

ON THE ROAD TO NOWHERE? THE CHALLENGES OF ALIGNING CONSTRUCTION AND DEMOLITION WASTE PRACTICES WITH CIRCULAR ECONOMY

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The construction sector is still a major contributor to the waste generated within the European union and contributes with around 25-30 percent of the total amount. A crucial part to achieve a sustainable built environment and mitigate the negative effects on the environment is to support the reuse and recycle of construction materials. The EU has put pressure on the sector to increase recycling for the member states and adopt Circular Economy (CE) principles, but Sweden is still far from achieving the targeted figures. Previous studies have shown that there are tensions between the shared understanding of formal and informal processes and practices of Construction and Demolition Waste (CDW) and the principles underlying the CE model. In order to explain the slow transition to Circular Economy, we identify and analyse these tensions in the field of CDW in Sweden. To do so, we draw on the concept of institutional field logic. This concept help us to understand how individuals' behaviours are constrained and affected by the socially constructed assumptions, values, beliefs, and rules by which individuals produce and reproduce social reality and which account for the decisions they make. The empirical material gathered for this qualitative study consists of 29 semi-structured interviews with industry practitioners and policy makers and documents analysis of the legal frame and industry guidelines. Although we can identify a few initiatives of implementing CE principles, our results show contradictions and incompatibilities between the two logics which can explain the lack of improving practice and the difficulty to realise the CE benefits.

Keywords: circular economy, demolition waste, institutional logics

INTRODUCTION

In order to achieve its recovery target, the European Commission is proposing the uptake of the circular economy by encouraging CDW recovery and management. The EU Circular Economy action plan (European Commission, 2020) has established general measures to be implemented by the member states to support the transition to the circular economy. The action plan concerns all stages of the products cycle: from design, production and consumption to waste management and also the creation of a EU market for secondary raw materials.

Sweden has made the bold statement of becoming one of the world's first fossil free nations and has designed a roadmap for how to achieve this transition. Although

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initiatives to improve the result of Construction and Demolition Waste (CDW) have been taken, Sweden is still far from achieving the targeted figures (Swedish environmental protection agency, 2018).

Responsible for a large proportion of the total amount of waste, the construction industry is seen as a key actor in this transition. Multiple levels policy and legislative frameworks are putting pressure on the industry to increase its recycling figures and incorporate Circular Economy (CE) principles (European Commission, 2020). According to these principles, buildings should be constructed with components and materials, which can be redeemed and re-used for new purposes at the end of the product's life cycle so, materials should enter a new life instead of being discarded and burnt (Djuric Ilic *et al.*, 2018). CE promises an efficient use of resources and thereby reduce the environmental impact and overconsumption. However, studies in other sectors than construction have suggested that the transition to CE is not aligned with conventional linear models of production (Stål and Corvellec, 2018, Djuric Ilic *et al.*, 2018). They show that the implementation of CE is creating tensions within organisations for example, between the CE assumptions, values and practices and the ones currently established in industries; or the requirement of a new distribution of tasks and responsibility between partners (Blomsma and Brennan, 2017, Van der Byl and Slawinski, 2015, Hahn *et al.*, 2015). According to Benachio *et al.* (2020) literature review, the focus of studies on CE in the construction sector deals mostly with prescriptive models, measures and solutions, either technical or business models related (Leising *et al.*, 2018). Likewise studies on CDW mainly address commonly reiterated barriers such as the lack of material quality, absence of culture, lack of market and regulation as well as the additional cost for recycling and reuse (Jin *et al.*, 2019, Park and Tucker, 2017, Ajayi *et al.*, 2015) but rarely discuss the assumptions, values and practices of the field.

The purpose of our paper is therefore to explore how the principles of CE are mobilised in the fields of CDW in Sweden and whether or not the tensions identified in the literature also occur in this industry. Our goal is to understand the organisational settings which frame the decisions rather than the decisions themselves. To do this we adopt the lens of institutional logics. Rather than focusing on actions and measures, institutional field logic addresses the values, norms and assumptions by which individual's interpret organizational settings and what they consider and rationalize as appropriate behaviour to achieve common goals (Thornton *et al.*, 2012).

THEORETICAL FRAME

Institutional Field Logic

To discuss the tensions arising in the implementation of CE in the area of CDW, we build on the Institutional Logics. IL is a concept developed within the wider field of institutional theory as a way of explaining the interactions between normative societal structures, organizational forms, and individual behaviours (Skelcher and Smith, 2015).

Institutional field logic is defined as "the socially constructed rules, norms and beliefs constituting field membership, role identities and patterns of appropriate conduct" (Greenwood and Hinings, 2006, p.819). They include historical patterns of cultural symbols and material practices, assumptions and values by which individuals and organizations provide meaning to their daily activity, organize time and space, and reproduce their lives and experiences (Thornton *et al.*, 2012). They supply actors with

numerous taken-for-granted categories and organizing principles by which they can define, select and implement decisions (Thornton and Ocasio, 2008). Institutional logics are central to our discussion as they help us to understand how individuals' behaviours are constrained and affected by the individuals, organizations and society that constitute institutions. To study and understand individual and organizational behaviour, Thornton and Ocasio (2008) insist on the need to understand the institutional context and understand how it regularizes behaviour as well as provides opportunity for agency and change. The field level phenomena occur in the interaction between “a collection of diverse, interdependent organizations that participate in a common meaning system” (Scott, 2014, p.106). Institutional fields are comprised of several logics such as market or professional logics and thereby also contains competing forms of rationality spurred from these logics, which account for a diversity in practices. It enables variance and contestation over which behaviour should be regarded as legitimized and appropriate (Lounsbury, 2008).

Thornton and Ocasio (2008) describe how institutional logics provide a link between institutions and actions as actors engage in rational mindful behaviour shaped by the central value systems with which they identify. The contradictions inherent in the differentiated set of institutional logics provide individuals, groups, and organizations with cultural resources for transforming individual identities, organizations, and society (Bertels and Lawrence, 2016). So, institutions do not only constrain behaviour, the contradictions between logics also provide individuals with the possibility to change (Thornton and Ocasio, 2008). According to Bertels and Lawrence (2016) although new logics within a field are often viewed as ‘new’ or emerging in a given field, they are often rooted in long-standing institutional logics of a more general nature. Hence, new logics emerge when values associated to a specific logic gain legitimacy and become incorporated into structures and thereafter translate themselves into practices. These new practices are described to be both a result of, as well as a starting point to the emergence of a new logic (Silva and Figueiredo, 2017). Whereas institutional logic has been largely mobilised in many fields over the last 20 years, it has made a late entrance in Construction management (Bresnen, 2017). Institutional logic in construction management literature has focused among others on hybrid organisation and partnership (Gottlieb *et al.*, 2020), health and safety (Jia *et al.*, 2017, Lingard *et al.*, 2019), and social procurement (Troje and Kadefors, 2018).

The Market Logic

Thornton *et al.* (2012) describe 6 institutional orders or ideal types of logics that can be used to understand the process by which institutional behaviour is shaped. The ideal types thereby have the advantage of both providing explanations of particular outcomes but can also be used to predict them. They are founded and characterised by values that both differentiate and make up the boundaries between them. These values demonstrate themselves through practices and patterns of behaviour within a given context (Friedland, 2013). One of these ideal types is the market logic, which can be described as an institution which shares a core set of ideas, practices, and policy prescriptions and insist on the actors' freedom to pursue their own economic interests and view the free market as a solution to both economic and social problems (Zhao and Lounsbury, 2016). The market logic is an area that has been well studied within different fields and industries and describe both the emergence of the order and the effect it has on the behaviour within the institution (Thornton and Ocasio, 2008).

The institutional logic of markets can be described as: the source of legitimacy is described to be a company's share price, the basis of strategy is to increase profit and the basis of attention is on the status it has within the market (Thornton and Ocasio, 2002). The market logic can therefore be characterised by prioritizing profit, creating competitive advantages, and reducing costs and is often associated with negative effects on the environment. At the same time, this logic is also attentive to economic pressure and increased efficiency and the organizations environmental performance can therefore be improved through the creation of economic incentives (Lee and Lounsbury, 2015).

The dominant logic of CDWM that builds on the principles that emerged during the industrial revolution and is based on a unidirectional model of material use through “take, make and dispose” which is referred to as the linear model (Esposito *et al.*, 2018). Where it is described to be unable to shift towards a more sustainable way of managing waste due to the lack of economic incentives.

The Circular Economy Logic

The alternative logic that we identify is the Circular Economy logic. CE can be defined as: “an economic system that replaces the ‘end-of-life’ concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes. It operates at the micro level (products, companies, consumers), meso level (eco-industrial parks, networks associations,) and macro level (city, region, nation and beyond), with the aim to accomplish sustainable development, thus simultaneously creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations.” (Kirchherr *et al.*, 2017, p.229). The CE state that economic activities are to be decoupled from the consumption of finite resources, and benefits are gained through a systemic shift that builds long-term resilience, generates business and economic opportunities, and provides environmental and societal benefits. It is based on the 'principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems' (Macarthur foundation, 2019). Although multiple interpretations and definitions exist for the concept of circular economy (Reike *et al.*, 2018), we refer to Adams *et al.* (2017) regarding the components of CE for CDWM. In their literature review, the authors identify the following actions necessary to realize CE in the construction sector: the design for disassembling, recycling and reusing; the choice of eco-friendly suppliers, material and delivery; minimising waste and increasing reuse during construction, minimising waste and repair during maintenance and deconstruction and reuse to close the loop. Whereas Benachio *et al.* (2020) identify a paradigm shift during the last decade in CDWM towards CE, they also recognise that even though the CE principles show great potential for the industry to reduce its waste generation, the implemented practices so far have not.

METHODOLOGICAL APPROACH

This project adopts the lenses of institutional theory in particular institutional logic to discuss the empirical material. As logics are revealed through language, practices, and are manifested through symbols and materials (Reay and Jones, 2015), we build on qualitative methods to explore the tension between the established WM and the emerging CE logics. Qualitative methods enable us to gain insights into the specific logics through quotes, observations, and thick description.

The study builds on an interpretative approach and draws on material collected during the period autumn 2017 and spring 2020. The data draws mainly of 29 semi-structured interviews with 39 industry practitioners and includes four visits to construction sites and one to a recycling plant, as well as the observations of two project start-up meetings and a two hours information workshop on the potential of circular economy for CDW professionals. We also draw on a documents study on the policy framework and industry guidelines on CDWM in Sweden.

The 39 interviews include six demolition companies, three contractors, two clients, one professional association representative, two municipality officers active in environmental protection and one large recycling company in the region. We have gathered their experiences and opinions regarding the actual and future practices of handling waste. An overview of the interviewees is presented in table 1.

Table 1: Interviewees overview

Organisation	Interviews	Interviewees	Positions
Large contractors	9	12	Project-, site-, production manager
	3	3	Environmental manager
Demolitions small - medium contractors	5	9	Project-, site-, production manager
	1	1	Sustainability manager
Large contractor - subsidiary	2	3	Business development manager,
Recycling contractor	4	5	Business developer manager, coordinator
Architect	1	1	Environmental manager
Municipality	1	2	Unit manager - Environmental dept.
Construction Industry association	1	1	Officer in charge of WM
Clients/FM	2	2	Project managers
Total	29	39	

All participants were informed about the goal of the study, the recording of the interviews and the anonymity of their contribution. The interviews were transcribed and analysed according to the themes developed in iteration with the theoretical framework on institutional logics and waste management literature. To carry our analysis, we have followed the five steps model of qualitative analysis suggested by Taylor-Powell and Renner (2003): knowing the data by getting over it several times; identify key questions or topics to organise the analysis; categorize information by themes and features; identify patterns and connections within and between categories and finally interpretation by attaching meaning and significance to the analysis. The results and interpretations of the different methods of gathering data have been triangulated, have been discussed between the researchers participating to the projects.

FINDINGS

The Two Field Logics

Here we present the findings focussing on the elements which refer to the two logics.

Established WM Logic

What we call the established CDWM logic is the common description among the interviews of the taken for granted understanding and expectations of how the CDWM is organised. The focus of the industry is directed to the design, construction and maintenance phase of a building through the consumption of virgin materials. Waste is viewed as an end of life result of these processes which need to be managed according to the legislative demands including collection, handling and disposal either

through incineration, waste to energy or recycling. During the last few decades, the focus of the regulatory frame in Sweden has been to limit landfill, minimise quantity of waste and insist on the separate handling of different material by especially focusing on hazardous waste to avoid unnecessary pollution and enable recycling. 'We have the possibility to choose during normal demolition, but when it comes to asbestos, we don't have a choice, the legal frame demands it and costs are not even considered' - Manager Demolition company.

The established logic assumes that recycling can only be a small part as the quality of the waste material is substantially lower than for new products and that the market demand for waste material is negligible. The transformation of waste into competing products is said to be too expensive for achieving sufficient quality of the results and that the lack of constant supply makes the production difficult to control. On newbuilt sites, the practice of handling waste is based on a tradition where contractors and subcontractors' workers carry out the work which is often perceived as an "annoying necessity to clean after yourself" - Site manager contractor.

As it does not generate any financial gain, waste and its management is described as a cost that should be kept at a minimum. The project managers refer to their basic mission which is to "produce a benefit at the end of the project" and insist on the impossibility to change work organisation under the actual market conditions and legislation. Besides, the lack of clients' interests and incitements to engage in CE are also used as claims to legitimise the status quo. The demolition companies' interviewees argue for the maintenance of the current practices with the same argument. According to them, the company's core activities and business proposals build on the services (deconstruction, handling and transport) they offered and not on the reselling of the material. As summarised by one of the managers: "at the end of the day I need to pay my people, there is only pocket money in waste" - Site manager demolition company. When asked about the necessity to change processes in order to achieve CE, there is a common expectation that the responsibility of improving recycling and reuse should be taken by the ones earning on it and it is therefore attributed to other actors in the supply chain, often the producer of the materials.

CE Logic

The implementation of CE in the Swedish construction industry is according to our interviews only comprised of minor changes in practice and its effects are rather limited. The active adherents to the CE logic are almost exclusively the five environmental managers of our companies (architects, contractors and demolition) and all of them have been trained outside of the construction industry (chemistry or environmental management education). In their organisation, they are a part of the management support to the projects departments and also have to deal with other sustainability, health and safety related issues. They strongly advocate for CDWM aligned with the circular economy principles. '[Waste] is a very serious issue that can have drastic consequences, it is an important aspect of current business, but will become a crucial aspect of our future businesses. Where we need to be knowledgeable about it and become an industry leader' - Environmental manager large contractor. Their task is to introduce elements of CE in the companies processes but they struggle to translate the CE benefits into the established WM logic: "We thought we would save money on sorting, but we cannot see that in our statistics yet. Because the more we sort, the more the cost for containers and transport increase. But this was how we pitched it from the beginning and probably the reason they agreed to

our goals/demands. So its problematic now that we don't see any financial gain" - Environmental manager large contractor.

To motivate the project managers to engage in sorting on site one of the large contractor's sustainability manager has organised an internal competition on the quantity of waste produced by building site and publish the results on a monthly base. It is a common feel that the holistic values of CE are not easily adopted by their organisations: "we should be able to put a price tag on ethical and ecological concerns to convince the project managers to seriously engage in CE" - Environmental manager. They also openly recognise that they are only disposed with a limited power to change practices within their own organisation. All our sustainable managers are engaged in networks of interests to implement CE and they also participate in projects with research institutes on the potential of recycling materials or optimisation of work processes.

However, building on the economic aspects of reusing material, the companies we visited have implemented a few CE friendly initiatives. They have created stockage of used material collected on site to be reclaimed and even if old doors, windows and other bathroom equipment's are seldomly reused, other material such as vintage bricks, left over expanded polystyrene or wood may find a new utilisation. But according to the contractor's project managers, the use of these materials are not routinised. No value or customer interest exist, and these solutions are not aligned with the traditional practices adopted in the established logic. Some interviewees even refer to these efforts as green washing.

Paradoxically, the sustainable manager may not necessarily be involved in the rare innovative projects where buildings are constructed out of large amount of reused or recycled material. These showcases, two or three for each of the biggest contractors, seem rather to be the results of client requests and local networks of professionals who embrace the challenge of an exciting project providing there is no financial drawbacks. Being managed by independent business units at the regional level, these showcases may not include the active participation of their sustainable managers, even though they advocate for CE solutions.

Most of the contractor's managers recognise the need for a transition to CE, but still legitimised the actual practices as securing financial viability. They make small attempts or adjustments to improve CDWM on site by for example improving the logistics of waste by minimising the walking distance to the dumpsters or recycle unused material from one building site to another. However, these actions are random and do not comply with a systematic activity plan. Table 2 summarise how the established WM logic and CE logic build on different characteristics.

CONCLUSION

Drawing on the notion of institutional field logics, we have tried to explain why CDWM practices are only slowly aligning with the CE principles. Our results explain why organisations have problems to align their practices with the legislative and societal demands to engage in circularity as the basic assumptions, values and norms are contradictory to the existing logic.

Organisations avoid challenging business as usual taking place at the level of the projects by positioning sustainability units close to top management to serve as advisory service provider. The CE logic builds on people, assumptions and examples coming from outside of the construction industry, which are difficult to translate into

the established logic which is strongly anchored in a market logic. The CE clashes with the established logic as it draws on interdependency between the actors for a common gain whilst the latter builds on a sequential process where each actor should make a profit in their own part of the process.

Table 2: Characteristics of the Established and Circular Economy WM logics

Institutional logics Characteristics	Established WM	Circular economy WM
Assumptions	No demands for recycled material, low quality, high cost	Recycled material can replace virgin materials
Values	Financial reward, private	Societal benefits, public
Beliefs	Waste as waste, other actors' responsibility	Waste as product Everybody responsibility
Rules	Legislation, KPI, customer	Company policies, guidelines
Practices	Long traditions	Not stabilized - partly to be defined
Control mechanism	Audit, regulation, contract	Social obedience, certification, reputation, stakeholder pressure
Organization of time	Short term, linear	Long term, circular
Source of identity and authority	Clear professional roles and hierarchy, positioning in the field	Researcher, activists, individual belief
Source of legitimacy	Normalized practices, profit, efficiency	Climate change, holistic, backed by scientific evidence,
Base of strategy	Focus on core activities	Contribute to society
Institutional entrepreneurship	Maintain the dominant	Participation to research, networks, training
Economic system	Value created inside organization	Value through interdependencies
	Service based, sorting ratio	Material based, prevention
Bases of mission	Company and customer value	Societal value
Bases of attention	Reduce WM cost, minimize time usage	Cost efficient solutions, sustainable resource management

However, small improvements are realised under the influence of sustainability units and some practices are slowly becoming routinised. New functions or professions are created in organisations supported by new education curricula such as milieu, environmental or sustainable managers. Networks of interests are crossing the boundaries of competing organisations that aim to address these issues and diffuse the principles of the CE. We also identify "bubbling" activities which seem to be bridging the two logics at the level of the projects, but even though individuals realize the need to improve, they still face tension in terms of contradictory organizational demands. But the necessary collaboration between organisations to fully adopt the CE logic seems far from reached. The only success mentioned through the joint forces in collaboration projects so far is the standardisation of sizes of the transport pallets. So, the industry will need stronger incentives and reference frame to engage with the CE, as we otherwise risk being on the road to nowhere.

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