FROM CONSTRUCTION WASTE TO BUSINESS VALUE: DEFINING NEW VALUE PROPOSITIONs FOR CONSTRUCTION CONTRACTORS

The social and legislative focus on sustainability has pressed the construction sector to optimise and innovate in terms of both material and business processes. The activities of Construction and Demolition Waste (CDW) management have been under the same pressure. The collection and recycling of waste, in particular hazardous waste, has received a considerable amount of attention. The life cycle of various products and material is also well documented and many models are aiming at optimising the supply chain and logistic processes. Likewise, demolishing and recycling activities, usually considered as low value work, have received a renewed attention and large contractors are now developing units or subsidiaries to cover these activities, thereby taking over a part of the value chain in CDW. However, whereas the potential of these new business opportunities has been forecasted and measured by numerous academics, there is far less attention given to management practice in term of business development and the rationales to sustain it.

Drawing on the discussion of business models carried by Baden Fuller and Mangematin (2015), we define a business model as a ‘model’ which can appear in many guises and serve many purposes, an artefact that can be used to convey knowledge about a business and its status to others. Instead of focusing on innovation as an internal matter, this conception allows us to understand this development as a dynamic process stretching outside company boundaries. Building on the case of a network of large contractor companies engaged in CDW that are developing new business proposition to do so, we propose to give an insight in how these propositions have emerged and are transformed in new businesses.

The empirical material consists of two parts: Part one is based on the preliminary results of a three years’ multidisciplinary project taking place in the Gothenburg region and is a platform bringing together practitioners and academics in CDW. The project focuses on gaining an overall picture of the CDW industry, their practices as well as how they develop new innovations in both material and processes. We participate in and observe project meetings, workshops, and discussions.

Next to the joint project platform, we more in-depth study a group of companies engaged in construction renovation through interviews and observations on the construction site, we follow their concrete considerations, choices and actions in developing the new solutions towards new business models.

Accordingly, our contribution aims at informing how the dynamic processes of business models can support innovation in the construction industry.
1 Introduction

The Architecture, Engineering and Construction (AEC) industry is often mentioned as one of the main contributors to environmental degradation as the industry is exploiting natural non-renewable resources and pollutes the environment (Kareem et al., 2015) The industry contributes to land depletion and deterioration, energy consumption, dust and gas emission, noise pollution, solid waste generation (Lu and Yuan, 2011). In this context, Construction and Demolition Waste (CDW) become relevant and are defined as the surplus and damaged products and materials that arise from construction, renovation, demolition, and other construction activities (Chen and Lu, 2017). CDW presents a significant challenge to the sustainable development in the context of rapid urbanization (Li et al., 2015).

For a long time, the CDW management activities have been mostly landfilled but the increasing volume of production has resulted in increased scarcity of landfill space along with increased costs of improving environmental protection related to landfill engineering and management (Symonds, 1999). Reduction of waste generated within the construction sector is now been encouraged to reduce the significant harmful effect it contributes to the environment. In Sweden, the waste is estimated at 8 million tons a year and only half of it is yet part of the recycling loop.

Moreover, the European Union urges its member states to increase the reuse and recycling of non-hazardous construction and demolition waste to at least 70 percent by 2020 (2008/98/EC). In 2015, the EU came with a new proposal concerning the circular economy including a new proposal for waste management. These regulations have forced EU countries to include new measures for waste prevention and recycling (de Guzmán Báez et al., 2012). Even though most EU-countries have started setting up regulations and guidelines for CDW, waste reduction activities are traditionally not considered as cost-effective, efficient and compatible with core construction activities (Teo and Loosemore, 2001). Furthermore, not all CDW is regulated and existing guidelines concerning CDW can be interpreted differently. Besides, CDW and in particular demolition waste value is limited due to the inability to predict the production environment; the unique characteristics of each project; the time pressure and cost limitation (Kareem et al., 2015).

However, recently, several of the large AEC actors in Sweden have developed new businesses models focusing on CDW either by adding new competences to their portfolio or by creating subsidiary. These models offer CDW solutions to other actors of the construction sectors and to private clients. They encompass activities such as management and recycling of physical waste on site, organisation of the supply chain and CDW management consulting.

In this paper, we propose to give an insight how these new business models are taken shape with the help of cases of large private contractors and a public CDWM company in Sweden. We build on the concept of sustainable business models (SBM) to describe, organise and analyse the processes which have driven toward these changes. The model enables us to decompose the new business models in different components and observe how these components are shaped and organised trough time to create the new propositions.

To do so we draw on the material gathered in an ongoing three years interdisciplinary project including interviews with publics and private actors engaged in CDW as well as managers of the companies which have developed business models targeting CDW. We gather their concrete considerations, choices and actions in developing the new solutions towards new
business models. The overall purpose of the paper is to inform about the dynamics and processes which shape the creation of new business models and consequently innovation in the construction sector.

2 CDW management context

The European Commission indicated construction and demolition waste as one of the voluminous waste streams; statistically, it accounts about 25% - 30% of all generated waste streams in the EU (EuroCommission, 2016). This pinpoints that the management of waste from construction activities is a priority in the EU due to the large amount generated. This waste consists of concrete, bricks, gypsum, wood, glass, metals, plastics, solvents, asbestos and excavated soil which are considered to have a residual value that can be recycled (EuroCommission, 2016). The European commission attested that there is a re-use market for aggregates derived from construction waste in roads, drainage and in other construction projects. In addition, waste management technologies have been developed and established for sorting and recovery of materials and energy from construction and demolition waste incineration which are readily accessible and at low-cost (EuroCommission, 2016). This indicates that waste can inevitably be avoided to a large extent, reduced, producing benefits for construction industries and ensuring a green environment.

Despite the established model for waste management i.e. reducing, reusing, recycling, and residual disposal (4Rs) within the construction sector (Peng et al., 1997), most of the companies have been slow to embrace these practices. Sweden is one of the leading nations in terms of sustainability and environmental consciousness. In regard to waste management, Sweden has established a more resource-efficient culture within the construction industry today compared to the situation in the 1990s (SEPA, 2012). But the present trends and forecast still points towards rising quantities of waste, despite attaining the objectives and demands of both the European Union (EU) and Swedish environmental protection agency (SEPA). Furthermore, the trend estimated that waste generated in Sweden may double by 2030 if no action is taken to reverse it (SEPA, 2012). This illustrates the relevance for a more business innovative practices and competencies towards construction waste management.

While a large amount of the CDW literature focuses on measuring waste generation through simulations, live cycle analysis, and mathematical models, others focus on how to deal with particular materials (Bosch and Buser, 2017; Yuan, 2013). Others focus more on investing in CDW management and education, as well as having site space for CDW and sorting waste on site (Wang, et al., 2010). Finally, research discusses changing the waste management attitudes within the industry in terms of engaging all stakeholders in CDW management, have adequate supervision of waste management activities, good company policies, training and education for all stakeholders as well as financial rewards and incentives (Udawatta et al., 2015). Improving stakeholder’s awareness about environmental and economic considerations of CDW is seen as vital to encourage adoption of sustainable practices (Bakshan et al., 2017; Osmani et al., 2008; Yuan, 2013). These studies raise considerable attention to the role of human factors in minimizing and managing construction waste (Yuan and Shen, 2011), however, only few articles discuss the innovative aspects of CDW in term of new business potential and literature has focused mainly on success factors, hindrances and influential indicators of CDW (Yuan, 2013): i.e., CDW reduction during design supports minimizing construction waste at an early stage (Li et al., 2015; Wang et al., 2015; Yuan, 2013).
Although, waste management researchers within the construction industry have strengthened how existing work practices, business approach to projects, and technologies can contribute to reduce generation of waste, they have not yet really highlight the efficacy of innovative approach to construction waste management as well as knowledge gained from each construction projects in other to build their competencies from each operation (Teo and Loosemore, 2001). According to Warsame (2009) and Tilley (2005) illustration on the complexity of today's construction projects as well as its uniqueness result in a project extending beyond a single firm (involving several actors). Therefore, it can be difficult for the main contracting organisation to influence the work practices towards waste management within the construction site. Especially, the decision making process by management to either outsource their waste or develop an in-house waste management approach can be difficult. In the case of outsourcing of waste, the economical residual value of the waste is transported and paid (expensive) for by the construction firm to waste management firms. But if construction waste are managed using an in-house approach, it can create value for the construction company by creating new competences, adding profitable business, developing marketing strategy as well as building sustainability brand (Peng et al., 1997, Hall and Nguyen, 2012). This development of in-house waste management can foster business innovative practices and competencies.

3 Business models

One strategy to develop new businesses is to implement Business Model (BM) methods. These models serve to map the actual core aspects of an organisation and to define possibilities for future developments. BMs can be of many types, mobilising different components and configurations (see Saebi and Foss 2015, for a review), most of the authors seem nevertheless to agree on a basic understanding: business models focus on how a company defines a value proposition to address specific customer segments and organise itself and its networks to reach the benefits associated to this defined proposition. As pointed out by Teece (2010), a BM is a strategic tool “defining the manner by which the enterprise delivers value to customers, entices customers to pay for value, and converts those payments to profit” (p:172). A BM can be viewed as the conceptual glue of a business. It should be sufficiently differentiated to meet particular customer needs, difficult to replicate and should lead to competitive advantage (Teece 2010). It focuses though more on changing the “way you do things” rather than “what you do” and would therefore often bring organisational changes for the company (Amit and Zott, 2012). However, these changes are not limited to the company but involve a larger group of actors including the company’s customers, shareholders and key stakeholders (e.g. suppliers) and are context dependent. (Zott et al. 2011). The dynamic process of BM and in particular its relation to practice is also underlined by Ahokangas and Myllykoski (2014).

Schneider and Spieth (2013) demonstrate that a contribution to studies of BM innovation encompasses many different understandings of the prerequisites, the processes and the effects of BM innovation. They point to, for example that BMs might develop as a continuous response to changes in the environment, and/or as a discovery driven trial and error process (Schneider and Spieth 2013). In this perspective, BM may serve to foster future development and include new technology. Though it is characteristic that these approaches, with their comprehensive business area coverage, do not include an appreciation of how new types of technologies would need to be integrated (see also Baden-Fueller and Haeflinger 2013).

According to Baden Fuller and Mangematin (2015) many firms run portfolios of business models: in the case of large diversified firms it is typically the consequence of diversification moves that involve exploiting competencies in different ways across multiple customer groups.
This results in different divisions capitalizing on common capabilities to sell products or services one way in one market, and in a different way in another market. The authors underline the lack of information regarding the merits of running these portfolios, and how companies have developed these business models across time and space (2015).

Among the many BM tools, Osterwalder and Pigneur (2010) have developed the BM canvas, a rather simple, conceptual tool which should help companies to successfully generate new BMs. The canvas comprises nine blocks which are supposed to show the logic of how a company intends to make money and represents the blueprint for a strategy to be implemented through organizational structures, processes and systems (p.15).

Table 1. The business model canvas (Osterwalder & Pigneur, 2010)

|----------------------|----------------------|--------------------------|-------------|-------------------|

3.1 Sustainable business models

The concern for sustainability has fostered interest in developing business models seeking to bridge the short term financial interest of companies to maintain or increase economic prosperity with the longer term focus of social, environmental and economic sustainability (Schaltegger et al. 2015). Their common purpose is to give a strategic tool to companies aspiring at integrating sustainability concerns and goals in their business. Among other Boons et al. (2012) show, based on a literature review, how BM and sustainable innovations are interrelated. The authors propose normative requirements for businesses to operate towards sustainability. Furthermore, Bocken et al. (2014) identify eight sustainable business models archetypes which together should provide guidance to integrate sustainability concerns in business purpose and support innovative practices. They aim a categorizing and explaining BM for sustainability (SBM), providing mechanisms to assist the development of sustainable BM and examples for business to de-risk the SBM innovation process, and finally to contribute to define a clearer research agenda for BM for sustainability (Bocken et al. 2014).

The eight archetypes developed are:

- Maximise material and energy efficiency
- Create value from ‘waste’
- Substitute with renewables and natural processes
- Deliver functionality, rather than ownership
- Adopt a stewardship role
- Encourage sufficiency
Re-purpose the business for society/environment
Develop scale-up solutions

Regarding the development of practical tool, Joyce et al. (2015) have proposed to add two more canvas to the Osterwalder and Pigneur’s initial BMC renaming the latter Economic BMC, an Environmental Life Cycle Business Models Canvas, focusing on the environmental impacts of both new products and services and a Social Stakeholder Business Model Canvas assessing the social impacts and benefits of new products and services. These three models acknowledging the complexity of sustainability seem however to be rather heavy to operate in a business context.

As already mentioned we use the BM canvas structure to identify, document and analyse how the two companies are shaped their new proposals.

4 Methodology

The present article reports the preliminary findings of an ongoing three years’ interdisciplinary research project gathering both practitioners and academics within CDWM in Sweden. The method is multidisciplinary and employs an interpretive approach to discuss the empirical material (Bryman and Bell 2011). The frame of understanding is based on a selective literature review drawing on BMs and sustainable BMs theory, and studies the particularities of the construction sector.

The empirical material has mostly been collected twofold. On the one hand the material has been collected through observations of the platform that gathers practitioners and academics within CDWM in Sweden. The two authors have participated in two large project meetings (16 hours) and one network meeting concerning waste handling (5 hours). In these project meetings the researchers have acted as participant observers. The second part of the data is based on interviews with multiple partners representing the industry of CDWM in Sweden, three contractor firms, 1 architect firm and 1 municipality owned firm working in CDW. In total 8 interviews were held which were all following a semi-structured interview guideline. The interviews were taped and transcribed verbally.

5 Results and discussion

From the observations and interviews we found that two of the three contractor firms had started to develop their own business concerning construction and demolition waste management. One of the contractors mentions that: “our firm is one of the few construction companies that are managing their own waste”. While one of the construction firms already has worked for a longer time with their own CDWM through a daughter company, the other contractor firm has just started in 2014 and this is a new business area for them. The public company who is working in CDWM has been the main firm in the area for a long time. They mention however that they see a trend in that only a few larger players will remain on the market: “We can see a tendency that the bigger ones are eating the small ones (buying them). In 2022 there will only be 5-6 actors. The market is going more mature and when the bigger sees possibility they buy the small ones”. For the public CDWM company the main driver is to be a construction waste company in Sweden and they view their competitive advantage is the short transport from waste to their site as well as fossil free transportation and the fact that they can deal with any type of waste from collection to recycling. On the other hand, the contractor firms focus more on delivery the full package towards the most sustainable solution as a construction company.
Their first focus is on providing knowledge and competence while the second one is more on competitiveness.

In the following sections, we combine the interview and observational results with the Business Canvas Model of Osterwalder et al (2010) in order to present an overview of the new business model in CDWM in the construction industry.

5.1 Cost Structure

Inductively, price is an important element of the business transaction which should be chosen appropriately. The reason is that when customers conduct a purchase, they purchase a 'package' of benefits and the price should reflect the value of the total package which all of the companies are trying to figure out. All interviewees claim to have a defined cost structure on managing their waste. However, Osterwalder et al. (2010) outlined that all costs in a business model should be continuously minimized and the degree on how low the cost structure should be minimized varies from business model to business model. The notable challenge of these construction firms was the high cost of managing their waste especially demolition waste. The cost variables identified were cost of transportation, treatment cost, planning cost, operational cost (sorting on site), etc. Since, most of these construction companies focus more on the cost-driven business models which Osterwalder et al. (2010) explained as a perspectives of minimizing costs as much as possible by utilizing low price value propositions, extensive outsourcing and maximum automation for their projects but on the other hand they are affected via cost of managing their own waste. From literature we know that waste reduction activities are traditionally not considered as cost-effective, efficient and compatible with core construction activities (Teo and Loosemore, 2001). However, if the construction companies implement or integrate a value driven business model which views waste as value added resources this can reduce the cost of waste management. Arguably, a value driven business model on their waste management practices have the tendencies of delivery better quality of clean waste fractions as well as boosting their profitability. Therefore, it is essential for construction firms to distinguish between cost driven and value driven business model cost structures.

5.2 Key Resources

Since resources fuels or make business operate accurately, it is difficult for construction firms to identify their waste as a key resource due to the quality standard. Most of the respondent expresses the difficulty of envisaging waste as a key resource because they fail to see the potential of categorising it. One of the contractor firms mentions: *We try to show people to understand that waste is a resource. If you manage to see the whole picture then you can see what happens before and the hot spots. Because waste can be seen as a snowball effect, one thing that starts the snowball and then the consequences are big.*

All of the interviewed companies have a lot of resources i.e. waste and some know how the product or service can create value for a specific customer segment but marketing or pricing is a challenge. However, most of them are trying to identify the customer needs and are aware of the importance of value proposition: *“If we win the project then we can sit down with the client and then we can discuss and offer him deep green projects by showing the clients the possibilities and benefits”.*

Osterwalder et al. (2010) indicated that financial, intellectual, and physical resources respectively as categorisation of resource. Therefore, even though several interviewees mention
that they do not yet work with demolition waste, the waste from demolition can be a financial resource provided waste fraction are effectively sorted out to meet the quality of their partners. Also, construction waste can be seen as a physical resource provided operatives on the construction site are encouraged to ensure clean waste fractions which are reusable for other projects/ a possible alternate resources for certain construction projects. An interviewee claims that “value creation is very important for construction waste management. So are the needs for new demands that drives usage of reused- and recycled materials towards as well; construction and demolition waste management can be foreseen as providing a market edge toward customers and other competitors by branding as a sustainable company and by demands from customers connected to different sustainable certifications”.

In addition, enhancing the competence on waste practices on site can be an intellectual resource which can provide consultancy which is a form of service offered to other firms. This is already a service offered by three of the CDW firms who educate workers on site. Lastly, if carbon taxes on virgin construction materials are increased this could drive innovation in making waste a resource.

5.3 Key Partnerships

In the interviews, the case companies discuss a number of their partners and how they work together. The public CDW company mentions the following:

To be really circular it should be a two-party business. This is the construction site and this is the supplier of construction material and this is us (waste company). The best circular economy will grow between the construction and supplier company. If I order 10 cubic meters of wood and only use 8 cubic meters, in the agreement it should be a possibility to send it back to the supplier. If you order two windows and you can utilize both then you lose money because you will send it to us. Don’t forget the two-party collaboration of supplier and builder – this is an important factor.

One of the contractors mentions the following when asked what are the challenges in the business model?

Find the right partner, build trust and also involve the whole supply chain because we all need to find a balance and know who will cover the start-up cost and also who is the key partner, customer that drives this.

Challenges identified by both construction companies that work with CDW and their partners are lack of trust, loyalty, transparency and strategic partners. From these companies’ perspective, partners are sorted based on their competences, low price offering, visions driven and culture in managing their waste as well as reporting their activities. On the other hand, partners hammered on the construction firm inconsistent flow of waste or resource (consistent waste availability), practical solutions from construction firms and a sense of responsibility from construction firms. Since, partnership is an essential component for the business model to operate successfully, it is seen as important to build loyalty and trust for long term partnership. In achieving this, construction companies need to reduce the amount of waste partners to ensure a consistent flow of waste. Another aspect is the involvement of waste management partners in the CDWM organisation. This enhance transparency on the side of partners in providing documentations to the construction firms on their whole waste handling processes and possibilities in the future of financial benefits. In conclusion, collaborative partnership is essential in enhancing waste handling business.
5.4 Key Activities

Finding a robust solution in sharing waste management knowledge and a better steering model in changing old waste behaviors in construction firms operatives are the challenges identified in this block. Key activities illustrate key drivers in changing operatives waste behaviors. According to Osterwalder et al. (2010), key activities need to be categorized which can be applicable to CDW waste generated on site. The interviews discuss a number of key activities that they apply in the CDW. One activity is to actively be engaged at the construction site early on during the production planning of the project. A contractor mentions the following: *The main thing and the most important thing is in the beginning of the project to help the manager to plan how should we do this and then we have this starting meeting how long will this project last and what are we supposed to build. ... You have three phases in every construction site and in every one of these phases you have fractions, waste fractions, and in the beginning you have concrete and Steel and in the end you have loads of plastic and cardboards and in the middle a lot of wood. To be able to manage ..., you try to connect the waste planner with logistics at the construction site so that you can plan when the goods are arriving to the site so that it should be delivered at the right floor at the right time, if you can do that you will diminish the waste.*

Another important activity mentioned by many of the interviewees and also discussed during the platform meetings of the research project is the relevance of giving education, consultation and advice. One contractor mentions the following concerning education. *“On a construction site there are a lot of different actors that we have to teach like our sub suppliers and other entrepreneurs. We have all materials in every language and we give workers small cards in their pocket in every language to know how to sort them. And their manager need to have knowledge about this subject so he can teach them, he needs to have skills in this subject and the workers also need to know the purpose behind this, to be well informed. We also have a ... school, construction school for education focused on climate, waste and hazardous objects. Mainly done through internet tests (e-learning)”.*

Contractor firms mention that managers should be actively involved and responsible in ensuring waste handling activities or behavior on site as a norm or standardized among operatives. This becomes relevant in order to improve awareness as well routines concerning CDW practices and is perceived in literature as encouraging to the adoption of sustainable practices (Bakshn et al., 2017; Osmani et al., 2008; Yuan, 2013).

Furthermore, another major activity of the new players in CDWM is sharing information, building up standards and routines and consult stakeholders and the building site. In this consultancy behaviour the contractors work close with multiple actors and discuss that they have to solve practical issues and problems on site. These problem solving activities support innovation and development of the new business model in finding new solutions to specific waste handling issues either in-sourcing or outsourcing of competence. Lastly, platform/network category of CD waste handling can be activities for continuously improvement which includes monitoring as well as controlling activities within construction firms and partners network in ensuring that a standardized practices is maintained.

5.5 Channels

The construction industry is said to build on networks and unformal relationships. Getting new customers is nevertheless creating competitions between the CDWM providers. For the public CDW company the contact with the customer is becoming a challenge “*The contact with the
customers differes all the time because we had The BIG for a long time but we lost them a couple of years ago but when you lost a customer like The BIG, they find a new contractor and the new contractor is not always better so now we are actually supplying The BIG a lot but their main contract is with another company. We are getting a new contract with The Serious. Our market presence is 20-35%. There are around 10 companies competing in that market. We can see a tendency that the bigger ones are eating the small ones (buying them). In 2022 there will only be 5-6 actors”.

For one the contractors active in CDW the marketing is done via branding as an sustainable company and by demands from customers connected to different sustainable certifications.

5.6 Revenue streams

The contractor who is not working much with CDWM yet mentions that: “the cost for waste is not always high enough for it to be a strong carrot because we have so expensive and costly projects so this one (waste) is minor one”.

The challenges outlined in this context are the low revenue flow of waste, undervalued products and services, and a small market. These make the revenue stream from construction and demolition waste management not profitable but in contrast to other partners (like recycling firms), they view construction and demolition waste management as a successful business. However, the revenue generated from waste by recycling firms is not fully profitable due to problems with the raw material (mixed waste) and low products (electricity, heat, etc) prices. The pricing mechanism on CDW tends to be the issue with both actors - construction firms and external partners. Notwithstanding, Osterwalder et al. (2010) expressed pricing mechanism as an important aspect of a business model for the firms survival as well as ways to generate revenue streams. The two contractor firms are trying to work with the current low waste revenue stream, and also work with a service component for their revenue model. The service model is in form of offering consultancy which includes competence and skills in handling construction waste as well as educating and informing multiple actors on site. One of the contractor firms already mentions that: *We see waste management as a business for our external customer and a service combined with business for our internal affairs.* In order to combine the business with the service the companies often work in close collaboration with suppliers, for example for the public CDW firm they are cooperating with a supplier in which one is collecting old installation material and another one is selling the goods - and together they form circularity (circular economy) as the best solution. The public CDW company mentions in this respect: “If a company pays 700 kronor per ton and if I told them that you could get it sorted for 1400 kr then they would choose another supplier, that’s the problem. So to go around this problem we need a joint venture. Trust is essential, collaboration is essential instead of competition. Our company wants to create trust between companies”.

Many of the interviewees mentioned logistics as an important element of their business model – this could be categorized as channels. The challenges with channeling was the excessive transportation of materials to the construction site which result in more waste generation and high cost of transportation of the waste. Despite the improvement in waste sorting on the construction site and collection centers situated in strategic locations by recycling firms, logistical issues have been a major priority of the CDWM firms. This is because too many materials are ordered to the construction site. In most construction projects, the planning and logistics of the construction is not done based on the outcome in relation to the generation of waste fractions and therefore, it is often not planned for an effective logistic waste transport. In
addition, a lot of waste emerges during internal transportation within the construction site by operatives. For example the moving of gypsum plate more than three times can diminish its quality and economic value as illustrated by a respondent. “A lot of waste emerges when you are transporting the internal transportation in the construction site because you break and move it, if you move the gypsum plate more than three times it’s dead economically and has low quality”.

Interviewees mention that a more selective distribution approach can be utilized. For a selective distribution approach, specific waste (sorted waste) from construction and demolition projects can be channeled to specific partners who identify the value of their waste thereby reducing the logistics issues. One of the contractors is working on developing a model to track and measure amounts of waste: “all waste handling can be traced and analyzed from each project through this program. In this way we can analyze how to organize the waste handling with the logistic to optimize it. For example should we put most of the projects close to stockholm because they have great suppliers for gypsum”.

5.7 Customer Relationships

When following the business canvas model, the topic of customer relationships becomes relevant. From the interviews we find that the customer relationships have numerous challenges. These challenges are:

- changing the mind-set about waste management for both clients and contractors. A contractor mentions: “Our key now is to find the key drives to start to think about the clean fractions, money is a big part. To change the mindset is very important I think, we need to give them a carrot for each cleaned fraction (incentives)” . As mentioned in literature, the human factor in terms of working towards minimizing waste and build up sustainable practices become relevant to consider (cf. Bakshan et al., 2017; Yuan and Shen, 2011)

- to find a better way to establish and maintain contracts with stakeholders. One contractor mentions “Sourcing wise our contracts with suppliers are going out so we are finding new suppliers to improve our waste management we are looking for good partners, good partnership”. Several of the firms mention the importance of building up good relationships toward a more long-term engagement. However, since this is a relative new market for some of the firms, this is a challenge.

- to achieve consistency in waste flow (waste availability).

However, all indicators show that these hindrances can create further market opportunities and these challenges can be solved if the customer approach is well communicated and structured. The construction companies can both utilize personal promotion and impersonal promotion when promoting waste management profitable business networks and relationships. Firstly, it is currently done through presentations to inform clients/contractors about their specific construction waste management practices. Secondly, a contractor mentions that by sitting down person to person with the client/contractors/partners in deliberating best possible benefits for both parties can create trust and loyalty and can result on the long-term in a collaborative relationship. Thirdly, some contractors receive continuously monthly reports from the waste handling conducted by the clients with figures and numbers.

5.8 Customer Segments
The segmentation of customers with construction and demolition waste differs between constructions firms and others actors. However, all the construction companies concur to the fact that their waste can be segmented into two types. One of these types is the type of waste in terms of clean or mixed waste fractions respectively. For example the public CDW firm clearly views a difference between clean or demolition waste since they have a rather different process for the CDWM. Both of these fractions tend to be in accordance with supplier firms as well as recycling firms that are able to fulfill the demanded criteria. Nevertheless, there are challenges with the consistent flow of the segment, quality of waste for energy production, and market strategy. Since, external actors or partners impact on the company with regards to CDW varies, construction firms need to categorize their partners and emphasize the most influential ones to the company. This can be a solution to the inconsistence flow of the waste stream. According to Anderson et al. (2009), classifying or segmenting customers can be either collaborative or transactional. Collaborative customer segmentation approaches can improve strong and close social, economic, service and technical ties which ensure a flow of waste to a particular partner. Furthermore, information sharing on how to improve the waste quality can be of value for both parties. In other words, products can be more customized and value adding which can be profitable.

In addition, there are different types of customer segments (Anderson et al., 2009). The two contractor firms as well as the public CDW firm have different customer segments, the construction industry, material suppliers as well as the private market. The contractor firms have diversified their business and service to two unrelated customer segments with very different needs and problems.

5.9 Value proposition

All of the companies have a lot of resources i.e. waste and some know how the product or service can create value for a specific customer segment but marketing or pricing is a challenge. Furthermore, most of them are trying to identify the customer needs and are aware of the importance of value proposition and they are aware that it is important to listen to customers in order to gain insight in what the customer wants. Inductively, price is an important element of the business transaction which should be chosen appropriately. The reason is that when customers conduct a purchase, they purchase a ‘package’ of benefits and the price should reflect the value of the total package which all of the companies are trying to figure out. One of the contractors mentions as a concrete value proposition driver: "To be the main builder to a piece of land. Waste doesn’t stand on its own feet, it’s a package. This is a marketing advantage to gain a piece of land i.e., business advantage”.

However, their main challenge is to price and market their product, handle a mixture of clean and mixed waste, and as well develop the value proposition of consultation and services to multiple customer segments. In resolving this challenge, it becomes relevant to create awareness among the different actors concerning the importance of waste, value of waste and relevance of waste management practices as in accordance to the literature (Bakshan et al., 2017).

6 Conclusion

This preliminary analysis of new CDWM businesses building on BM model is enabling us to trace the development of this new proposals. It is clear from the actors interviewed that the pressure on the sector to improve CDWM efficiency has been the prime driver for in-house
organisational changes and development of new competences and practices. Once these competences been established internally, they have been mobilised to create new services and to be offered outside of the company to new customers. So, these new BM can be seen as spin off of internal development rather than being especially created and developed for conquering new market share.

This is our first iteration with the material, our goal is to deepen our understanding of the process and dynamic behind these NBM and document why only a small number of these construction companies are adding CDWM to their portfolios.

However, the BM canvas we have used here does not seem to be suitable to map the competitive and unstable aspects of the construction market. The structure of the canvas supposes that generating revenue or profit is the ultimate goal of any new business. In our cases these new proposals complete existing services and reinforce partnership; their profitability is not yet the only motivation. This observation would suggest that it could be more suitable to mobilise the green business models such as the one developed by Bocken et al. (2014) to study the transition from construction waste to business value of CDWM.

7 References

- Authors own reference. 2014.


