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NOTE
Promoting sustainable construction waste management in Hong Kong

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Similar to many affluent cities found elsewhere in the world, Hong Kong is currently facing a great challenge to manage the wastes generated from its construction and demolition (C&D) activities that has wide-ranging impacts on the environment. To tackle this, the Hong Kong Special and Administrative Region (HKSAR) Government has signalled the required changes by sorting out the inert substances from C&D waste for reusing and recycling and using recycled building materials in construction through its role as both a construction client and contractor. The current practices and attitudes of local project participants towards C&D waste management were collected through questionnaires. A total of 69 questionnaires were received: 61% of the respondents stated that their projects did not take any measures to collect and separate C&D wastes and 64% of the projects did not use recycled building materials in construction. The prevailing problems of local construction industry are addressed through examinations of the constraints involved in improving C&D waste treatment and according to the results of the survey, to evaluate the practicability of increasing the capability and capacity of the industry to learn to be more sustainable.

Keywords: Construction and demolition waste, sorting, recycling

Introduction

The construction industry is one of the largest solid waste generators in Hong Kong. Tremendous amounts of C&D waste have been generating from ongoing new construction works, as well as renovation and demolition works. It is absolutely imperative for the construction industry to adopt ecologically sound planning and construction practices for the purpose of creating a healthy and sustainable built environment.

The published figures from the Environmental Protection Department, HKSAR (Poon *et al.*, 2001) showed that the daily average of C&D wastes was four times as that of municipal solid waste. It reveals that the construction industry produces a considerably high proportion of solid waste in Hong Kong.

C&D waste contains a mixture of inert substances (mainly sand, bricks and concrete) and non-inert substances (bamboo, plastics, glass, wood and other organic materials). C&D waste with more than 50% of inert substances would not be acceptable to landfills and thus the inert substances should be sorted out from C&D waste before they are disposed of at landfills. When properly sorted, materials such as clean concrete and asphalt can be recycled for use in construction. Public fill includes substances such as debris, rubble, earth and concrete which are suitable for land reclamation and site formation, and a large proportion of the public fill can be reused/recycled.

The dilemma is that we are running out of both reclamation sites and landfill spaces. In 2001, an average of 16 820 tonnes of solid waste was disposed of at landfills per day, the mixed C&D waste has accounted for more than 40% of the total waste intake at three strategic landfills.

Our landfills will be full by around 2015 (EPD, 2002a) and the construction industry can no longer rely solely on reclamation to accept most of the C&D waste

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due to the lack of local reclamation projects. The government is urged to search for 860 hectares of landfill spaces in the near future to serve Hong Kong from 2016 up to 2045, which is around two-third of the area of the Hong Kong International Airport (EPD, 2002b). Sourcing of new sites for landfills will be extremely difficult given the many competing demands for our limited land resources. Hence, an effective means is to reduce disposal of waste at landfills by separating the inert portion from the non-inert portion, such that the inert public fill could be reused/recycled and only the non-inert waste would be disposed of at landfills. Recycling of C&D waste involves the sequence of activities, including collection and separation of C&D wastes generated from construction projects, and transforming them into secondary materials for construction use.

Methodology

A survey was conducted by means of questionnaires in July 2003 to collect and collate the current practices and views from local project participants as regards collecting and sorting of C&D waste, using of recycled building materials, and experience in attending relevant seminars. 200 questionnaires have been sent out, and a total of 69 questionnaires were returned from the groups of respondents shown in Table 1. The findings of the survey will be discussed in later sections of this paper.

Resistance to change

There are some barriers to the implementation of sustainable C&D waste management in local construction industry, which exist both internally and externally. Shen *et al.* (1992) suggested that the considerable time and cost requirements associated with investment in improving environmental performance discourages clients', developers', contractors' and architects' initiatives to deliver sustainable construction. In Hong Kong, the prevalence of small and medium construction enterprises inhibits the industry from investing heavily in the purchase of C&D waste recycling plant.

If the disposal alternatives require separation of materials, the collection area needs to be larger than the traditional system of one point for collection of all material. In view of the space constraints of local construction sites, sorting of C&D waste at source is not widely put into practice in Hong Kong.

Table 1 Survey respondents

Nature of the company	No. of respondents
Architect	5
Contractor	34
Developer	9
Engineering consultant	5
Government department	2
Property management	1
Subcontractor	8
Specialist contractor	5
Total	69

Traditional tendering approach

On the other hand, the traditional competitive tendering approach adopted in Hong Kong has resulted in low profit margins in the face of stiff competition between contractors. In reality, most clients in the private sector are primarily concerned with the cost and functionality of the finished products, and whether it is delivered on time and up to the standard, but pay little attention to the environmental impact of the construction process. Thus, contractors have little incentive to do more than the minimum requirement and reducing cost is the only way of gaining competitive edge. From the survey, 42 respondents (61%) said that their projects did not take any measures to collect and separate construction wastes.

Financial incentives

In order for some initiatives to succeed, there shall be financial incentives for participants to recover their costs. The HKSAR Government has been in the process of consulting the industry on the framework of its proposed landfill charging scheme since 2002. It put forward three types of disposal facilities for construction waste with different inert content, i.e. landfills (no more than 50% inert content), sorting facilities (more than 50% inert content) and public fill reception (pure inert content) open for construction contractors, waste haulers and other waste producers. The proposed charging rates are set at HK$125/tonne for landfills, HK$100/tonne for sorting facilities and HK$27/tonne for public fill reception facilities. It aims to encourage contractors to reduce construction waste and carry out sorting to facilitate reuse/recycling of waste. However, the scheme may not provide a financial incentive for contractors to go for sorting in light of the comparatively higher cost involved in sorting of C&D materials on construction sites.

Culture of the industry

The attitudes of project participants towards the practice of sustainable C&D waste management were surveyed

Table 2 Attitudes of project participants towards the practice of sustainable C&D waste management

Attitude of respondent	Number (%)
Aware and active	7 (10%)
Unaware	15 (22%)
Aware but not active	47 (68%)
Total	69 (100%)

(see Table 2). The external environment will definitely exert some influence on what the organization chooses to do. In Hong Kong, the overwhelming majority of contractors have been to do what is necessary to ensure profit and survival. Nearly 70% of the respondents expressed that though their company was indeed aware of the importance of taking appropriate environmental measures in the construction process, they did not take an active part in the required changes. Only 7% of the respondents said that their company was both aware of and active in the implementation of appropriate environmental measures.

Recycled building materials

The unpredictability of self-interest and a fear of change hinder the culture of the industry from shifting. Out of the 69 respondents, only 25 respondents (36%) mentioned that recycled building materials were used in their current project and the reasons for not using recycled building materials as expressed by the other 44 respondents (64%) are shown in Table 3.

In Hong Kong, the government is the largest client of the construction industry. For public works and public housing projects, the specifications have been amended to regulate the use of recycled materials as hardcore in foundations, sub-base in road pavement and concrete in less technically demanding works. Though such requirements have not gained in popularity in the private sector, it is hoped that producers of recycled building materials can achieve greater economies of scale in production and improvement to quality, and thus simulating greater demands for these products in the future. However, for recycling to become a viable option in the future, the products using recycled materials must meet higher quality standards as evidenced by the fact that 29% of the respondents worried about the quality of recycled building materials (including 15% expressed concern about the lower quality of recycled products; 4% about the unreliable quality and 10% about the ability of the recycled materials to meet specifications).

Table 3 Reasons for not using recycled building materials

Higher price compared with similar traditional products	30 (44%)
Lower quality compared with similar traditional products	10 (15%)
Quality is not reliable	3 (4%)
Limited choices in the market	12 (17%)
The prevailing products in the market cannot fully comply with specifications	7 (10%)
The source and quantity of supply is not stable	7 (10%)
Total	69 (100%)

Training programme

At the present time, a change in the attitude of contractors may be more important than changes in building technology with regards to construction waste management. This culture change can be initiated by some leading and influential organizations in the industry. For instance, a one-day Green Construction course was organized by the Hong Kong Construction Association (HKCA) in partnership with the Environmental Protection Department, the Construction Industry Training Association, the Institute of Vocational Education, the Housing Department and the Public Works Department in November 2002. The main purposes of this partnering course are to arouse the environmental awareness of the industry and to develop tools to help the industry meet the environmental requirements. Involvement of companies in these activities is an excellent means of sharing information and ideas to improve performance throughout the industry.

Nevertheless, these training events should be organized in line with appropriate promotion exercises and with the support of organizations. Only 15 respondents (22%) mentioned that they have attended relevant training courses within the past 3 years and the reasons of the 54 respondents (78%) for not attending these trainings courses are show in Table 4. From the table, we see that 47% of the respondents who were not able to attend relevant training courses were due to heavy work commitment or lack of sponsorship from the company. Due to the impact of the current recession on construction, it became apparent that the training funds provided by organizations had been shrinking over the

Table 4 Reasons for not attending related training course

Not aware of relevant information	18 (33%)
Could not obtain financial sponsorship and/or study leave from company	15 (28%)
Heavy work commitment	10 (19%)
Not useful to work	7 (13%)
Do not feel interest	4 (7%)
Total	54 (100%)

past few years, and from the perspective of organization, investment in training is now more likely to benefit the individual's career rather than the firm in light of the increased mobility of staff.

Conclusions

Indeed, the thought of profit maximization is deep-rooted in the minds of local project participants where little interest is taken in the environmental impacts of the construction process. Sorting of C&D waste at source and using recycled building materials are not widely practised in Hong Kong, as they are not considered to be cost effective.

To foster the culture of environmental consciousness of project participants, government should continue to induce the required changes through its role as both a construction client and contractor promoting sustainable construction waste management. In line with this, it is necessary to raise the awareness of the industry through appropriate training programme. It is hoped that the level of understanding and willingness to act on environmental measures within the industry can be changed from 'unaware' through 'aware but not active' to 'aware and active' in the near future.

References

Environmental Protection Department (2002a) *Implementation of Waste Disposal Plan*, available at: http://www.epd.gov.hk/epd/english/environmentinhk/waste/prob_solutions/iwdp.html

Environmental Protection Department (2002b) *What is Construction and Demolition Material?*, available at: http://www.epd.gov.hk/epd/misc/cdm/en_what.html

Poon, C.S., Yu, T.W. and Ng, L.H. (2001) *A guide for managing and minimizing building and demolition waste*, The Hong Kong Polytechnic University, Hong Kong.

hen, L.Y., Bao, Q. and Yip, S.L. (1992) Construction and environment – a management matrix. *Chartered Builder*, June issue.