Who says command-and control doesn't work?

Industrial impact reduction and public policy in Taiwan

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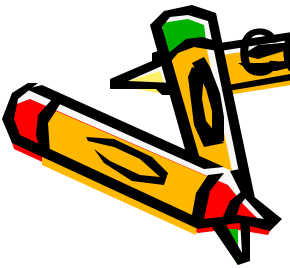
‘Command-and-control’

- Refers to the assertion of government authority through the use of regulations
- Critique: ineffective, inefficient (high administrative burden), inflexible, confrontational

This paper

- Describes Taiwan's experience in 'command-and-control' in relation to reducing the environmental impacts of manufacturing industries
- Tries to show that 'command-and-control' can be effective, flexible, non-confrontation, consistent with the firm's profitability and competitiveness objectives



Why Taiwan?

- Per capita income quintupled in 15 years (US$2,500 in 1983 to $15,000 in 1998)
- GDP growth in last three decades: 8.6%
- Once dubbed the “umbrella kingdom”, it is now 19th largest economy in the world, productive sectors ranked 4th in terms of competitiveness, foreign exchange reserves of US$84B, the third largest in the world.
- Rapid industrial growth and population of 22M concentrated on 1/3 the land base of Canada’s Vancouver Island
- In spite of Asian financial crisis and severe August earthquake, 1999 saw economy grew at 5.48%

Taiwan, a developmental state

- S. Weiss : attributes the impressive industrial transformation of Japan, Taiwan and South Korea to a distinctive kind of business-government relation where cooperation and coordination can coexist, a relationship that evolved and adjusted with the phase of development

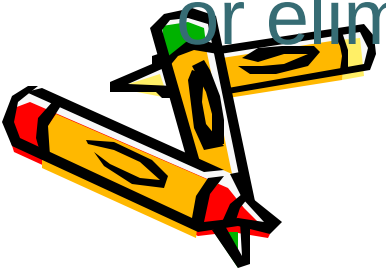
Industrial waste management

Three options

À Dispose in the easiest and cheapest way possible: dump down the drain, on ›empty land', up the chimneys, etc.

À ›End-of-pipe' : dilute, neutralise, reduce hazard, solidify, incinerate, dispose in engineered landfill site

À Cleaner production : analyse the source of waste and introduce change to minimise or eliminate the hazard or volume of waste



Cleaner Production

Definition

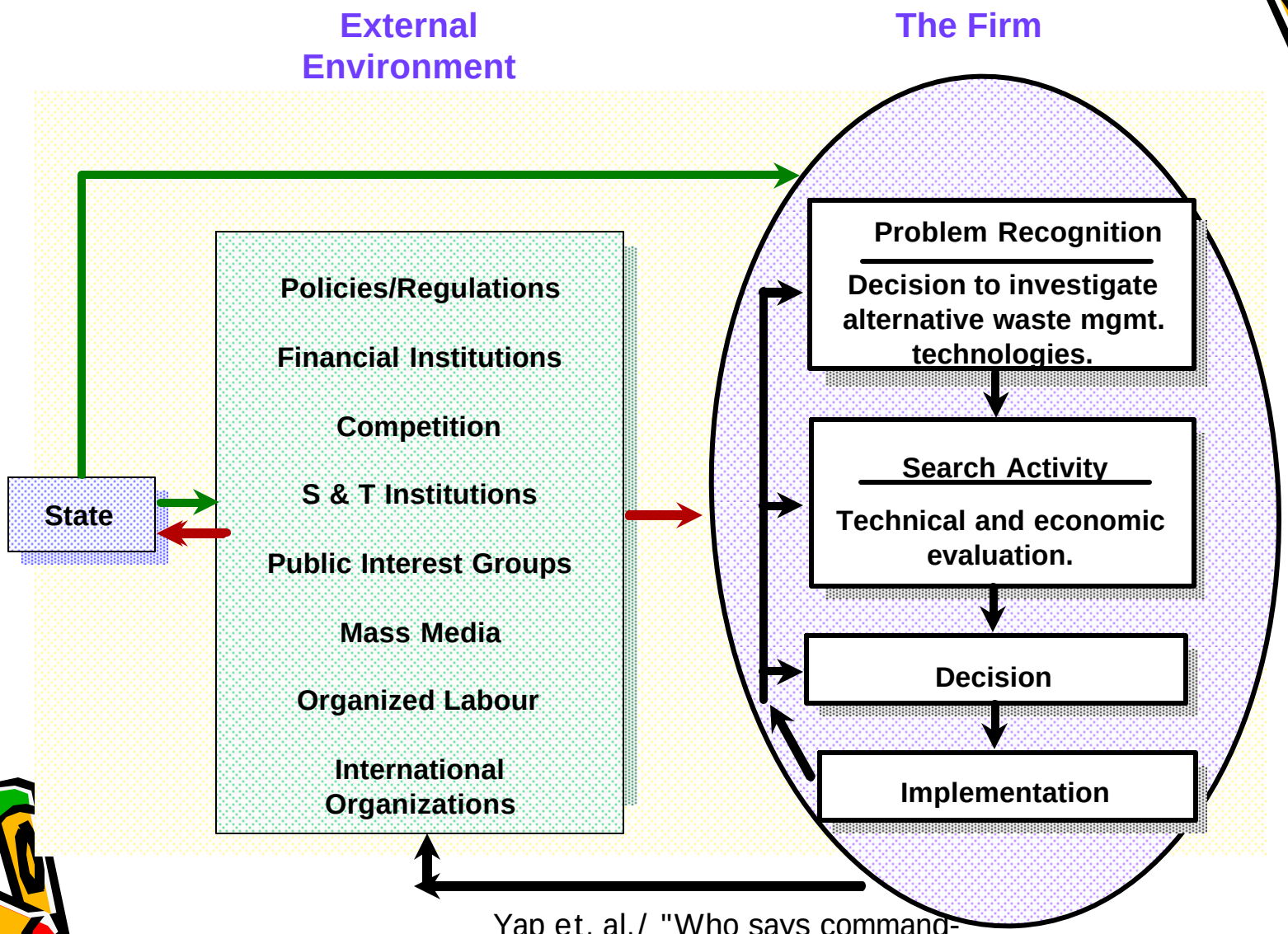
- "The continuous application of an integrated **preventive** environmental strategy to reduce risks to humans and the environment" (UNEP 1994)
- Looks at the whole life cycle and includes conservation (of material and energy), reduction, if not elimination of toxic raw materials, emissions and residuals
- Closely similar terms : pollution prevention, waste minimisation, waste reduction

What drives a firm=s decision?

Three views

- Neoclassical: a firm will choose the least cost option (e.g., Palda 1993)
- Internal dynamics: a firm's decision to 'green' the corporation, to innovate, is an outcome of internal negotiation, and depends on the consensus- building capacity of key employees (Prakesh 2000, Stanwick and Stanwick 1995)
- Multicriteria: Motivations include profitability, regulations, external pressure

Figure 1: Waste Management Decision-making Framework of the Firm (Adapted from: Yap 1988)



The study site: central region of Taiwan

Characteristics

- Total population: 5,010,000
- Dominance of SMEs: Taichung county alone has over 14 000 factories in 3 industrial parks and one export processing; second fastest growing county in Taiwan

Selection Criteria

Case studies: 3 electronic firms, 4 textile plants, 1 food processing, 1 electrical equipment manufacturing, 4 SMEs outside industrial parks or export processing zone

- **P** Economic importance
- **P** High hazard or big volume of industrial waste generated
- **P** Willingness to share information

Research questions

- How does the firm deal with its wastes?
- What factors drive its decisions?
- What has been the role of public policy?
- How effective has it been?
- Expectation: to document environmental disasters because of complete subordination of environmental protection to industrial development objectives

Research methodology

- Review of documents from government, universities, industry and non-governmental institutions
- Interviews of key informants from industry (management and technical personnel), government departments, R&D institutions, environmental consultants, and industry associations
- Facility visits

Main Findings

- All case study firms adopted CP strategies for compliance in varying degrees
- Additionally nearly half of the firms had achieved ISO 14001 certification and most of the rest were preparing for certification
- Environmental decisions of case study firms **not** atypical of manufacturing sector
  - ➢ greater response (than in Canada) to VNRIs

Table 2: Profile of Case Study Firms				
Firm no.	Main Product	Annual Sales/Market	Ownership	No. of employees
1	cameras	NK/ 70% export	Japanese	2000
2	integrated circuit boards	NK/ export	Japanese	750
3	frozen and dried food products and sauces	NT$150M/ 100% domestic	Joint Japanese and Taiwanese	55
4	knitted fabrics	NT$1.1B/ 88% exported to HK, PRC and other SEA countries	National	150
5	dyed and printed fabrics	NT$0.9B/ 100% domestic	National	400
6	electrical machinery	NT$100M/exclusively for export to the U.S., EU, PRC and other SEA countries	national	47
7	solar panels	NT$42M/ for export to southern Europe and northern African countries	National	14

Response to VNRIs: some examples

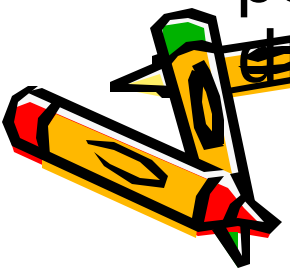
- Waste exchange Information Centre has successfully exchanged 217 216 tons of industrial waste (US$54.3M reported savings)
- Within 4 years after introduction of the Green Mark 490 products were awarded certification (Canada's Environmental Choice Program, est. 1985, has 200 products certified)
- Four years after the introduction of ISO 14001, 450 firms (15% SMEs) achieved certification, mostly from EU certifiers (For Canada, the number is 252, for the U.S. 710 and for Japan 2873).

Other related findings

- Air quality of Taiwan as a whole and Taipei in particular – SO_2 CO, NO_2 and O_3 levels comparable to that of Hamilton, Toronto and even Ottawa
- 61% of major rivers classified as unpolluted, 9.7% lightly polluted, 16.4% moderately and 12.6% heavily polluted
- 10% of the island is integrated in a multilayered conservation network with 6 national parks, 18 nature reserves, 23 forest reserves, 10 wildlife refuges
- Over 1000 species of rare plants and animals classified as requiring conservation
- Home to the largest mangrove reserve in the world – 1000 ha of wetland in Chiayi

Many challenges remain

- 500,000 tons of hazardous wastes generated annually
- 25,000 tons of municipal waste generated daily
- Heavy soil contamination in some areas – ban on agricultural activity in Tao Yuan county in the north
- Residents of Kaoshiung (60-80 factories per sq km) depend on bottled water for drinking



Analysis

Case study firms : main drivers

- Public image
- Profitability
- Regulatory compliance

Drivers for ISO 14001 certification

MOEA Survey of 408 firms

- ✓ To improve public image (91%)
- ✓ To achieve development in a sustainable manner (87%)
- ✓ To be compatible with international trends (86%)
- ✓ To raise worker environmental awareness (85%)
- ✓ To ensure compliance with environmental regulations (84%)
- ✓ To integrate, improve environmental management system (83%)
- ✓ To improve manufacturing efficiency (82%)
- ✓ To extend ISO 9001 efforts to solve environmental problems (82%)
- ✓ To reduce investors' concerns (75%)
- ✓ To expand product markets (73%)

Public policy strategy: yin and yang

Compliance as an opportunity for innovation

- Creating a demand for environmental innovation (through regulation and their enforcement): e.g., highly publicized and highly prestigious awards for strong corporate environmental performance
- Strengthening enforcement: creation of 'Green' police corps (1000 to 2000 strong)
- Increasing environmental protection budget to over 1.2% of central government budget: NT26.9B (1992) to NT44.03B (1998); staff increase from 29, 769 to 34, 272
- Helping industry develop responses: e.g., ITRI, Textile Research Centre, China Productivity Centre
  - Communicating, transferring and diffusing innovation to industry: active use of the *Technology Assistance Providers (TAPs)*
- Ensuring coherence and integration of programs: staff, functions and resources of MOEA and EPA are decentralised to the county and city level

Examples

- Since introduction of APC regs, US$300M fines collected, $21M in 1993 alone
- EIA (introd. 1994) used effectively to ensure EP tech installed in, or redesign, relocation, even rejection, of multibillion dollar industrial parks
- US$10B allocated for purchase of environmental technology for 1997-2005
- Educational system designed to produce highly competent scientists and engineers – 25 researchers per 10,000 population

Conclusions

Three reasons why ROC public policy effective

- ✓First: Design of programs on the basis of a strategic analysis of where public policy and private sector interests coincide (unique: government understanding of and hence emphasis on Cleaner Production)
- ✓Second: The balancing of *yin* and *yang*
- ✓Third: Credibility with industry: technical competence of civil servants (merit-based recruitment and promotion) - e.g., rigorous technical training of the *TAPs*

Taiwan post WTO?

- Lee Teng Hui, first Taiwan-born president of Taiwan
  - "the main secret of Taiwan's development was not her ability to meet the technological requirements for increasingly productive gadgets, but her ability to meet the organizational requirements of new combinations … of mutually helpful behavior necessary to achieve the gadgets"

    (in Vogel 1991,p.22)