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Stakeholders' willingness to pay for enhanced construction waste management: A Hong Kong study

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ABSTRACT

Based on the polluter pays principle, construction waste disposal charging schemes (CWDCS) have been deployed by various economies as one of the most effective ways of managing construction waste. Nevertheless, a means of rationalizing these schemes has not been well documented. Using the economic technique of contingent valuation method (CVM), this study aims to investigate stakeholders' willingness to pay (WTP) for enhanced construction waste management (CWM) with a view to providing a scientific foundation for CWDCS rationalisation. In considering this WTP in light of repeated exhortations that all stakeholders play a role in the management of construction waste, the study is unique. To ascertain stakeholders' WTP, a payment card-style questionnaire survey was designed and administered to Hong Kong's major CWM stakeholders in February 2014. Interestingly, the results show that there is no statistically significant variation in the WTP expressed by different stakeholder groups. The average maximum WTP is around HK$232/t for landfill disposal of construction and demolition (C&D) waste, HK$186/t for off-site sorting facility (OSF) disposal, and HK$120/t for public fill reception facility (PFRF) disposal. These values are higher than the existing CWDCS charges (HK $125/t for land filling, HK$100/t for OSF disposal, and HK$27/t for PFRF disposal) but much lower than the charges proposed to the government. This research provides not only a scientific foundation for the ongoing debate on changes to Hong Kong's CWDCS, but also a valuable reference for other economies facing the challenge of developing charging schemes to deal with construction waste.

Contents

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1. Introduction

Construction waste disposal charging schemes (CWDCS) have been deployed by various economies to manage construction waste. In this paper, the terms 'construction waste' and 'construction and demolition (C&D) waste' are used interchangeably to refer to the surplus materials generated by site clearance, excavation, construction, refurbishment, renovation, and demolition. According to these schemes, waste disposal fees are devised and levied on those who dispose of construction waste in public landfills. Such fees may thus also be called landfill tax or landfill charging [30]. In Europe, landfill tax rates vary greatly from one country to another. In the UK, for example, a landfill tax was introduced in 1996: a standard rate for active waste and a lower rate for inactive waste. Currently, the active waste rate is £72/t (US$199.8/t) and the inactive waste rate is £2.50/t (US$4.16/t) [33]. Austria charges €9.20/t (US$12.6/t) of construction material and soil deposited in landfills. Finland charged €40/t (US $54.9/t) as of 2011, with a rise to €50/t (US$68.7/t) planned in 2013. Meanwhile, C&D waste land filling is banned in the Netherlands [10]. In Queensland, Australia, a levy of AU$35/t (US$32.4/t) of C&D waste has been imposed since December 2012 [3]. The National Environment Agency of Singapore charges S$77/t (US$57/t) of waste disposed [16].

It has been reported that CWDCS are a very effective way of not only reducing waste but also promoting the reuse and recycling of waste materials [2,22,24,29]. Nevertheless, the rationale behind some CWDCS is not without question. Yuan and Wang [48] reported that China's CWDCS have largely been determined according to a rule of thumb rather than the findings of scientific investigation. Their study used a system dynamics model to determine that the maximum construction waste disposal charge in Shenzhen, Southern China should be ¥80/t (US$12.9/t) [48]. Begum et al. [5] used contingent valuation method (CVM) as their theoretical foundation for investigating how much construction contractors would be prepared to pay for improved construction waste management (CWM) in Malaysia. The study assessed the average maximum willingness to pay (WTP) for improved CWM to be RM69.88/t (US$21.4/t). Further examples of research on construction waste disposal charges are scarce, particularly when compared to the volume of existing research on municipal solid waste (MSW). This maybe attributed largely to the inherent complexity of such charging.

Construction is not by its nature an environmentally friendly activity [29]; the waste produced contributes significantly to environmental degradation [15,27,30]. If not reused or recycled, construction waste ends up in landfills, where its anaerobic degradation leads to air pollution and contamination of the soil and groundwater. Landfills compete for space and give rise to "Not In My Back Yard" (NIMBY) syndrome, particularly in economies with compacted urban space such as Hong Kong, Singapore and Japan. Both the natural environment and any urban space saved via reduced land filling are, in economist's terms, public goods subject to free rider problems. If the environmental cost of construction is not fully internalised by devices such as a landfill tax, then it is an externality; a social cost not included in the cost–benefit calculus that drives city-building. However, the natural environment is a typical non-market good which cannot be easily priced. As will be illustrated later, attempting to set a construction waste disposal charge by calculating the externalities of CWM on an urban or community scale is difficult, if not completely unrealistic.

A further complication in CWM is the involvement of stakeholders. To provide context, stakeholders in MSW management include the general households in a community. By contrast, the stakeholders in CWM are 'a manageable few' including clients, architects, contractors and material suppliers organised in companies and professional bodies. However, CWM stakeholders are not as homogeneous as their counterparts in MSW management; they comprise different interest groups. Without full consideration of their diverse interests, a CWM policy is ultimately likely to fail. Grandy [23] pointed out that engaging stakeholders in policymaking will inevitably involve them in the 'politics of urban waste'. Even so, to go anywhere with the directions of politics or economics, an analysis of stakeholders' stance (e.g. willingness to pay) must be properly conducted to provide at least a certain degree of scientific foundation for a CWDCS.

The aim of this study is to investigate stakeholders' willingness to pay for CWM by examining Hong Kong's construction industry. It is conducted at an opportune time; to deal with its acute CWM issues, Hong Kong is currently considering raising its construction waste disposal charges. The study has both academic and practical values. It contributes to the ongoing debate surrounding the application of economic tools such as CVM to the pricing of public goods like environment protection. Practically, it provides a scientific foundation for the formulation of CWM policies. The remainder of the paper comprises five sections. Section 2 is a review of the literature on stakeholder involvement in CWM, economic rationales for CWDCS, and CWM in Hong Kong. Section 3 describes the research design, which is a payment card-style questionnaire survey for major stakeholders involved in CWM in Hong Kong. Analyses and results are reported in Section 4. In Section 5, the results are discussed, and conclusions and policy implications are drawn in Section 6.

2. Literature review

2.1. Stakeholders' involvement in construction waste management

According to stakeholder theory founded by Freeman [21], stakeholders have different interests in a system and thus have different impacts upon it, positive or negative, and the system responds to their interests. Stakeholder management is about how stakeholders are identified, classified, considered and subsequently managed [21,11,45], with the purpose of addressing diverse views of participants, improving communication among stakeholders, and clarifying their needs [21,37]. Although numerous methods and tools have been suggested for identifying stakeholders (e.g. [14,43]), it remains difficult. In an abroad sense, a stakeholder is "any identifiable group or individual who can affect the achievement of an organisation's objectives or who is affected by the achievement of the organisation's objectives" [21]. In a narrow sense, stakeholders are those groups or individuals that an organisation depends upon for its continued survival. There are other stakeholder typologies. For example, primary stakeholders are those ultimately affected, either positively or negatively, by an organisation's actions. Secondary stakeholders are the 'intermediaries'; persons or organisations who are indirectly affected by an organisation's actions. Applying the typologies, stakeholders in CWM can be identified as: (1) public or private clients, (2) designers (e.g. architects and engineers), (3) consultants, (4) main contractors, (5) sub-contractors and material vendors, (6) C&D recyclers, (7) regulators, (8) environmentalists, and (9) the general public.

Increasingly, the importance of managing stakeholders when dealing with construction waste is being recognised. Alamgir et al. [1] clearly stated that successful waste management strategies require the meaningful involvement of concerned stakeholders. Research on CWM has focused on contractors and subcontractors as the frontline stakeholders [42,39,32]. Clients are envisaged to play a pivotal role in CWM, as ultimately they pay for the construction waste that is generated. Subcontractors or material vendors now face extended producer responsibility (EPR) which means that they are responsible for the waste (e.g. packaging) generated from their supplies [44]. Hyder Consulting [26] found extensive stakeholder engagement, with over 110 organisations potentially affecting or