



Best Practices and Innovative Approaches for Sustainable Waste Management

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Introduction

- Daily global generation of MSW exceeded 2.02 billion tonnes.
- Higher waste complexity and generation.
- Urban population growth capacity at 2% for 2000-2015 and 65% by 2050
- Urgent need for an appropriate waste management system.
- Sustainable development : economic progress is in tandem with environmental preservation.



Littering and indiscriminate waste discards



Waste received by landfills in Malaysia



Financial issues in WM

■ WM incurs high cost

- Most municipalities in Asia utilized >70% of the income raised.
- The richest cities in Malaysia (Kuala Lumpur, Petaling Jaya and Subang Jaya) spend approximately 40-70%.

■ Lower financial capability → unsatisfactory WM services

- In Nepal cities, the withdrawal of foreign waste management companies → waste management system collapsed.
- Indiscriminate disposal of waste in Accra, Ghana → clogging drains



Unsightly situation in Katmandu, Nepal



Plastic sachet clogging drains



Effective Waste Management Strategies

- appropriate policy is very crucial.
- Appropriate drivers (political, environment and economy) lead to sustainable management system.
- Successful strategies → Japan, Sweden, Germany, Singapore and Denmark.
- Improvement via innovative technologies.



“Eye-pleasing” Incineration plant in Osaka



Walking Street in Copenhagen, Denmark.



Legal framework

- In Japan: Japan Home Appliance Recycling Law

- In 2001, recycling of electrical appliances increased by 20%.

- The European Union (EU) directives on restrictions on the use of certain hazardous substances:

- 2002/95/EC - in electrical and electronic equipment (RoHS);
- 2002/96/EC on waste electrical and electronic equipment (WEEE); and
- 2005/32/EC on the eco-design of energy-using products



Recycling of e-waste is commonly practiced in Europe

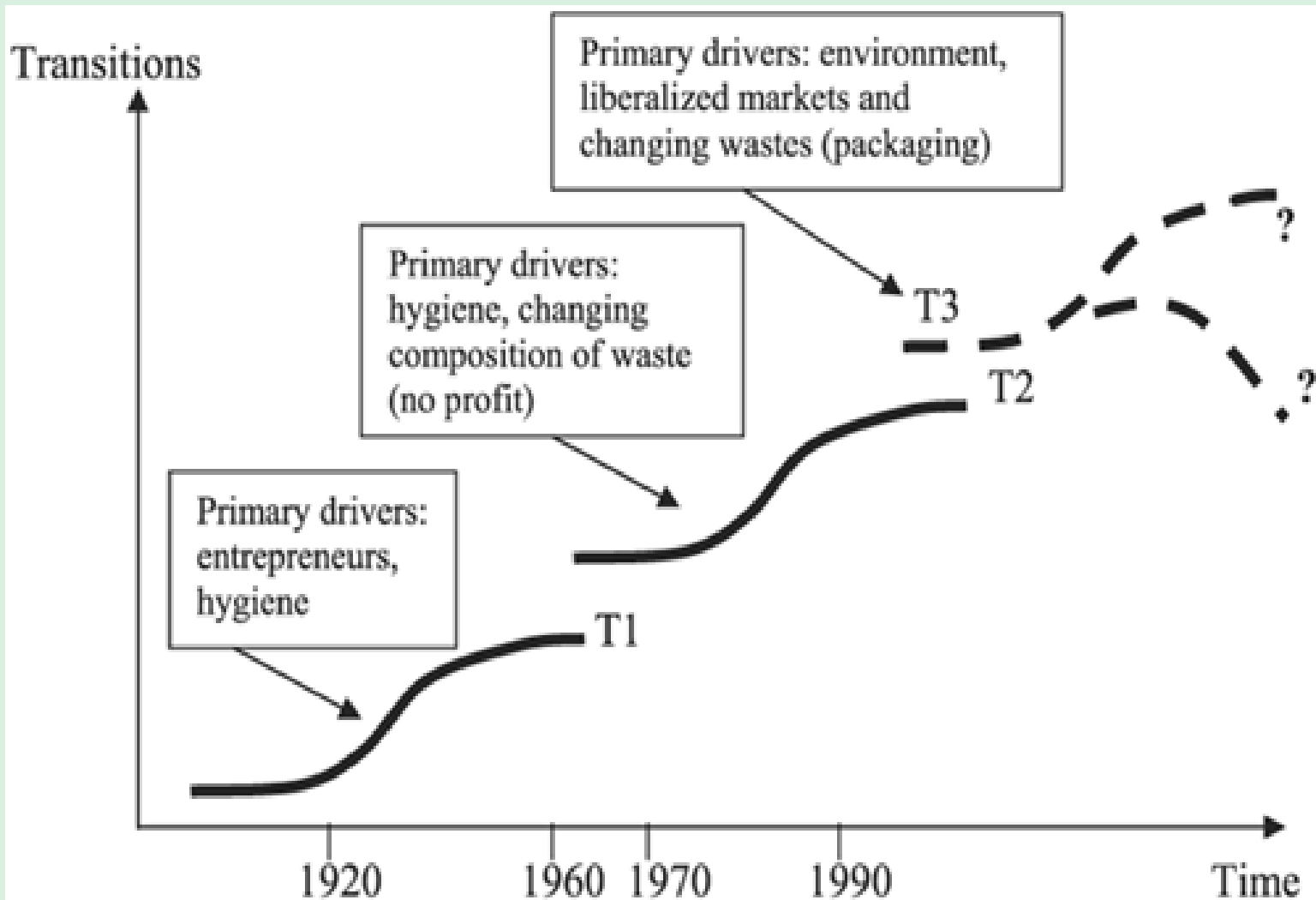


E-waste recycling



Legislative framework on recycling

- Also important to increase participation.
 - Consumers
 - Manufacturers
- Increase recycling rate
- Reduce litter



Transition in the Danish WM trend



Deposit-refund scheme for drinking bottles and cans reduce littering and increase recycling in EU and UK



Zero-waste strategy promotes recycling in Singapore



Improvement of WM by action program

■ Appropriate policy

- Semakau Landfill, Singapore

■ Privatization

- Improve urban WM in Nepal cities
- Larger collection capacity in Accra, Ghana
- More efficient collection services in Cairo, Egypt.



Singapore's offshore Semakau
Landfill

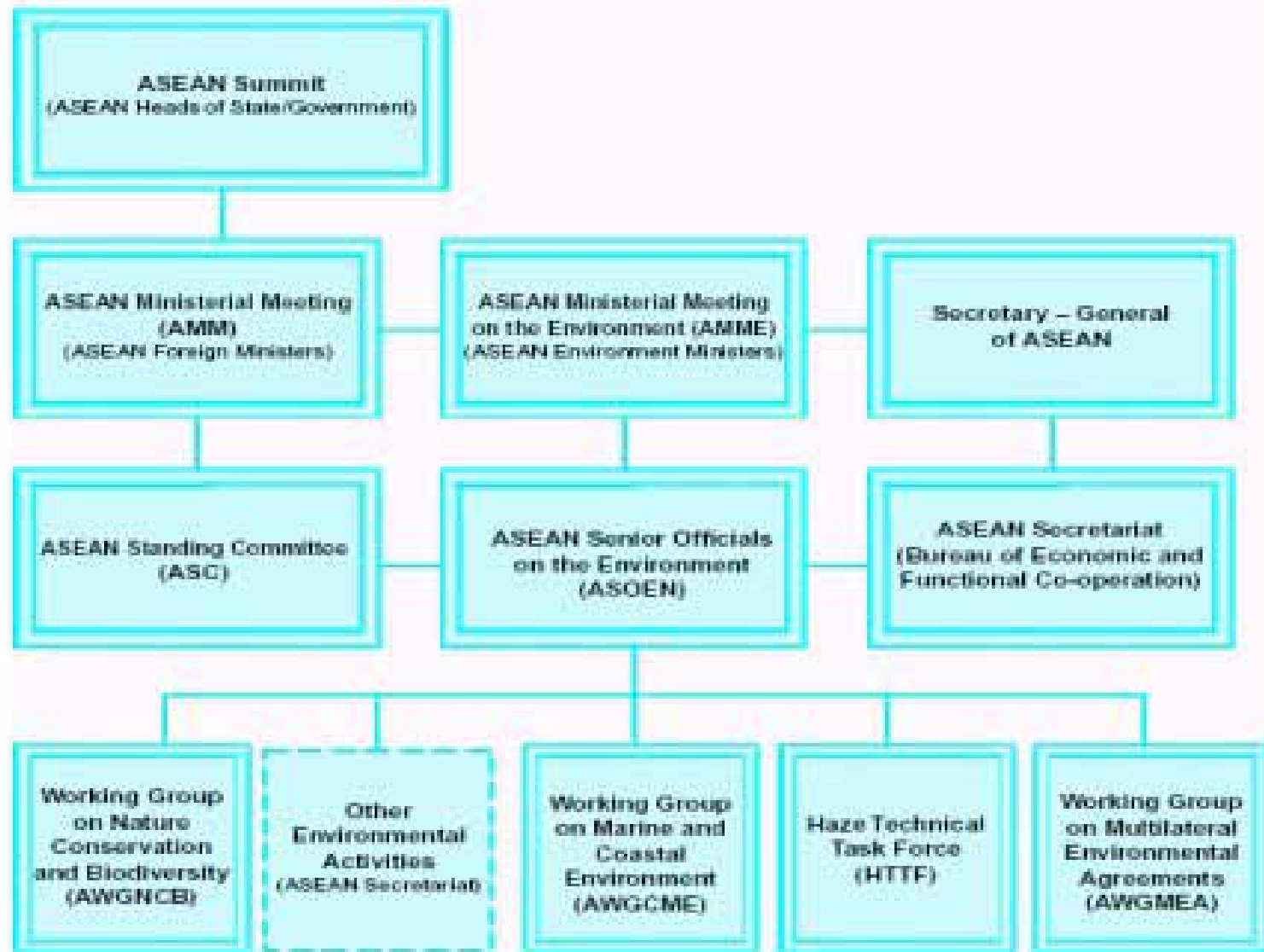


Streets in Biratnagar, Nepal are cleaner after the privatization of WM



Regional Cooperation

- cooperation for investment and operation of WM
- positive consequence of a harmonized policy
- improved waste collection efficiency, and the recycling rate
- Common among EU countries:
 - Italy, Hungary, Republic of Croatia
 - Municipalities in Portugal



Source: ASEAN State of the Environment Report 2000

Regional cooperation among ASEAN



Turning wastes into valuable resources

- 3Rs strategies
- aimed to maintain public health and sanitation
- economical benefits
- waste into value-added products
 - Recyclables,
 - Biogas
 - Compost
 - RDF/ Energy



Chips from plastic bottle-caps at the end of the recycling process



Blaabjerg **Biogas** plant, **Denmark**



RDF processing system in Malaysia



Successful stories

- Denmark: 13 organic household composting plants, 33 incinerators, 134 garden waste composting plants and five biogas facilities.
- India: economic gains in recycling with 9-15% of total waste generated
 - Biogas from organic waste
- The Philippines: Material Recovery Facilities (MRFs), conducting recyclables collection events, partnership and networking.
- Bangladesh: composting capacity of 700 tonnes produce 50,000 tonnes
- Sweden: 35% of the Swedish municipalities sending compostable household waste to a central treatment making a total of 344 500 tonnes of organic waste.
- Many more.



Public-Private-Partnership (PPP) for waste management

- private sector involvement in providing public infrastructure.
- Four main factors of PPP implementation in EU:
 - value-for-money project,
 - identification of risks (description and allocations) between public and private sectors,
 - effective performance monitoring strategies via quantitative performance indicator, and
 - its affordability level to users



Main Players in PPP

- provide capacity development

- Includes

- World Bank,

- UN

- International Solid Waste Association (ISWA),

- JICA,

- IWWG,

- Danida

- European Investment Bank etc

- act as the Expert-Group Organizations



Successful PPP strategies

- European Investment Bank (EIB) finance PPP between Viridor Laing (Greater Manchester) and Ineos Runcorn, and TPS Greater Manchester Waste Disposal Authority for incineration project → increase recycling and composting by 50% and divert 65% of the waste from landfill.
- World Bank USD25 million PPP project in Jordan with the Amman City Authority → improve the operational, financial and environmental performance of its municipal solid waste system.
- JICA and local NGO in Sao Paolo, Brazil → formalized 'Coopamare' (privatizing informal recycling activities) improvement of the recycling rate and lowering the poverty line.
- Many more.



Mixed waste for composting
purpose in Egypt



Community based waste management

- Categorized into three main types:
 - Type 1- the CBWM-community activist set-up identifying service provider,
 - Type 2- the private entity community service provider, and
 - Types 3- the CBWM-community activist set-up planning and managing the services.



Zero-waste community

- In Canberra, Australian – in 2001,
 - waste sent to landfills were reduced by 40%
 - >80% recycled and reuse.
 - Harvest CH₄ from landfills to power 3,000 homes for 30 years.
 - Active participation of the citizen.
- In Kamikatsu, Japan – in 2003,
 - aimed to achieve a zero-waste community by 2020.
 - recycling rate increased to 80%
 - 98% of the population practice home composting
 - the community is willing to do more to improve their current achievement.



Waste segregation by local
Kamikatsu residents



timtak on flickr

Wastes are segregated into 34 categories at the Zero-waste centre in Kamikatsu.



Conclusions

- The implementation of various strategies is important
- Appropriate policy and effective WM are crucial
- WM should be economically appealing
- PPP and community based waste management can enhance sustainable WM system.

