

---

# Working Paper Proceedings

---

**15<sup>th</sup> Engineering Project Organization Conference**  
with  
**5<sup>th</sup> International Megaprojects Workshop**  
Stanford Sierra Camp, California  
June 5-7, 2017

---

## **Institutional Struggle Behind the Diffusion of Construction and Demolition (C&D) Waste Recycling Practices**

**Venkataraman Ram, IIT Madras, India**

**Ashwin Mahalingam, IIT Madras, India**

**Satyanarayana N Kalidindi, IIT Madras, India**

### **Proceedings Editors**

Ashwin Mahalingam, IIT Madras, Tripp Shealy, Virginia Tech, and Nuno Gil, University of Manchester



© Copyright belongs to the authors. All rights reserved. Please contact authors for citation details.

# INSTITUTIONAL STRUGGLE BEHIND THE DIFFUSION OF CONSTRUCTION AND DEMOLITION (C&D) WASTE RECYCLING PRACTICES

V. G. Ram<sup>1</sup>, Ashwin Mahalingam<sup>2</sup>, and Satyanarayana N. Kalidindi<sup>3</sup>

## ABSTRACT

A significant amount of Construction and Demolition (C&D) waste is being generated in developing countries such as India due to rapid urbanization. C&D waste recycling is one of the key steps towards resource efficiency in the construction industry and therefore, there is a huge coercive push towards C&D waste recycling through regulations in Indian cities. Preliminary studies conducted on C&D waste management practices being followed in Indian cities have indicated several institutionalized behaviors among the stakeholders and numerous barriers to the development of C&D waste recycling facilities. The knowledge on the evolution of C&D waste recycling overcoming the institutional challenges along the way is essential. But there is little work on the process of institutionalization of C&D waste recycling in the literature. In this paper, actions relating to institutional construction taken by MCD in New Delhi and Government of Hong Kong Special Administrative Region (HKSAR) playing the role as institutional entrepreneurs have been described. A multi-stage model of institutional construction proposed by Suchman (1995) and process model of institutional entrepreneurship proposed by Battilana et al. (2009) has been combined and adopted to map the stages in both MCD's and HKSAR's actions in developing C&D waste recycling projects. Adopting an institutional field perspective and theory of SAF as analytical framework, heavy contestations in response categorization and response comparison stages resulting in field level struggles were observed. Setting up recycling plants has become the initial stimulus of change in both cases that has created a 'pull effect' and demanded beneficial improvements in the system. Depending on the field characteristics and strategies adopted, the characteristics of emergent proto-institutions varied. Acknowledging the creation of proto-institutions was beneficial to analyze concurrent contributions of multiple institutional entrepreneurs or their groups. Institutional entrepreneurship seems a plausible way in bringing about change in C&D waste management as there needs to be a strategic crafting of the problem and Government bodies suit well for such initiative as they are centrally positioned as well as possess the required amount of agency and power relations to mobilize allies and positively influence field settlements in their favor during institutional struggles.

---

<sup>1</sup> PhD Research Scholar, Dept. of Civil Engineering, IIT Madras, India, Phone +91 89030 16774, ramkrithik@gmail.com

<sup>2</sup> Associate Professor, Dept. of Civil Engineering, IIT Madras, India, mash@iitm.ac.in

<sup>3</sup> Professor, Dept. of Civil Engineering, IIT Madras, India, satyakn@iitm.ac.in

## KEYWORDS

Institutional Entrepreneur, Institutionalization, C&D Waste, Recycling, Practices.

## INTRODUCTION

“When there is technical feasibility, technological availability and value in C&D waste recycling, why contractors (‘rational agents’- intended) interested in making money are not indulging in recycling the waste yet (‘in Chennai’) and make money?”

– An interviewee, Greater Chennai Corporation (urban local body of Chennai)

Our quest started with the quote mentioned above. We found that a significant amount of Construction and Demolition (C&D) waste is being generated in developing countries such as India due to rapid urbanization. C&D waste generation in India has been estimated to be 626 million tonnes during the period 2006 to 2013 and expected to increase in the coming years (Centre for Science and Environment, 2013). Life cycle assessment studies have shown that recycling is beneficial as compared to incineration or landfilling and recycling is one of the key steps towards resource efficiency in the construction industry (Ortiz et al. 2010). Begum et al. (2006) showed that cost savings can be achieved by implementing proper waste management practices. Benefits accrue due to elimination/reduction in: virgin material purchase (Jaillon et al. 2009), transportation cost (Bossink and Brouwers 1996), and disposal/tipping cost (Lu and Tam 2013). Several social and environmental benefits are also obtained including landfill space saving (Poon et al. 2004), public image improvement (Begum et al. 2006) and resource conservation (Poon et al. 2004; Lu and Tam 2013). However, landfilling of C&D waste is widely practiced by construction stakeholders due to convenience and cost effectiveness (Ram and Kalidindi 2015).

Preliminary studies conducted on C&D waste management practices being followed in Indian construction sites have indicated several institutionalized behaviours among the stakeholders and thereby pose numerous barriers to the development of C&D waste recycling facilities (Ram and Kalidindi 2015). There are no guidelines or rules regarding ways/methods to handle C&D waste generated in most of the Indian cities. Recycling facilities are unavailable and appropriate places for C&D waste disposal are neither planned nor communicated to the stakeholders. Absence of government support impede the development of C&D waste recycling facilities (Rao et al. 2007). Moreover, disposal of C&D waste in authorized corporation run landfills by private waste generators is not allowed even for a fee. Thus, the regulations left the waste generators with no choice than to illegally dispose the waste generated in random locations all around the city. Due to random disposal, the costs of collection and transportation of waste becomes high and impede economic viability for a recycler (Nunes et al. 2009).

Apart from regulative barriers mentioned above, several normative and cognitive barriers also exist. A nationwide survey conducted among Indian construction industry participants revealed that almost 70% of the people are not even aware of the recycling possibilities of C&D waste (TIFAC 2001). Attitudes and behavioural factors acting as barriers to reuse / recycling of C&D waste were also found in the literature (Lingard et al. 2000; Teo and Loosemore 2001). Anecdotal evidences

showed that construction contractors do not prefer to use recycled products because of quality concerns and the poor image associated with them (Rao et al. 2007). Moreover, on-site sorting of waste is rarely seen in Indian construction projects which affects the quality of recycled products. In short, the stakeholders lack the resource recovery frame and a complex web of regulative, normative and cognitive institutions influences the stakeholders' practices and thereby aid in preserving the status quo (landfilling /illegal disposal) (Ram and Kalidindi 2015).

#### **C&D WASTE MANAGEMENT LITERATURE**

Studies on source evaluation of C&D waste generation reported about six major categories of C&D waste: design, procurement, materials handling, operation, residual, and others (Gavilan and Bernold 1994). While waste generation happens at any stage right from conception, design, construction, operation and demolition of the building, more attention towards waste management at planning stage (design) is advocated to reduce level of material wastage (Poon et al. 2004). About 33% of on-site construction waste is attributed to design practices. However, architects (or designers) think that waste minimisation is a liability on contractors and fail to incorporate reduction measures during design stages (Osmani et al. 2008). Ordering excess quantity (normally 5%-10%) gives way for procurement related waste (Bossink and Brouwers 1996). Improper planning, inappropriate storage at site, human error, and negligence were primary causes of operation related C&D waste (Ekanayake and Ofori 2004).

A variety of waste reduction measures such as prefabrication (Poon et al. 2004), use of cleaner technologies, and standardization in design practices (Osmani et al. 2008) are found in the literature. The critical role of stakeholders' awareness about C&D Waste Management (WM) and the need for clear communication channels between multiple contractors of the project has been elaborated by Teo and Loosemore (2001). Improving awareness of construction stakeholders via training and promotional activities and establishing certain awards to motivate general public were also suggested (Begum et al. 2009; Yuan 2013). Implementing policies and strict enforcement are popular suggestions being made in the literature (Lu and Tam 2013; Yuan 2013). Some of the other measures suggested include on-site management systems (Yuan et al. 2013), changing people' attitudes (Osmani et al. 2008), proper planning (Poon et al. 2004), adequate supervision (Begum et al. 2009), sense of collective responsibility and relationship building among stakeholders (Teo and Loosemore 2001).

But, construction clients perceive waste management to be expensive and as less important than profit maximisation. Since reuse/recycling practices is not on their priority, they are reluctant to adopt them (Manowong 2012). Some of the barriers cited for onsite sorting and other on-site waste management activities are lack of site space, high management effort needed, increased labour input, increase in project cost, and interference with normal construction activities (Poon et al. 2001; Wang et al. 2010). Qualitative description of regulations has been criticised and the need for detailed regulations that contain practical schemes and quantitative indicators used to measure C&D WM performance has been put forth (Yuan 2013). Even though training programs were regarded as effective for improving waste management by managers, construction workers perceive them to be irrelevant (Lingard et al. 2000). Appropriate regulations and financial rewards are believed to improve willingness

and efficiency of WM activities (Lingard et al. 2000; Manowong 2012). However, influence of policies in bringing about changes in contractors' practices was not reported to be significant (Poon et al. 2013). Furthermore, financial reward was not found to be as influential as culture in motivating the workers (Aljaz 2011).

To sum up, the tradition in C&D waste literature is still in favour of active enforcement of environmental laws and some other prescriptive strategies to improve the situation of C&D waste recycling (Rodriguez et al. 2015). While there are few works citing the influence of culture and behaviour, broadly, it undermines the resistance that might be offered towards change in the institutionalised practices and gives prescriptions of strategies to enhance waste management activities. Therefore, we turn to literature on institutions and institutional change to understand and explain the much needed change in the C&D waste management activities.

### **LITERATURE ON INSTITUTIONS AND INSTITUTIONAL CHANGE**

Institutions are defined as a set of rules, norms and values that create regularity in behavior (Scott, 2014). Economic behavior differs according to institutional contexts and institutions lead to equilibrium which can either be optimal or sub-optimal (Grief, 2006). Since we are interested in looking at the interaction of institutions and various construction organizations including contractors, recyclers, waste haulers, and government bodies, institutional analysis at the level of organizational fields become relevant than those at individual organizational level or societal level. Organizational fields consist of actors and organizations of a particular domain who indulge in transactions between themselves more frequently than other organizations/actors outside the field of interest (DiMaggio and Powell 1983; Scott 2014). Literature on institutions and institutional change have come a long way from looking at organizational fields as static & rigid structures to highly dynamic contexts wherein continuous attempts to alter the rules of the game happen and thereby remain as arenas of conflicts all the time (Wooten and Hoffman 2008; Scott 2014; Mahalingam and Delhi 2012).

Initial studies on institutional change reported change as response to the influence of exogenous shocks or disturbances to the institutional environments (Meyer 1982). Later, influence of agency was embraced with the theorization of Institutional Entrepreneurship accounting for actions taken by certain purposeful actors' push for change as one of the models of institutional change (DiMaggio 1988). Focus on Institutional entrepreneurship increased owing to its ability to have bridged old and new institutionalism by providing renewed interest on agency and power. However, developments related to institutional logics and increased attention on micro foundations of institutions, started drifting the focus away from institutional entrepreneurship (Battilana et al. 2009). Recent studies take a bottom-up perspective and put forward a view that changes are unintentionally triggered by the improvisation of mundane day-to-day activities (Smets et al. 2012; Gray et al. 2015). Some of the major drawbacks of the literature on institutional entrepreneurship as quoted by many scholars include the paradox of embedded agency (Seo and Creed 2002), explicit attention on 'heroic actors' possessing considerable capacity to change institutions (Garud et al. 2007) and overly simplified accounts of change without considerations to complex and collective nature of institutional change (Battilana et al. 2009).

## **INSTITUTIONAL ENTREPRENEURSHIP**

Literature on Institutional entrepreneurship has evolved considerably and addressed much of the complaints raised over it. It defines Institutional entrepreneurs as those actors who deliberately design the course of actions of stakeholders and leverage resources to aid in institutional construction towards particular institutional arrangements which otherwise is a natural process happening through unintended actions over a period of time (DiMaggio 1988; Eisenstadt 1980; Scott 2014). Agents who actively participate and initiate divergent changes are considered as Institutional entrepreneurs irrespective of whether the attempt is a success or a failure (Greenwood and Hinings 1996; Battilana et al. 2009). Several enabling conditions to become institutional entrepreneurs have been cited by many scholars in response to the argument of embedded agency.

Enabling conditions have been categorized into two: Field level conditions and Actors' social position (Battilana et al. (2009). Some of field level conditions include jolts/crises (Child et al. 2007), acute field level problems (Philips et al. 2000), degree of heterogeneity (the presence of multiple institutional logics) and degree of institutionalisation (Maguire et al. 2004). While studies show that divergent change have been initiated by both the actors at the periphery or low status organizations (Garud et al. 2002) and the actors at the centre or high status organizations (Greenwood and Suddaby 2006), the interaction effect of field level conditions with actors' social position has been cited to be a possible explanation for that phenomenon (Battilana et al. 2009). For detailed reviews on institutional entrepreneurship and change, please refer Micelotta et al. (2017) and Battilana et al. (2009).

Battilana et al. (2009) have also proposed a process model of institutional entrepreneurship connecting all the variables discussed above. However, an intermediary process called the creation of 'proto-institutions' ('institutions in the making' as conceptualised by Lawrence et al. 2002) is missing from the process model of institutional entrepreneurship proposed by Battilana et al. (2009). The concept of proto-institutions has received less attention among the scholars theorizing on institutional entrepreneurship too (Battilana et al. 2009; Granqvist and Gustaffson 2013; Zietsma and McKnight 2009). We believe that the incorporation of proto-institutions in the process lens of institutional entrepreneurship is beneficial to analyse concurrent contributions of multiple institutional entrepreneurs or their groups. By doing so, it is possible to move beyond heroic conceptions and can find interplay of negotiations, competition and learning over time to arrive at shared understandings in the field reaching institutionalisation of durable proto-institutions (Zietsma and McKnight 2009). Studying the actions of the institutional entrepreneurs' activities might shed light on the emergence and thereby might explain the existence of plural institutional logics in a field. However, the micro processes of institutional entrepreneurs' institutional work are understudied. In this paper, How does institutional field's characteristics and the skill of the entrepreneur in framing and mobilizing allies influence the micro processes and the outcomes of the field settlement is studied with the help of a modified theoretical lens for institutional construction through institutional entrepreneurship.

## **RESEARCH SETTING**

In India, Municipal Corporation of Delhi (MCD) took initiative and introduced recycling to the construction industry in New Delhi. In 2009, MCD successfully implemented a pilot C&D waste recycling plant in New Delhi with 500 tonnes per day processing capacity. The concept being environment friendly was expected to be copied by several other urban local bodies (ULBs) of India. However, there were only a few recycling facilities developed and all (about five) except one were through the initiatives of MCD in the city of New Delhi (one is in the city of Ahmedabad).

In order to improve the situation in other cities too, the Government of India recently enforced a separate regulation for managing C&D waste in India in 2016. The regulation enacted contains specific roles and responsibilities for various stakeholders and has stipulated a period of 24 months for all ULBs to mandatorily set up C&D waste recycling facilities. Thus, there is a huge coercive push towards C&D waste recycling in India. However, the institutional change literature has shown the need for the alignment of normative and cognitive institutions embedded in the stakeholders towards recycling for successful diffusion of recycling practices and gain legitimacy in the system (Scott 2014). To facilitate better decision making, the knowledge on the evolution of C&D waste recycling overcoming the institutional challenges along the way is essential. But there is little work on the process of institutionalization of C&D waste recycling in the literature. Moreover, applicability of several waste management measures advocated and their empirical validity are missing in the literature.

Similar to India, Hong Kong also faced issues with respect to managing C&D waste. The Government of Hong Kong Special Administrative Region (HKSAR) took initiative in Hong Kong and implemented C&D waste recycling. The approach adopted by MCD and HKSAR slightly differed from each other and hence it was expected to find some contrasting examples of cases and evidences.

## **BRIEF RESEARCH METHODOLOGY AND APPROACH**

Thus, a multiple case study research methodology was utilized to study the activities of MCD & HKSAR (Yin 2003). Both MCD and HKSAR experienced the problem of managing the C&D waste as every other urban local body but chose to act on it rather than following the traditional solution of landfilling and thus, have become institutional entrepreneurs. Studying the actions taken by MCD & HKSAR and how it leveraged various resources in institutionalizing C&D waste recycling is an ideal research setting to understand the struggle behind the evolution of C&D waste recycling. An institutional field lens containing the stakeholders such as government, waste generators, recyclers and resource consumers help in understanding the episodes of conflict and their responses to the initiatives. Transcripts of interviews conducted and secondary sources of data such as newspaper articles, archival records and project documents were used in preparing the case histories. Open coding and axial coding techniques have been used to analyse data and map their interrelationships on the performance of C&D waste recycling facilities.

A multi-stage model of institutional construction proposed by Suchman (1995) has been adopted to map the stages in both MCD's and HKSAR's actions in developing C&D waste recycling projects. Suchman's model categorizes seven stages through

which a novel concept such as C&D waste recycling progresses before gaining institutional legitimacy. (1) **Problem Generation** stage encompasses the identification of problems of the existing institutions and its impacts on the activities of the project organizations. (2) **Problem Cognition** stage is where the troubled actor(s) decide to act on the problem rather than ignoring them. The prevailing market conditions decide the need for constructing new institutions. A large and recurrent problem eliminates the option of pursuing Ad Hoc solutions and necessitates deeper understanding to generate institutionalized solution. (3) **Problem Naming** stage situates the problem on a larger network of actors thereby help in leveraging resources that might help in addressing this problem in a holistic way. (4) **Response Categorization** stage is where the search for effective strategies addressing the identified problems begins. In this period, solutions reported to be effective elsewhere in the industry are identified. (5) In the **Response Comparison** stage, evaluation of responses with respect to the desired level of performance happens. Testing of new ideas and solutions in overcoming identified problems is conducted. The alignment with the prevailing institutional elements is assessed and those set of solutions that produce desired results are noted. (6) **Theorization** is the period in which the types of interventions and their appropriate combinations to be adopted to ensure the successful construction of new institutions are made. Appropriate contexts and conditions under which the prescriptions work are also theorized. (7) **Diffusion** is the last step in attaining general validation and institutional legitimacy.

While it is an effective lens, situating the process model of institutional entrepreneurship proposed by Battilana et al. (2009) within this multistage model of institutional construction will improve the explanatory power of the lens and enable us to trace the evolution of institutional construction through institutional entrepreneurship with more details on process as well. Literature on institutional fields have put forth the influence of agency and struggles that happen within such fields during the evolution and diffusion of new institutions (Wooten and Hoffman, 2008). Hence, combining a theory of action such as Strategic Action Fields (Fligstein and McAdam 2011) will help us better analyse the field dynamics and settlement processes (Mahalingam and Delhi 2012) and hence we placed it in response categorization and comparison stages. The modified multi stage model of institutional entrepreneurship with the incorporation of proto-institutions as described earlier is shown in Figure 1 (adapted and modified based on Suchman's model (1995), and Battilana et al. model (2009)). This theoretical framework was especially helpful in accounting for several episodes of contention in the field. Episodes of conflict, mobilization of allies and the strategies being adopted in response to such conflicts and thereby leading to persistence of old institutions or rise of new institutions were of interest during the analysis.



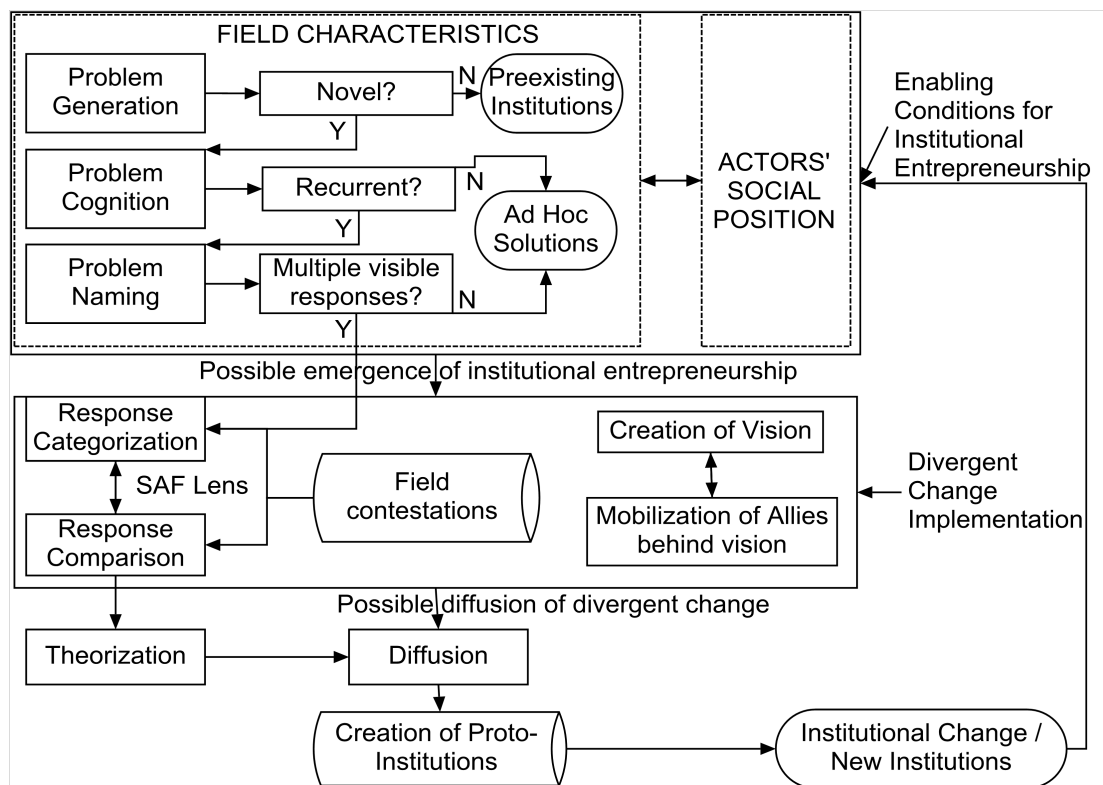


Figure 1 Modified Multi Stage Process Model of Institutional Entrepreneurship

## KEY FINDINGS

### NEW DELHI

#### PROBLEM GENERATION, COGNITION & NAMING STAGES: ‘ACTORS & INITIAL STATE’

Identifying the inherent limitations of the prevailing system reinforced with long held views and beliefs constitutes the early stages of institutional construction. While a huge amount of development activities and associated C&D waste generation kept happening in New Delhi (the capital city of India), construction industry stakeholders’ collective rationale was not aligned towards conservation of natural resources. C&D waste generation of the order of 4000 tonnes per day (TPD) in New Delhi were only landfilled. Till 2016, there were no separate regulations concerning C&D waste and C&D waste management was mentioned in a paragraph as part of ‘Municipal Solid Waste Management & Handling Rules’ enforced in the year 2000. While this regulation discussed about managing C&D waste in a cursory manner, lack of details on specific roles and responsibilities of each of the construction industry stakeholders such as the construction waste generators / contractors, waste haulers, and Government bodies made it vague and ineffective.

As per Delhi Municipal Corporation Act (1957), obligatory functions of Municipal Corporation of Delhi (MCD) include regulation of building construction activities and waste management in the city. Thus, MCD was taking care of collection, transportation and disposal of C&D waste in New Delhi. While there are three landfill sites in New Delhi, private waste generators generally dispose of their C&D waste in

unauthorised locations. Out of 4000 TPD generation, about 2000 TPD of C&D waste is only being received in the municipal landfills located at Ghazipur, Balaswa and Okhla in New Delhi. Illegal dumping at the banks of river Yamuna and several other unauthorised places such as roadsides, low lying areas has been frequently reported in the newspapers and contributed to a bad social image of MCD towards waste management. In the midst of these problems faced by MCD, the development activities related with hosting Commonwealth Games (CWG) in 2010 started increasing in Delhi. Anticipation of huge quantity of C&D waste generation due to enormous amount of construction activities related to CWG has led MCD to realise the problem of C&D waste and its impact on the environment if not properly managed. Having realised that the reputation of the organisation is at stake and extensive media coverage expected with preparation activities of CWG have also contributed to the problem cognition stage.

Feasibility of adopting C&D waste recycling, one of the popular management strategies adopted in many foreign countries was evaluated. The Ministry of Urban Development (MoUD) was also enthusiastic about C&D waste recycling project and had spearheaded a Memorandum of Understanding with the Norwegian Government to improve technology and knowledge sharing in the field of C&D waste recycling. Based on some of the successful stories of C&D waste recycling in countries such as Hong Kong, Norway, and Japan, MCD projected C&D waste recycling as best practice instead of landfilling and was committed to establish a pilot C&D waste recycling facility. The close proximity of MCD with the Central Government of India helped MCD in leveraging support and help during the establishment of C&D waste recycling facility. MCD has also performed a feasibility study for setting up pilot recycling facility in collaboration with M/s. IL&FS Environmental Infrastructure Services Ltd. (IEISL) and projected recycling as a holistic solution for C&D waste management.

#### **RESPONSE CATEGORIZATION & COMPARISON STAGES: '*FIELD STRUGGLES*'**

MCD commissioned the pilot recycling facility in 2009 on a Public Private Partnership basis with M/s. IL&FS (IEISL) and implemented several changes in collection, transportation, and disposal of C&D waste to facilitate successful operation of the recycling facility developed. Initially it was planned to issue an order to all government organizations (such as Delhi Development Authority (DDA), Public Works Department (PWD)) notifying them about the recycling facility and mandating them to dispose of their C&D waste for recycling at the facility. Waste generators were also expected to pay the tipping fee to cover the development and processing costs. Several containers at different locations for collection of C&D waste from small generators were also planned. However, C&D waste disposal practice among private waste generators were not as desired and therefore, setting up collection points all over the city was adopted. Understanding the contractors' preferred distance for disposal, about 168 waste collection points were set up by MCD to serve as temporary disposal locations for C&D waste generators by 2010. By this way, removal of uncertainty in the locations for collection of C&D waste as well as a regularity in disposal behavior was achieved.

The market for recycled materials was still at its nascent stage. To showcase safe utilization of recycled materials, the approach road to the recycling facility from a

State Highway was built using recycled aggregates in 2010. MCD sought the help of Central Road Research Institute (CRRRI) for design and monitoring of the performance of this test road constructed using recycled aggregates. A 10 km long stretch in a highway project was also taken up in 2015 in collaboration with DDA and is being constructed using processed C&D waste. MCD have also collaborated with academic institutions and professional organization such as Indian Concrete Institute (ICI) to spread awareness on recycling, usage and management of C&D waste. Technical committee formed by ICI framed guidelines on safe usage of recycled aggregates in 2015. However, lack of permission to use recycled aggregates in the codal provisions was cited as one of the major constraints in utilizing recycled materials by Government authorities. MCD leveraged its social position and convinced the Government of Delhi to issue an order to all Delhi Government agencies including Central Public Works Department (CPWD) to mandatorily use recycled aggregates in their projects to a certain extent (10%) in 2015. A plethora of laboratory investigations on recycled aggregates in various academic institutions in India and the guidelines framed by ICI formed the basis for a strong recommendation to include the usage of recycled aggregates in the Bureau of Indian Standards. Accordingly, IS 383: Bureau of Indian Standards for use of aggregates in construction have been revised in 2016 and the permission to use recycled aggregates have been embedded formally. Usage of paver blocks made of recycled materials in one of the projects for the Supreme Court of India (Apex body of Indian judiciary system) has been frequently cited in the marketing slogans by IEISL to boost market acceptance of recycled products.

MCD has also mandated the submission of a waste management plan during building approval processes for large generators. The launch of 'Swachh Bharat Mission' (Clean India Mission) in 2014 have also triggered few advancements in the institutional field related with C&D waste management. Discussions for developing three more recycling plants were initiated and started getting developed. One of those three plants is about to get commissioned by 2017. Furthermore, an on-site recycling facility was commissioned in one of the redevelopment projects undertaken by a large developer (a Government of India Enterprise) in New Delhi. The company found that it was beneficial for them to recycle on-site and use the recycled materials rather than comply with the rules and transport all the waste to a recycling facility situated far away from their site. Thus, there was the formation of proto-institution towards C&D waste recycling.

## **HONG KONG**

### **PROBLEM GENERATION, COGNITION & NAMING STAGES: 'ACTORS & INITIAL STATE'**

Hong Kong Special Administrative Region (HKSAR) faced several issues with respect to managing C&D waste in Hong Kong. C&D waste generation in Hong Kong during 2001 was about 14 million tonnes annually. Owing to the planned redevelopment of old districts and expansion of railway networks to improve connectivity over the entire territory, C&D waste generation was increasing every year in that period (Poon 1997). A variety of waste disposal ordinance and regulations were already in place in Hong Kong. Some of them were: a Waste Disposal Ordinance (enacted in 1980) that provided a broad framework to address waste management right from the point of generation to the point of disposal, Green

Manager Scheme to oversee housekeeping issues, water use and energy savings in Government departments, a waste reduction framework in 1998 and a landfill charging scheme proposal in 1999 (Lu and Tam, 2013).

Since a regulation specific to construction waste management was missing, low awareness about C&D waste among policy makers could be inferred. As a result, landfilling was the traditional management practice of C&D waste (especially for soil, masonry and concrete) and being a cheaper alternative, has become popular choice among the construction contractors (incumbents). Since C&D waste is voluminous in nature, rapid depletion of landfill space occurs in landfilling C&D waste. As Hong Kong is already a mountainous region with limited area for development and landfill spaces were diminishing at the rate of 3500 m<sup>3</sup> per day, HKSAR needed to divert the generated C&D materials heading into their landfills. Moreover, HKSAR spent about HK\$ 200 million (US\$ 1 = HK\$ 7.8) per year for disposal of C&D waste (Poon 2001).

In addition to managing the disposal problem, the need for virgin resources such as rocks for the development activities was also increasing. Back then in 2001, 60% of Hong Kong's demand for virgin aggregates were only met by local reserves and the rest 40% were being imported from Mainland. Moreover, it was projected that the local rock reserves were depleting and the operating stone quarries might get closed completely by 2013 (within the next twelve years) creating a shortage in the supply of aggregates. HKSAR (Challenger) understood that C&D waste management problem is large and going to increase several manifolds in the coming years and hence need to be solved holistically rather than ad hoc solutions. Thus, in order to solve multiple problems, HKSAR chose recycling as one of the important strategies in addition to reduce and reuse expecting that the recycled aggregates can partially substitute the demand for natural aggregates as well as prolong landfill spaces. In 2001, a report was published by construction industry review committee consisting of several HKSAR Government departments titled 'Construct for Excellence' propagating ideas such as maximizing use of green materials and reducing construction waste in the design and construction of buildings.

#### **RESPONSE CATEGORIZATION & COMPARISON STAGES: '*FIELD STRUGGLES*'**

Almost 7000 tonnes per day of C&D waste were still landfilled during 2001 out of which about 80% were inert and hence could beneficially be used at least for land reclamation (Poon 2001). Lack of incentives to perform waste reduction and recycling led the incumbents to stick to their institutionalized practices such as poor on-site waste sorting, absence of recycling, and landfilling of C&D waste. A series of interventions were made by the challenger (HKSAR) with an intention to trigger changes in the intrinsic motivation behind the practices and belief systems of the incumbents leading to several episodes of contentions or struggle within the institutional field.

Joint Practice Notes (JPN) were issued in 2002 giving incentives in terms of exemptions in site coverage and/or gross floor area calculation to boost the use of prefabricated and other such green products. In 2003, Buildings Department of HKSAR issued a JPN entitled 'Use of Recycled Aggregates in Concrete' deliberating the safe utilization including limits of usage for various categories in order to alleviate the fear of using recycled materials. Several awareness campaigns were conducted to improve awareness of builders and developers about waste management

on construction sites. Learning from other countries such as Japan and Netherlands, HKSAR commissioned a pilot C&D waste recycling facility in 2004 in a public fill area near Tuen Muen to showcase the technical and operational feasibility and build market for recycled materials (Lu and Tam, 2013). However, several problems were encountered during its operation such as lack of confidence and local experience in using recycled materials, insufficient guidelines and specifications, uncertainties in quality and steady supply of recycled aggregate, abundant availability of cheap virgin aggregates and lack of tax on landfilling.

Hong Kong Government's General Specifications of contract explicitly stated the use of virgin materials only in construction works and thus there was an implicit restriction in the usage of recycled materials (Poon 1997). To facilitate the successful operation of the pilot recycling facility, specifications were revised to include consumption of recycled aggregates in public projects commissioned in the area during 2004 to 2006. In order to ensure a steady supply of input C&D materials to the facility and prevent illegal dumping, a Trip Ticket System (TTS) was also introduced in 2004 to track and monitor the movement of trucks carrying C&D waste (Lu and Tam, 2013). Since the quality of recycled aggregates produced depends on the incoming C&D materials quality/homogeneity, on-site sorting practices can have a great influence towards improving C&D waste recovery. However, survey conducted among building construction professionals in Hong Kong revealed a high degree of aversion to on-site sorting practices. Some of the reasons cited were that the sorting practice needs too much of site space, involves high level of management and labour input, associated increase in cost and interference with normal construction activities. About 70% of the respondents preferred against on-site sorting unless it forms a part of contractual obligation. Time constraints were also cited by respondents from both construction as well as demolition sectors (Poon 2001).

In 2005, Construction waste disposal charging scheme (CWDCS) was enforced to improve waste segregation among stakeholders in construction projects. Two off-site sorting facilities were also set up by HKSAR to facilitate those contractors facing site space constraints to accept materials for sorting and later send them to recycling facilities. Contractors were charged based on the sorted nature of C&D waste being handled. Thus, a contractor incurs a disposal charge of HK\$ 27 per ton if waste consists of inert materials entirely, HK\$ 100 if waste is deposited in off-site sorting facilities (accepted only if waste comprise at least 50% of inert materials) and HK\$ 125 if deposited in a landfill facility (waste containing less than 50% of inert materials are only accepted) (Lu and Tam, 2013). Through a defined acceptance criteria for each of these facilities, contractors were incentivised to perform on-site sorting to reduce their waste disposal costs. However, implementation of CWDCS lead to increase in the amount of illegal dumping (365 detected cases in 2005 to 1587 detected cases in 2006) rather than major changes in waste reduction or waste sorting (Yu et al., 2013). The TTS introduced in 2004 was enhanced to form an interlocking pattern in the year 2010 with clear responsibilities for transporter and builder to ensure adherence to disposal regulations. While there were indications of effectiveness of the combined effect of policies in reducing the amount of waste reaching landfills, even by 2013, about 25% of the materials disposed at landfills of Hong Kong were from construction sector (Lu and Tam, 2013).

## **DISCUSSION AND IMPLICATIONS**

### **THEORIZATIONS**

In the C&D waste literature, a unified account of theorization is missing. Economic viability of recycling C&D waste have been found to be achieved when the practice of landfilling becomes costlier than recycling and the cost of virgin materials are higher than recycled materials (Duran et al. 2006; Nunes et al. 2007; Yuan et al. 2011). However, such conditions are not always readily met and there is also institutional bias of resource consumers and other stakeholders as seen in the cases of Hong Kong and New Delhi. Influence of policies such as construction waste disposal charging scheme to nurture favorable conditions for recycling have been discussed in the literature (Lu and Tam 2013). However, circumvention of policy through illegal dumping (a strategic response as discussed by Oliver (1991)) as observed in Hong Kong could result as response to the coercive pressure applied.

The ideology of the use of policies in collective action problems such as this could be traced back to the logic of collective action proposed by Olson (1965) wherein the inability of self-interested individuals in coordinating collective action and the need for externally enforced rules was advocated. However, the theory of collective action has evolved and has shown that self-governance is possible; coordination and cooperation among rational agents towards voluntary collective action can be sustained under certain principles: *“When the users of a resource design their own rules that are enforced by local users or accountable to them using graduated sanctions that define who has rights to withdraw from the resource and that effectively assign costs proportionate to benefits, collective action and monitoring problems are solved in a reinforcing manner”* (Ostrom 2014). While there are several empirical as well as experimental evidences for validity of these principles showcased in fields such as fisheries and water resources, they are neither prescriptive nor exhaustive and applicability for large complex systems needs further research (Ostrom 2014).

Situations having resource scarcity problems (i.e. natural aggregates for construction for example) were found to be an enabling condition for actors to migrate and operate as institutional entrepreneurs (Durand and McGuire 2005). In India, guidelines for recycling, use and management of C&D wastes drafted by ICI remains a nascent contribution. Following the Government of India’s order to set up recycling plant in every Indian city with population greater than a million, a plethora of activities are expected soon and refinement in the theorizations about the process of institutionalisation might get refined and enriched with more empirical evidence.

### **DIFFUSION, LEGITIMACY AND PROTO-INSTITUTIONS**

We have observed that setting up a recycling facility has greatly contributed in downstream developments such as developing the market for recycled products and associated changes in both the cases. As put forth by Lingard et al. (2000) that the availability of local infrastructure for recycling critically influences waste management outcomes, the pull effect of the recycling facility towards changing the institutional environment can be inferred. Thus, setting up recycling plants has become the initial stimulus of change that has created a ‘pull effect’ and demanded beneficial improvements in the system. However, successful operation of the

initiatives faced several problems downstream as evident from the field struggles in both the cases.

Seo and Creed (2002) prompted that “Actor’s *structural position at the interstice of different institutional logics can enable reflexivity*”. Since urban local bodies (MCD & HKSAR) were positioned perfectly well to influence the stakeholders, experienced large and recurrent problem of managing C&D waste, not under the influence of construction organizations and possessed sufficient amount of power relations, attempt of institutional entrepreneurship has led to the emergence of proto-institutions and progressed up till diffusion stages. In line with how the political will and the power relations lead to the legitimization of certain practices and thereby paving way to the emergence of certain fields of activity (Clegg, 1989). Urban local bodies in India are also responsible for management of various other wastes including municipal solid waste. Hence, we wonder whether the urban local bodies are ideal organisations to plant the initial stimulus for change as actors embedded in multiple fields are more likely to act as institutional entrepreneurs (Battilana et al. 2009).

MCD had a vision to set up several centralized recycling plants latent from the action of having set up 168 collection points distributed all over the city. MCD had also mobilized several allies, right from conception including a PPP partner (IEISL) and various government & professional organizations to facilitate legitimacy attainment for recycling activities and products. Attainment of local validity in New Delhi was seen with the successful operation of the facility for over a decade now and also development of three other recycling plants within the same city. While widespread diffusion and general validation remains undetermined, we categorize this state as the emergence of ‘proto-institution’ (see Lawrence et al. 2002).

We contend that the creation of proto-institution marks an important stage in the institutional construction wherein the efforts of the institutional entrepreneur has paid off locally. Having become a role model for other actors both inside and outside the institutional field, professional organizations such as ICI started projecting the success of MCD towards recycling all over the country through conferences, seminars and workshops urging everybody to follow the footsteps (sowing seeds for mimetic isomorphism). Municipal Corporation of Ahmedabad, being impressed with the display of a successful model for recycling, mimicked the MCD’s model and established a recycling plant in its jurisdiction.

In Hong Kong, adoption of rigid structures by HKSAR with stringent monitoring led to the cooperation of waste generators and thereby possible diffusion of favourable practices C&D waste recycling. HKSAR framed the issue in terms of resource recovery and widespread adoption of practices was externally forced. However, a study on the perceptions of waste generators have reported that the 70% of the contractors are unlikely to adopt waste management practices if the client’s insistence is absent in the contract. As Ostrom (2014) hypothesised, under “*strong external monitoring and sanctioning, cooperation is enforced without any need for internal norms to develop*”. HKSAR also has taken the pioneering leap, framed a vision for the change and implemented a divergent change leading to the formation of proto-institutions. However, unlike the case of New Delhi, extensive mobilization of allies or improvisation of symbolic structures (like on-site recycling) enforced was not seen or reported. In the absence of external rules and monitoring (the case of voluntary collection points set up in New Delhi), “*norms can evolve to support*

*cooperation especially when there is communication between the actors”* (Ostrom 2014). A cross comparison of field characteristics and settlements in the cases of New Delhi and Hong Kong has been reported in Table 1.

Table 1 Details of Field Contestations and Outcomes

Region →		
Field Characteristics	<b>Hong Kong</b>	<b>New Delhi</b>
Incumbent actors	Construction contractors, waste haulers	Construction contractors, waste haulers
Challengers	HKSAR	MCD
Field Characteristics- IE's Trigger frame	Resource scarcity	Social image of MCD and other field conditions
Creation of new actors	Recycler, Off-site sorting facilities	Recycler
Mobilization of Allies	No notable allies except various government departments	PPP with IEISL, MoUD (GOI), CPWD, DDA, CRRI, ICI, BIS
Creation of Artefacts and Archetypes	Series of regulations, Trip Ticket System, Differential incentives for on-site sorting	Waste collection points, Demo projects, Standards and Guidelines
Settlement status	Emergence of Proto-institutions and forced adoption of practices favorable for C&D waste recycling	Emergence of Proto-institutions favoring recycling practices in collection, processing and utilization stages of recycling
Logics of the field	Govt. operates recycling facility as well as consumes recycled products	PPP & Government subsidy essential for setting up C&D waste recycling facility, on-site recycling also emerged

One interesting phenomenon that took place in Delhi was the activity of NBCC which had set up an on-site recycling facility for managing the C&D waste generated in one of its large redevelopment projects deviating from the model of MCD. NBCC learnt that recycling is possible from MCD as the (institution's) inertia to change is broken, leveraged the changing institutional conditions to innovate and overcame several on-site barriers to establish on-site recycling facility. We need to monitor the post stage of proto-institution creation to see if there are any other instances of innovation and what triggered them. Moreover, acknowledging proto-institutions



gives way to explain the possibility for multiple pathways for action (Micoletta et al. 2017).

Did widespread perception of resource scarcity (for quarried aggregates) in Hong Kong led to the adoption of rigid structures (tightly knitted strategies) leaving no room for improvement or refinement in the practices? Did the absence of resource scarcity frame in New Delhi led to the adoption of loose structures (or strategies) that paved way for variety of responses from waste generators? Or is it the strategies (or the structures enacted) that are adopted during field contestations lead to differences in the characteristics of proto-institutions formed? What characteristics of proto-institutions influence entrepreneurial activities by other actors in the field (like the one of NBCC in New Delhi)? How and which kinds of proto-institutions become institutionalised? These are some thoughts that we would like to investigate further and warrants empirical evidence.

### **PRACTICAL IMPLICATIONS**

The knowledge and theorization on the process of institutionalization of C&D waste recycling projects could help the government bodies in India and other developing countries to take better decisions towards managing C&D waste in their jurisdictions. Implications for mimetic isomorphism to achieve institutional change in the field of C&D waste recycling through institutional entrepreneurship could be drawn from the cases of Delhi and Hong Kong. Thus, an approach outlining how individual or organizational actors might take lead and initiate change in their environment despite institutional pressures is discussed in this paper.

### **CONCLUSION AND FUTURE WORK**

Institutional Entrepreneurial activities related with C&D waste recycling in two different cities by two different actors have been studied through the lens of a modified multi-stage model of institutionalization. Adopting an institutional field perspective, heavy contestations in response categorization and response comparison stages resulting in field level struggles were observed. Successful local validation observed with the creation of proto-institutions marked the diffusion of C&D waste recycling practices. Institutional entrepreneurship seems a plausible way in bringing about change in C&D waste management as there needs to be a strategic crafting of the problem and Government bodies suit well for such initiative as they are centrally positioned as well as possess the required amount of agency and power relations to positively influence field settlements in their favor during institutional struggles. We showed how institutional entrepreneurs played an important role in contributing to the initial phases of change and how they had become role models / guide for other actors in the field to mimic or improvise their daily activities.

More work needs to be conducted to identify the distinctive skill set needed for such institutional entrepreneurship activities and various combinations of strategic manipulations undertaken by institutional entrepreneurs to strike similarities with the taken-for-granted norms and values. The characteristics of both the field and actors leading to the differences in the characteristics of the proto-institutions created in these two cases need to be investigated in detail. Anecdotal evidence indicated that a private recycling initiative in the city of Mumbai, India has failed to operate

successfully and the developed facility was shut down. A detailed analysis of this contrasting case might give some interesting findings and possible answers to questions and contribute to theory building.

## REFERENCES

- Aljaz S. (2011). "The impact of the organisational structure and project organisational culture on project performance in Slovenian enterprises." *Journal of Contemporary Management Issues*, 16, 1–22.
- Battilana, J., Leca, B., and Boxenbaum, E. (2009). "How actors change institutions: Towards a theory of institutional entrepreneurship." *Academy of Management Annals*, 3, 65-107.
- Begum, R. A., Siwar, C., Pereira, J. J., and Jaafar, A. H. (2006). "A benefit–cost analysis on the economic feasibility of construction waste minimisation: The case of Malaysia." *Resources, Conservation and Recycling*, 48(1), 86–98.
- Begum, R. A., Siwar, C., Pereira, J. J., and Jaafar, A. H. (2009). "Attitude and behavioral factors in waste management in the construction industry of Malaysia." *Resources, Conservation and Recycling*, 53(6), 321–328.
- Bossink, B. A. G., and Brouwers, H. J. H. (1996). "Construction Waste: Quantification and Source Evaluation." *Journal of Construction Engineering and Management*, 122(March), 55–60.
- Centre for Science and Environment. (2013). "Waste-to-Resource: Briefing Note CSE warns cities are choking because of C&D waste." <http://www.cseindia.org/content/waste-resource-briefing-note-cse-warns-cities-are-choking-and-because-their-own-construction> (Nov. 12, 2016).
- Child, J., Lua, Y., and Tsai, T. (2007). "Institutional entrepreneurship in building an environmental protection system for the People's Republic of China." *Organization Studies*, 28(7), 1013–1034.
- Clegg, S. R. (1989). "Frameworks of Power." Sage Publications, London.
- DiMaggio, P.J., and Powell, W.W. (1983). "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields." *American Sociological Review*, 48, 147-160
- DiMaggio, P. J. (1988). "Interest and agency in institutional theory." *Institutional patterns and organizations: Culture and environment*, 1, 3–22.
- Duran, X., Lenihan, H., and O'Regan, B. (2006). "A model for assessing the economic viability of construction and demolition waste recycling—the case of Ireland." *Resources, Conservation and Recycling*, 46(3), 302–320.
- Durand, R. and McGuire, J. (2005). "Legitimizing agencies in the face of selection: The case of AACSB." *Organization Studies*, 26(2): 165-196.
- Eisenstadt, S. N. (1980). "Cultural Orientations, Institutional Entrepreneurs, and Social Change: Comparative Analysis of Traditional Civilizations." *American Journal of Sociology*, 85(4), 840.
- Ekanayake, L. L., and Ofori, G. (2004). "Building waste assessment score: Design-based tool." *Building and Environment*, 39(7), 851–861.
- Fligstein, N., and McAdam, D. (2011). "Toward a general theory of strategic action fields." *Sociological Theory*, 29(1), 1–26.

- Gavilan, R. M., and Bernold, L. E. (1994). "Source Evaluation of Solid Waste in Building Construction." *Journal of Construction Engineering and Management*, 120(3), 536–552.
- Garud, R., Hardy, C., and Maguire, S. (2007). "Institutional entrepreneurship as embedded agency: An introduction to the special issue." *Organization Studies*, 28, 957-969.
- Granqvist, N., and Gustafsson, R. (2013). "Fluidity in institutional embedding of proto-institutions." *Academy of Management Proceedings*, 15692.
- Greenwood, R., and Hinings, G. R. (1996). "Understanding radical organizational change: Bringing together the old and the new institutionalism." *Academy of Management Review*, 21, 1022-1054.
- Grief, A. (2006). "Institutions and the Path to the Modern Economy- Lessons from Medieval Trade." Cambridge University Press, NY.
- Jaillon, L., Poon, C. S., and Chiang, Y. H. (2009). "Quantifying the waste reduction potential of using prefabrication in building construction in Hong Kong." *Waste Management*, 29(1), 309–320.
- Lawrence, T. B., Hardy, C. and Phillips, N. (2002). "Institutional effects of interorganizational collaboration: the emergence of proto-institutions." *Academy of Management Journal*, 45(1), 281–290.
- Lingard, H., Graham, P., and Smithers, G. (2000). "Employee perceptions of the solid waste management system operating in a large Australian contracting organization: implications for company policy implementation." *Construction Management and Economics*, 18(4), 383–393.
- Lu, W., and Tam, V. W. Y. (2013). "Construction waste management policies and their effectiveness in Hong Kong: A longitudinal review." *Renewable and Sustainable Energy Reviews*, 23, 214–223.
- Maguire S., Hardy, C., and Lawrence, T. B. (2004). "Institutional Entrepreneurship in Emerging Fields: HIV/AIDS Treatment Advocacy in Canada." *Academy of Management Journal*, 47(5), 657-679.
- Mahalingam, A., and Delhi, V. S. K. (2012). "A contested organizational field perspective of the diffusion of public–private partnership regimes: evidence from India." *Engineering Project Organization Journal*, 2(3), 171-186.
- Manowong, E. (2012). "Investigating factors influencing construction waste management efforts in developing countries: an experience from Thailand." *Waste Management & Research*, 30(1), 56–71.
- Meyer, A. (1982). "Adapting to environmental jolts." *Administrative Science Quarterly*, 27: 515-537.
- Micelotta, E., Lounsbury, M., and Greenwood, R. (2017). "Pathways of Institutional Change." *Journal of Management*, Epub First: March 27, 2017, DOI: 10.1177/0149206317699522.
- Nunes, K. R. a, Mahler, C. F., and Valle, R. a. (2009). "Reverse logistics in the Brazilian construction industry." *Journal of Environmental Management*, 90(12), 3717–20.
- Nunes, K. R. a, Mahler, C. F., Valle, R., and Neves, C. (2007). "Evaluation of investments in recycling centres for construction and demolition wastes in Brazilian municipalities." *Waste Management*, 27(11), 1531–40.
- Oliver, C. (1991). "Strategic responses to institutional processes." *Academy of Management Review*, 16(1), 145–179.

- Olson, M. (1965). *The logic of collective action: Public goods and the theory of groups*. Cambridge, MA: Harvard University Press.
- Ortiz, O., Pasqualino, J. C., and Castells, F. (2010). "Environmental performance of construction waste: Comparing three scenarios from a case study in Catalonia, Spain." *Waste Management*, 30(4), 646–54.
- Ostrom, E. (2014). "Collective action and the evolution of social norms." *Journal of Natural Resources Policy Research*, 6(4), 235-252.
- Phillips, N., Lawrence, T.B., and Hardy, C. (2000). "Inter-organizational collaboration and the dynamics of institutional fields." *Journal of Management Studies*, 37(1), 23–44.
- Poon, C. ., Yu, A. T. ., and Ng, L. . (2001). "On-site sorting of construction and demolition waste in Hong Kong." *Resources, Conservation and Recycling*, 32(2), 157–172.
- Poon, C. S. (1997). "Management and recycling of demolition of waste in Hong Kong." *Waste Management & Research*, 15(6), 561–572.
- Poon, C. S., Yu, A. T. W., Wong, A., and Yip, R. (2013). "Quantifying the Impact of Construction Waste Charging Scheme on Construction Waste Management in Hong Kong." *Journal of Construction Engineering and Management*, 466–479.
- Poon, C. S., Yu, A. T. W., Wong, S. W., and Cheung, E. (2004). "Management of construction waste in public housing projects in Hong Kong." *Construction Management and Economics*, 22(7), 675–689.
- Ram, V. G., and Kalidindi, S. N. (2015). "Building Demolition Waste Management Practices- An Indian Case Study." *The 4 th World Construction Symposium on Sustainable Development in the Built Environment: Green Growth & Innovative Directions*. Colombo, 151–161.
- Rao, A., Jha, K. N., and Misra, S. (2007). "Use of aggregates from recycled construction and demolition waste in concrete." *Resources, Conservation and Recycling*, 50(1), 71–81.
- Rodríguez, G., Medina, C., Alegre, F. J., Asensio, E., and De Sánchez Rojas, M. I. (2015). "Assessment of Construction and Demolition Waste plant management in Spain: In pursuit of sustainability and eco-efficiency." *Journal of Cleaner Production*, 90, 16–24.
- Scott, W. R. (2014). "Institutions and organizations: Ideas, interests, and identities." Sage Publications.
- Seo, M., and Creed, W. E. D. (2002). "Institutional contradictions, praxis, and institutional change: A dialectical perspective." *Academy of Management Review*, 27(2), 222–247.
- Suchman, M. C. (1995). "Localism and globalism in institutional analysis: The emergence of contractual norms in venture finance." *The institutional construction of organizations*, Sage, Thousand Oaks, CA, 39–63.
- Teo, M. M. M., and Loosemore, M. (2001). "A theory of waste behaviour in the construction industry." *Construction Management and Economics*, 19(7), 741–751.
- TIFAC. (2001). *Utilization of Waste from Construction Industry*. New Delhi, India.
- Wang J., Yuan H., and Kang X. (2010). "Critical success factors for on-site sorting of construction waste: A China study." *Resources, Conservation and Recycling*, 54, 931–936.

- Wooten, M. E., and Hoffman, A. J. (2008). "Organizational fields: past, present and future," in Greenwood, R., Oliver, C., Suddaby, R. and Sahlin, K. (eds.) *The SAGE Handbook of Organizational Institutionalism*, Sage, Thousand Oaks, CA.
- Yin, R. K. (2003). "Case Study Research – Design and Methods", 3rd edition, Sage Publications, Thousand Oaks, CA.
- Yu, A. T. W., Poon, C. S., Wong, A., Yip, R., and Jaillon, L. (2013). "Impact of Construction Waste Disposal Charging Scheme on work practices at construction sites in Hong Kong." *Waste Management*, 33(1), 138–46.
- Yuan, H. (2013). "A SWOT analysis of successful construction waste management." *Journal of Cleaner Production*, 39, 1–8.
- Yuan, H. (2017). "Barriers and countermeasures for managing construction and demolition waste : A case of Shenzhen in China." *Journal of Cleaner Production*, 157, 84–93.
- Yuan, H. P., Shen, L. Y., Hao, J. J. L., and Lu, W. S. (2011). "A model for cost–benefit analysis of construction and demolition waste management throughout the waste chain." *Resources, Conservation and Recycling*, 55(6), 604–612.
- Zietsma, C., and McKnight, B. (2009). "Building the iron cage: Institutional creation work in the context of competing proto-institutions." In T. Lawrence, R. Suddaby, & B. Leca (Eds.), *Institutional work: Actors and agency in institutional studies of organizations*, 143-177. Cambridge, UK: Cambridge University Press.