csi/pub/papers/mega8.htm accessed on April 26, 2003

[12] http://www.wri.org/wri/wr-96-97/ud_b2.html accessed on April 26, 2003

[13] David O'Connor. *Grow Now/Clean Later, or Pursuit of Sustainable Development?* Paris: OECD.1996. P. 7

[14] Yohei Harashima, Tsuneyuki Morita. *Comparative Study on Environmental Policy Development Processes in The Three East Asian Countries of Japan, Korea, and China.* 2001. P. 8 http://www.ias.unu.edu/binaries/IASWorkingPaper95.pdf accessed on April 26, 2003.

[15] David O'Connor. *Managing The Environment With Rapid Industrialization*. Paris: OECD. 1994. P. 208

[16] David O'Connor. *Managing The Environment With Rapid Industrialization*. Paris: OECD. 1994. P. 33

[17] Toru Iwami. *"Advantage of Latecomer" in Abating Air-Pollution: Experience in East Asia.* 2001. P16 http://www.e.u-tokyo.ac.jp/cirje/research/dp/2001/2001cf133.pdf accessed April 26, 2003

[18] T. Panayotou. "Environmental Degradation at different stages of Economic Development" in Iftikhar Ahmed & Jacobus A. Doeleman ed. *Beyond Rio: the environmental crisis and sustainable livelihoods in the Third World*. New York: St. Martin's Press. 1995. P. 33

[19] R. Repetto."Trade and Sustainable Development", in M.G. Qauibria ed. *Critical Issues in Asian Development*. Oxford: Oxford University Press and Asian Development Bank.1995 P.186-212

[20] David O'Connor. *Grow Now/Clean Later, or Pursuit of Sustainable Development?* Paris: OECD. 1996. P. 7

[21] Toru Iwami. *"Advantage of Latecomer" in Abating Air-Pollution: Experience in East Asia*. 2001. P.16 http://www.e.u-tokyo.ac.jp/cirje/research/dp/2001/2001cf133.pdf accessed on April 26, 2003

[22] David O'Connor. *Managing The Environment With Rapid Industrialization*. Paris: OECD. 1994. P. 49-50

[23] Yohei Harashima, Tsuneyuki Morita, *Comparative Study on Environmental Policy Development Processes in The Three East Asian Countries of Japan, Korea, and China*. 2001. P. 9-14
http://www.ias.unu.edu/binaries/IASWorkingPaper95.pdf accessed April 26, 2003.