USE OF ECONOMIC TOOLS FOR MALAYSIAN ENVIRONMENTAL MANAGEMENT

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ABSTRACT

In managing environmental issues, the Government of Malaysia has traditionally given priority to the most significant environmental problems arising at any particular time. In the 70's and early 80's, the main task was to control pollution from agro-based industries such as palm oil mills and rubber factories. In the 80's, control of pollution due to domestic sewage was the main concern. In the early 90's, dealing with the accumulated scheduled wastes at factory premises has been the main issue. The current priority of the Government is to manage the ever-increasing volume of solid waste. In dealing with these issues, conventional regulatory instruments have been used extensively. In an effort to provide a more flexible approach, economic tools have also been used, but as a supplement to the standard regulatory instruments.

As economic tools attract more attention from Government agencies, it would be useful to evaluate the effectiveness of the tools used to date, particularly in the area of industrial environmental management. Since economic tools are used as supplements, the effectiveness of any tool alone is not possible. However, evaluating the impact of a regulatory instrument in combination with an economic tool can provide a useful measure of performance. Most of the economic tools used in the management of industrial

environment provide an option for the Government to manage pollution and contribute to the achievement of set objectives. However, some economic tools are not contributing significantly to the environmental protection efforts and modifications are required to improve their performance. Economic tools are not meant to replace the regulatory instruments, but in certain cases, they help to encourage the industries and the public to participate voluntarily in environment-friendly policies.

Key Words: Economic tools, effluent standards, environmental management, environmental policy, pollution fees, pollution prevention, regulatory instruments.

1. BACKGROUND

In recent years, many countries have adopted economic instruments in their environmental pollution control efforts. Based on the policy that polluters have to bear the cost of their pollution generation, economic instruments serve as tools to implement such policies more effectively. In a global context, regulatory and economic instruments have been successfully applied to surface water pollution control, groundwater protection, air pollution control, solid waste management, and hazardous waste management.

The pre-dominant industrial environmental management instrument applied in Asia, including Malaysia, is the command-and-control (CAC) approach based on the enforcement of legally mandated standards through fines and other penalties (Chen and Bacareza, 1995). As an alternative, economic tools such as effluent charges and user charges are employed in specific situations. However, the general view of economic tools is that they give producers and consumers an incentive to act in accordance with society's needs, i.e. to protect and improve the quality of the environment (Lindeneg, 1992). The Malaysian Government has adopted the command-and-control approach to control the industrial pollution and economic tools complement the existing regulatory instruments.

The argument is that, if there is no stick, who wants to take the carrot? The extent to which these economic tools have been applied in Malaysia and their effectiveness in bringing producers and consumers to comply with existing environmental regulations as claimed by many researchers in this field is not well documented. The purpose of this paper is to provide an overview of the performance of economic tools that have been used mainly for industrial environmental management in Malaysia.

2. ECONOMIC TOOLS USED FOR INDUSTRIAL ENVIRONMENTAL MANAGEMENT

The types of economic tools used and their objectives are presented in Table 1. The performance of each tool is discussed in the following sections.

2.1 Industry License Fees

In the mid 70's, palm oil mills were identified as the major source of water pollution and controlling pollution from palm oil mills became the priority task of the Department of Environment (DOE). The DOE used two approaches; a set of effluent standards and a licensing fee.

Table 1: Use of Economic Tools for Industrial Environmental Management

For watercourse and land disposal, a committee comprising of relevant Government agencies and industries determined two types of effluent standards based on the use of the best available technology and financial viability.

Effluent Standards for Watercourse Disposal

The first set of effluent standards came into force in July 1978 and required mill owners to bring down the average BOD_3 concentration of their raw effluent from 25,000 mg/L to 5,000 mg/L. Initially this was not a mandatory requirement meaning, instead of complying with the standard, mill owners could simply pay an effluent fee based on the calculation of the pollution load to be discharged (Table 2). The DOE adopted this approach for two main reasons, firstly to give mill owners sufficient time to install appropriate wastewater treatment systems and secondly to allow for further development of relevant technology to treat waste. During the second year of implementation, the effluent BOD_3 standard was further reduced to 2,000 mg/L. At this stage, compliance to the regulations was made mandatory. In addition, mill owners were still required to pay the effluent fee. Figure 1 shows the reduction in BOD_3 (Watercourse Disposal) discharged from 1979 to 1984 in comparison with the BOD_3 (Landcourse Disposal) discharge. Similar standards were observed for COD, TS, SS, O&G, NH_3N and TN. For pH and temperature, the limits were set at 5-9 and 45 ^oC.

Figure 1: Comparison of Palm oil effluent BOD_3 discharge for Watercourse and Land Disposal

Effluent Standards for Land Disposal

For effluent discharged onto land, BOD_3 is the only parameter controlled under the conditions of the license. From July 978 to June 1979, there was no BOD_3 concentration limit attached to the license, except when the Director General considered it necessary. After July 1979, palm oil mill owners were required to bring BOD_3 levels down to 5,000 mg/L (Figure 1).

Licensing Fee

This tool has been used as a supplement to the effluent standards for controlling pollution from palm oil mills. It comprises a processing fee, an effluent fee, a late fee, and a recovery fee.

Processing Fee: A fee of RM 100 is charged for obtaining written permission from the DOE under Section 19 of the Environmental Quality Act, 1974.

Effluent Fee: This is the fee payable for effluent discharged into a watercourse or onto land. Since palm oil mill effluent is organic in nature, the effluent fee is based on the pollution load depending on the mode of disposal. In the charging formula, different rates are set for watercourse and land disposal. The rates are set with the objective of creating incentives for mill owners to install wastewater treatment plants for reducing the pollution load. A comparison of effluent fees for watercourse and land disposal is presented in Table 2.

Table 2: Comparison of Effluent Related Fee for Watercourse and Land Disposal

Table 3 illustrates the effluent fee paid for watercourse disposal and land disposal, assuming the quantity of effluent to be discharged is 100,000 tons.

Table 3: Comparison of Effluent Related Fee for Discharging 100,000 tons of Palm oil Effluent into Watercourse and onto Land.

Table 3 shows that the effluent fee paid for watercourse disposal is less than the fee for land disposal. This does not mean that the DOE favors watercourse disposal. As shown

in Figure 1 for land disposal, mill owners need to bring down the concentration of BOD_3 to 5,000 mg/L at any period, meaning that the industry would spend less to meet the stipulated standard. The reduction of the effluent fee paid for watercourse disposal is used to offset the higher cost incurred in the treatment process.

Late Fee: This is the fee charged to any person who fails to renew the effluent discharge license on time. The fee is RM 10 for each day of delay.

Recovery Fee: The effluent fee is based on the information of quality and quantity of effluent declared by the applicant in the application. Upon inspection by the DOE, if the quantity of effluent generated is found to be greater than the value furnished by the applicant, the Director-General may recover such fees as would have been payable with respect to the extra quantity discharged.

Effectiveness of these tools in reducing pollution load discharged from palm oil mills can be evaluated by looking at the percentage of reduction achieved for the BOD_3 load discharge. The response of the industry is shown in Table 4.

Table 4: Response of Palm Oil Industry to Effluent Fee

In 1978, when the first set of effluent standards was introduced with non-mandatory compliance, 7% of all mills were willing to pay a fee more than RM 100,000. It is possible that some of the mills may have had doubts about the cost benefits of the treatment technology available at that time. A constraint on land use is another reason some mills may have preferred to pay the effluent fee. When the second set of standards was

introduced, compliance was mandatory. Consequently, mill owners had no choice but to install wastewater treatment plants. None of the mills paid more than RM 10,000 in effluent fees after 1979. As a result of this program, the BOD_3 load reduction in palm oil mill went from 76% in 1978 to 99.7% in 1989, while the number of mills increased from 130 to 254 (Figure 2).

Figure 2: BOD_3 Load Reduction in the Palm Oil Industry

After this period, discharge of BOD_3 load was maintained at about 5 ton/day, a discharge that is quite low compared to discharges from other sources of water pollution such as domestic sewage and animal husbandry. Overall, the effluent fee has created an incentive for the palm oil industry to install wastewater treatment plants and it is highly compatible with the polluter-pays principle and its continued use is recommended. However, the charge rates were set some 20 years ago and hence should be reviewed to reflect the time value of money and to provide a more effective stick for the industry to promote cleaner technologies in reducing the quantity of effluent produced.

2.1.2 Raw Natural Rubber Factory Licensing Fee

Raw natural rubber factories were another agro-based industry that contributed significantly to water pollution in Malaysia in the 1970's and the DOE used the same approach to control pollution.

Effluent Standards for Watercourse Disposal

For effluent discharge from factories producing concentrated latex and associated products, compliance with the first generation of standards stipulated in the regulation from April 1979 to March 1980 was not mandatory until after April 1980. From 1979 to 1983, four generations of standards were set regarding the concentration of $BOD_{3.}$

For products other than concentrated latex and its associated products, compliance was mandatory from the beginning because the technology available to treat effluent to meet DOE requirements was considered sufficient. Up till now, three generations of standards have been used. In the first generation, concentration of BOD_3 was set at 300 mg/L, 200 mg/L in the second and 100 mg/L in the third generation of standards

The licensing fee is comprised of fees similar to those in the palm oil industry. For watercourse disposal, the effluent fee is RM 10 per ton of BOD_3 load. For land disposal, the fee is RM 0.01 per ton of effluent discharged. The combination of effluent standards and a licensing fee worked well and achieved a 53% reduction in terms of BOD_3 load discharged from rubber factories during the first year of implementation. The percentage of reduction further improved to 81% in 1980 and more than 90% in 1983 and thereafter.

In general, the approach adopted by the DOE to control pollution from the rubber industry has shown a positive result and brought pollution from this sector under control. Again, the rates for the effluent fee were set about 20 years ago and should be reviewed.

2.1.3. Contravention of the License Fee

When the Environmental Quality (Sewage and Industrial Effluents) Regulations Act was first formulated in 1979, there were a large number of manufacturing industries. For manufacturing, two types of effluent standards, A and B, were used to control pollution. The standard A is observed more stringently than standard B. Factories located upstream of a water treatment plant have to comply with standard A while those downstream should

follow B. The Director General of the DOE is allowed to grant a contravention license to an industry if the reasons given by the applicant are genuine and justified. However, the contravention license is issued for a temporary period only and the applicant needs to pay the fees as shown in the following section.

Computing the Effluent License Fee

Under the 1979 Regulations, discharging effluent onto land is prohibited and the contravention license fee is computed for effluent discharged into a watercourse only. In general, the license fee is computed on the figures in Table 5.

Table 5: Method of Computing Contravention License Fee

The Table shows that it is more expensive to discharge effluent upstream from a water treatment plant than downstream and the charge is higher for contaminants specified in Note 1 than in Note 2 due to their different toxicites.

Performance of the licensing fee is based on the number of contravention licenses issued. A low number of contravention licenses indicates that the DOE is seeking higher compliance to Section 25 (restrictions on pollution of inland waters) of the Environmental Quality Act, 1979. Figure 3 shows the number of licenses issued increased from 49 in1994 to 75 in 1998.

Figure 3: Number of Contravention Licenses Issued for the Period of 1988-1994

Based on the information from applicants, poor performance of this tool was a result of the need for a longer period to construct new treatment plants or upgrade the existing plants; lack of proper effluent treatment technology, and land constraints. Nevertheless,

this tool is highly compatible with the polluter-pays principle and its continued use is recommended with periodic adjustments to reflect the time value of money.

2.1.4 Scheduled Wastes Treatment Fee

In the early 90's, the Government's main concern became the accumulation of scheduled wastes within the premises of the companies producing large amounts of waste (waste generators). An integrated scheduled waste treatment plant was built at Bukit Nanas, Negeri Sembilan. The facility includes an incineration plant, physic-chemical treatment plant, solidification, and a secured landfill.

The waste generator has to pay a treatment and disposal fee, which is set in consultation with the DOE. In general, the charge is based on categories of wastes, the nature of the waste, whether in liquid or solid form, and type of treatment facilities required. For example, the cost of liquid organic waste packed in standard 200-liter drums for incineration ranges from RM 800 to RM 3150 per ton.

Effectiveness is measured by the number of waste generators sending their waste to Kualiti Alam Sdn Bhd (KASB) for treatment and disposal. A higher number of companies signing up with KASB indicates a positive response from the waste generators to clear up the wastes accumulated on their premises, thus complying with the Environmental Quality (Scheduled Wastes) Regulations, 1989. Since the treatment facilities started operating in the beginning of 1998, only data for January and February is available for evaluation. In January 1998, 327 companies had signed up with KASB and this increased to 338 in February. However, only 114 companies out of the 338 sent their wastes for treatment and disposal.

Of the 2252 waste generators registered with the DOE in 1996, only 5.1% sent their wastes for treatment and disposal. In terms of total waste collected, this is only 4.3% of the total waste generated in 1996, a far from satisfactory response. This situation is expected to

improve if the DOE imposes a maximum limit on the time period that waste generators can store waste on their premises. Beyond this period, they must send their waste for treatment and disposal. The use of this tool in the management of scheduled wastes is highly compatible with the polluter-pays principle and should be continued.

2.2 Other Econometric tools

2.2.1 Tax Incentives for Storage, Treatment and Disposal of Scheduled Wastes

The first set of regulations to control and manage scheduled wastes was formulated in 1989. Under this regulation, waste generators need to notify the DOE about generation of scheduled wastes on their premises. In 1990, the following incentives were introduced to encourage waste generators to participate in the treatment and disposal of scheduled wastes:

(a) Pioneer status incentive for 5 years, i.e. no tax on their profit for the first 5 years of operation ;

(b) All capital expenditures incurred will be written off within a period of 5 years. This allowance is at an initial rate of 40% and an annual rate of 20% for 5 years.

However, before applying for this tax incentive, approval from the DOE should be obtained.

Effectiveness is measured by the number of companies that apply. A high number of applicants indicates a positive impact. Until 1994, only 5 big companies involved in oil production had applied. The low number of applicants indicates the low level of interest among waste generators to participate in the business of scheduled wastes treatment and disposal. The tax incentive scheme has been withdrawn as waste generators are now encouraged to send their wastes for treatment and disposal at KASB's Bukit Nanas, Negeri Sembilan integrated treatment facility. Moreover, the tool is not compatible with the polluter-pays principle.

2.2.2 Grants for Ozone Depleting Substances (ODS) Phasing-out Program

Since 1989, Malaysia has been a party to the Montreal Protocol to phase out substances that deplete the Earth's ozone layer. Malaysia itself does not produce any ODS but imports them from other countries for use in solvent cleaning, foams, mobile air conditioning, residential and small commercial air-conditioning, aerosols, fire fighting, and agricultural applications. In general, there are three approaches used by the Government to accelerate the phasing out of ODSs; institutional measures, regulatory measures, and grants from multilateral funds.

Institutional Measures: A National Steering Committee (NSC) for ozone layer protection was formed in 1985 to formulate and oversee the implementation of the ODS phasing-out plan. NSC is chaired by the Secretary General of the Ministry of Science, Technology and Environment (MOSTE) and its committee members included the DOE, Ministry of International Trade and Industry (MITI), Ministry of Finance (MOF), Fire Services Department, Customs Department and Statistics Department.

Regulatory Measures: The formulation of Environmental Quality (Prohibition on the Use of CFCs and Other Gases as Propellants and Blowing Agents) Order, 1993 under the Environmental Quality Act, 1974 prohibits the use of ODSs in certain industrial sectors. However, at present there is no regulation to prohibit the use of ODSs in the solvent cleaning sector or in the residential and commercial air conditioning and refrigeration sectors.

Grants from Multilateral Funds: As a member to the Montreal Protocol, Malaysia receives financial and technical assistance from multilateral funds. With sufficient financial and technical assistance, Malaysia will be able to totally phase out ODSs sooner than the mandatory date stipulated under the Montreal Protocol for developing countries. As of 31 December 1996, RM 68 million was obtained from multilateral funds to carry out

84 projects, which are expected to phase out about 5445 MT of ODSs between 1993-1998. With grants and technical assistance provided under multilateral funds and the use of regulatory measures, Malaysia aims to phase out CFCs and halons in all sectors except refrigeration and air conditioning by the year 2000. Figure 4 illustrates the consumption of ODSs from 1989 to 2000.

Figure 4: Estimated consumption of ODS by Major Industrial Users (1989-2000)

2.2.3 Differential Fuel Pricing for Leaded and Unleaded Gasoline

Lead in gasoline is known to adversely affect mental development, kidney function and blood chemistry, especially in young children, and the Malaysian Government has adopted several measures to reduce the concentrations of lead in the ambient air.

1). Reduction of lead in gasoline, enforced through the Environmental Quality (Control of Lead Concentration in Motor Gasoline) Regulations, 1985. Under this regulation, the concentration of lead in gasoline should not exceed 0.4 g/L effective from 1 January 1986. After January 1990, lead concentration was further reduced to 0.15 g/L.

2) Unleaded gasoline was introduced in 1992. To promote its use, the Government introduced a price differential of 3 cents starting from 1 January, 1994 (RM 1.10/L and RM 1.07/L for leaded and unleaded gasoline respectively).

Effectiveness is reflected in the trends for leaded and unleaded gasoline consumption from 31% in 1992 to 76% in 1996 (Figure 5). As a result, there is less lead in the atmosphere as shown in Figure 6. The recommended Malaysian guideline for Lead is 1.5 $\mu g/m^3$ considering a 3-month averaging time. To achieve a zero concentration level, the

Government has devised a stage-wise phase out of leaded gasoline once current supplies of leaded gasoline are consumed.

Figure 5: Percentage of Sales of Leaded and Unleaded Gasoline

Figure 6: Annual average concentration of Lead, 1988 – 1996

2.3 Compounds and Fines

The DOE carries out enforcement of the Environmental Quality Act (1974) and regulations thereunder. Under this Act, the DOE has the power to collect compounds and fines from those who violate the Act. In practice, the DOE prefers to offer a compound to offenders rather than go to court because the procedures for gathering the necessary evidence are cumbersome and prosecution is time consuming. There is a shortage of DOE staff to handle court cases, and the assumption is that industries will take remedial actions to correct problems after receiving a compound.

Compounds

Typically, a compound is issued for offenses that fall under the Environmental Quality (Clean Air) Regulations (1978) and Environmental Quality (Scheduled Wastes) Regulations (1989). The trend for compounds issued under these regulations is illustrated in Figure 7. Under the Environmental Quality (Clean Air) Regulations, 1978, the majority were issued for open burning of wastes. The number of compounds issued for this type of offense increased from 165 in 1990 to 712 in 1995. Under the Environmental Quality (Scheduled Wastes) Regulations, 1989, most compounds were issued for failure to keep an inventory. The number of compounds issued under this regulation increased significantly from no cases in 1990 to 142 in 1995. Total fines and compounds collected in 1996

amounted to RM 1.18 and RM 1.17 million respectively. This jump in the number of offenders indicates that fines and compounds were not effective in reducing non-compliance. Consequently, the Act was amended in August 1996. With this amendment, the maximum fine was increased significantly, especially for Sections where a high number of prosecutions were recorded for the past few years. The maximum compound was also increased from RM 500 to RM 2,000. Data for 1997 shows that the number of prosecutions increased to 274 compared to 256 in 1996 (Table 7). Simultaneously, the total collected fines increased from RM 1.2 to RM 2.4 million. Awareness of the amendment among industries is still very low. However, in the coming years, it is anticipated that the number of offenders will be reduced due to higher penalties imposed under the Act.

Figure 7: Trend of Compounds Issued under the Clean Air and Scheduled Wastes Regulations

Table 6: Offenses Prosecuted and Compounded Under the Environmental Quality Act 1974

There are three major types of offense; failure to comply with the conditions of a license; emission of wastes into the atmosphere without a license, and emission of wastes into any inland water body without a license.

From 1990 to 1995, the number of prosecutions increased from 15 to 128, with most offenses falling under Section 25 of the Act, i.e. emission of wastes into any inland water body without a license.

Here the effectiveness of this tool is hard to judge. Assuming that enforcement is strict, the number of offenses prosecuted or compounded gives an indication of the status

of industrial compliance to the environmental regulations. A low number of offenders indicate positive results.

3. NEW ECONOMIC TOOLS UNDER CONSIDERATIONS

Under the Environmental Quality (Amendment) Act 1996, new economic tools were incorporated to enhance environmental protection in Malaysia: environmental labeling schemes, environmental funds, and compensation schemes for loss or damage to property. Presently, the Government is also considering a tariff structure for solid waste management that has been privatized.

3.1 Environmental Labeling

An environmental labeling scheme awards green labels to environment-friendly products or products with a low environmental impact. For example, hygiene paper made from 100% recycled paper fiber; and washing machines that use less water and energy are regarded as environment-friendly products. The purpose of labeling is to help consumers identify and purchase those products that are environmentally friendly. The new Act has provided the DOE with the power to specify the types of products that need to carry environmental labels and as well as the rules on the use, design and application of the label. The assumption is that strong demand for products with environmental labeling will encourage manufacturers to adopt more environment-friendly policies.

The Act also enables the DOE to prescribe any substance as environmentally hazardous and require the substance to be reduced, recycled, recovered or regulated in a manner specified in the order. A manufacturer can be fined a maximum of RM 50,000, be

sentenced to 5 years imprisonment, or both for failing or refusing to comply with these orders.

3.2 Environmental Funds:

An environmental fund is established for the following purposes:

a) to conduct, promote and coordinate research in relation to any aspect of pollution or the prevention thereof;

b) to recover, remove, disperse, destroy, clean or dispose of waste or mitigating pollution;

c) to prevent or combat the following occurrences: a spillage, discharge or dumping of oil; discharge, deposit or dumping of environmentally hazardous substances; a discharge, deposit or dumping of waste;

d) to encourage conservation measures against any damage that may be caused by any of the occurrences mentioned above.

The fund is generated from the following sources:

(1) money provided by the Government from time to time;

(2) all donations and contributions received from within or outside Malaysia;

(3) money imposed or collected on the waste generated by the Director General of DOE;

(4) all money paid or received from any person involved in the exploration, extraction, refining, production, bulk movement, distribution or storage of oil; the production, bulk movement, distribution or storage, of environmentally hazardous substances; or the bulk movement or storage of wastes.

3.3 Compensation for Loss or Damage to Property

The newly created section of the Environmental Quality Act states that not only do offenders have to pay penalties, but they must also compensate any victims who suffer as a result of their negligence at a rate determined by the courts.

4. CONCLUSION

Analysis of environmental management trends in Malaysia indicates that the Government gives priority to significant environmental problems arising in a particular time period. In the 70's, the focus was on controlling pollution from agro-based industries. In the 80's and 90's, the priority was domestic sewage pollution and scheduled wastes respectively. Recently, the focus has been on solid waste management. In dealing with these problems, traditional approaches such as regulatory instruments have been used extensively. Various economic tools are being used as a supplement to the regulatory instruments and help provide some measure of flexibility in dealing with environmental issues.

More economic tools will likely be introduced to encourage the industrial sector to participate in environment friendly procedures. The recent amendment to the Environmental Quality Act has incorporated some innovative economic tools such as environmental labeling, establishment of an environmental fund and compensation to victims of environmental damage. A main feature of these new amendments is the ten-fold increase in penalties for non-compliance. However, records show that very few offenders have received the maximum penalty. Unless there is change in judiciary perceptions regarding violations of environmental protection Acts, provision of penalties alone will not yield a significant reduction in the number of offenses. In general, economic tools can not replace traditional regulatory instruments but should be seen as effective supplementary instruments.

References

Abu Bakar, J. (1995). Regulatory Reforms and Policies on Environment and Natural Resources: The Case of Malaysia. *World Bank Workshop on Managing Regulatory Reforms and Regulatory Policies in East Asia, July 3-7*, Kuala Lumpur.

Center for Environmental Technologies (CETEC) (1995). *Malaysian Country Program Update to Phase out Ozone Depleting Substances under the Montreal Protocol Report*. Petaling Jaya.

Chen, X. and Bacareza, L. B. (1995). Application of Economic and Regulatory Instruments for Environmental Management in Asian Industrializing Countries. *Industry and Environment*, Vol. 18, No 4, pp. 16-20.

Department of Environment (DOE), Malaysia (1998). *Division of Scheduled Wastes.* Kuala Lumpur.

Environmental Quality Act, (1974). *International Law Book Services*, Kuala Lumpur. ISBN: 967-89-0764-X.

Environmental Quality Data 1992-1995 (1996). *Department of Environment*, Kuala Lumpur.

Environmental Quality Report (1980 - 1996). *Department of Environment*, Kuala Lumpur.

Lindeneg, K. (1992). Instruments in Environmental Policy - Different Approaches. *Waste Management and Research*, Vol. 10, No 3, pp. 281-287.

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