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# STAKEHOLDER PARTICIPATION: THE KEY TO CIRCULAR CONSTRUCTION

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A qualitative approach on how stakeholder participation can enable an optimal project development process for circular construction

"All stakeholders should participate in the circular dance, but first, the project developer has to put on the right music."

Respondent C

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## Summary

Climate change is a global affair and might be the most crucial global theme of current times, but it is not only CO2 emission. The finite nature of raw materials is cause for concern, and the exhaustion of raw materials from the earth can have severe effects on climate change. Moving to a circular construction sector will have a massive impact and is vital for the sustainability of the construction sector. However, this will bring many organisational challenges in the project development process, especially in stakeholder participation, where little potential is captured today. So what are the key enablers of stakeholder participation within circular project development, how can other stakeholder be motivated to make the transition, and how can information best be managed? After a comprehensive literature research and collecting primary data via semi-structured interviews, this research will find the key enablers for optimal stakeholder participation for circular project developments based on a new framework. The project management is central, because it represents a leading role in defining the project ambitions and creating an open and equal design process for all stakeholders. Using the knowledge and experience of stakeholders is crucial, and only then can the highest level of innovation be achieved. Future research could pay attention to experiences from the executing stakeholders instead of the project leaders.

**Keywords:** Circular economy - Stakeholder participation - Project development – Stakeholder engagement

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## Introduction

Climate change is one of the most important global themes of current times. Increasing global temperatures caused by CO<sub>2</sub> emission and the ending of raw materials are the most important factors, among many other concerns. For The Netherlands, climate change has some particular consequences and challenges. First and foremost, a rising sea level, more river discharges, rising average temperature, more rain, and more drought (PBL Netherlands Environmental Assessment Agency, 2013). This is also directly related to the mining of raw materials, because extracting raw materials causes CO<sub>2</sub> emission. Another challenge The Netherlands faces is that the country is strongly dependent on resources from foreign countries, with geopolitical tensions being the main risk here (Het Ministerie van Infrastructuur en Milieu, 2016). Other underlying thoughts include maintaining national wealth, Corporate Social Responsibility and a healthier and cleaner environment overall. The solution: a circular economy, including the construction sector. A circular economy is best described by Esposito et al. (2015, p.2) as "the ultimate goal of a circular economy is to preserve our current way of life by making it technically viable for the longer term by producing within a closed system". Obviously, there is a complex management process behind the technical process that needs to be improved and evolved.

Considering all motivations mentioned above, The Dutch government, together with European commitments, has set very ambitious goals: The Netherlands should reduce its use of raw materials by 50% in 2030 and it must be a completely circular economy by 2050, in which there is no waste and only renewable sources are to be used (Het Ministerie van Infrastructuur en Milieu, 2016). The Dutch construction sector is accountable for around 50% of all raw material resources, 40% of the total energy consumption and around 35% of the national CO<sub>2</sub> emission. These are huge numbers compared to other sectors, and much progress is to be made. The other challenge the construction industry faces, next to climate change, is the finite lifespan of raw materials. The demand for raw materials keeps growing, even though the mining and importing of these raw materials will lead to exhaustion of the earth (Het Ministerie van Infrastructuur en Milieu, 2016). However, this ideology is not a new phenomenon; first introduced in *The Limits to Growth* (Meadows et al., 1972), the idea opened the eyes of many: declining raw materials could have massive environmental, economic and social impacts. To achieve circular construction projects, technical innovations have to be made, and changes in the construction processes and stakeholders make this possible through collaboration. A Stakeholder is defined as "the people and groups affected by the project or in a position to influence it" (Andersen, 2008, p.81). As Silvius and Schipper (2019) state, sustainability, together with open and proactive engagement, should be integrated into project management to achieve circular construction.

## Research problem

Raw materials are indeed finite, which means that real estate (or any other product for that matter) has a technical lifespan and or an economic lifespan. After a certain period, a building is at the end of its technical or economic lifespan and is often demolished. This way of constructing is not future-proofed, and the innovation in the field of new technologies and sustainability is taking place through the Construction and Real Estate sector (ABN Amro, 2017). The most logical answer is to make the transition from the so-called "take, make and dispose" or linear economy to keep the valuable raw materials in a circular system, so that waste is practically eliminated and emissions can be minimised.

This can only be realised if a building is carefully designed, easy to demolish, and made from sustainable materials; there is a need to change the entire construction and project development system, including the roles of each stakeholder, focus on life cycle costs and new forms of ownership (i.e. service providing) (Benjamin Verheye, 2019). In other words; the aim is to create sustainable project management, which is best described by Silvius and Schipper (2019, p.8) as "Sustainable Project Management is the planning, monitoring and controlling of project delivery and support processes, with consideration of the environmental, economic and social aspects of the lifecycle of the project's resources, processes, deliverables and effects, aimed at realising benefits for stakeholders, and performed in a transparent, fair and ethical way that includes proactive stakeholder participation".

ABN Amro (2017) states that the new circular value chain starts a transition in total stakeholder engagement. The whole development team should focus on the total cost of ownership and the usage of buildings. In addition, the development team should not only focus on the building as a whole, but also look more closely at the individual materials and their value during recycling and demolition, which commands an entirely different approach and thought process for all stakeholders. In addition, ING (2017) suggest that the circular economy boosts opportunities for almost every stakeholder in the development process.

Pomponi and Moncaster (2016) state that research focuses too little on the meso level (buildings) and too much on a macro level. They also state that the stakeholder lacks the interdisciplinary endeavours and that the problem of circular project development does not lie at technological innovations but instead in the role of stakeholders and engagement methods. Eskerod & Huemann (2013) have researched a few project management methods and found that none of the major methods features sustainable development principles or manage stakeholder relations particularly well. Górecki (2019) comments on this further and states that an effective collaboration between policymakers, companies and governments need to be established. According to Freeman (1984), sustainability in projects is all about stakeholder orientation. Research conducted by Adams et al. (2017) agrees here, and in addition states that a fragmented supply chain, lack of interest, lack of knowledge and limited awareness across the supply chain are the most significant challenges for enabling a circular construction sector. Furthermore, managing all information across the life cycle and communicating with all stakeholders is challenging and time-consuming (Xue et al., 2021). These problems might be tackled with excellent stakeholder participation, good information sharing and sharing knowledge on circular construction.

This research aims to understand how to optimise stakeholder participation and finding the key enablers for a circular construction project. This will result in a new framework that wants to implement the key enablers for stakeholder participation on a few critical components. First, in identifying the key stakeholders, how these stakeholders can reach consent on the prioritisation to circularity and how all stakeholders can flourish in the process. Then finding the optimal engagement methods and strategies for the development process and then finally present a method of how information can best be managed over the complete life cycle of the building. The final aspect covers how new and existing stakeholders can be motivated to engage in circular construction, reduce the lack of interest and awareness, and optimise the capacity for stakeholders to engage in the process. The research will only focus on the Dutch construction sector at a meso level and comply with Dutch

construction regulations, but more strictly on the project managers and construction companies because of the first-hand experience of managing stakeholders and working together.

### **Research question**

The following central research question is established:

*"What are the key enablers for optimal stakeholder participation in a circular project development process in the Netherlands?"*

### **Subquestions**

The following four subquestions will help to answer the main research question:

1. How is the circular project development process organised, and which internal and external stakeholders are active in the Dutch real estate market?
2. What are the changes in the decision-making process, and how can this lead to the desired level of circularity?
3. How can the project manager encourage the transition and inspire other stakeholders for the circular economy utilising stakeholder engagement?
4. How can information during a circular project development best be managed and distributed amongst stakeholders?

The remaining's of the paper will, first of all, carry out a comprehensive literature review, which will be presented in the theoretical framework. Secondly, the methodology and the results of the qualitative research will be displayed, after which conclusions can be drawn and which recommendations for future research can be made from both the theoretical framework and the results of this research.

## Theoretical framework

### **Sustainable stakeholder participation**

According to Nozeman (2010), traditional project development is designed as a series of project phases with the corresponding stakeholders: structural, preliminary, final, and technical. Each stage is finalised and given consent before the project team moves onto the next phase. Modern project development, however, is a process in parallel with multiple project phases executed simultaneously. This is necessary because of the increased number of stakeholders and complexity in projects. In these complex projects, stakeholder collaboration is one of the most critical aspects of enabling a circular real estate development process. Aarseth et al. (2016), Eskerod and Huemann (2013), Zainul-Abidin (2008) and Silvius et al. (2017) all agree and state that sustainability should be integrated into the process from the beginning when the project team and a decision-making method is selected. Eskerod and Huemann (2013) and Silvius et al. (2017) elaborate on this further and present a few other vital factors for successful collaboration and decision making. First of all, and most importantly, stakeholders should always consider the underpinning values during the decision-making process, like balancing the sustainable development goals. This contrasts with traditional decision-making and is not primarily based on cost, time, quality, or risk. Secondly, all decisions should focus on the short, middle and long perspectives. This includes making decisions that positively impacts future stakeholders as well. The third consideration is to focus on a global scale (Eskerod and Huemann, 2013). Meadows (2017) agrees and state that the focus on sustainability should both be on the short

and long term. Critical in a circular project management process are the values of transparency and accountability, especially in the decision-making process.

Silvius and Schipper (2019) also find this critical because sustainable project development has a worldwide stakeholder orientation (climate change affect everybody) and projects should last the whole life cycle of a building. This could change how stakeholder engagement is performed in the real estate industry; because of these projects' long-lasting nature, sustainable relationships need to be originated.

To enhance circular stakeholder engagement, the project stakeholder management framework from Silvius and Schipper (2019) focuses on identifying stakeholders, assessing stakeholders, and structure stakeholder engagement. This creates an overview per stakeholder and its interests, contributions and engagement to other stakeholders. Silvius and Schipper (2019, p.3) see sustainable stakeholder participation in five clear steps in a continuous process: "identify key stakeholders and significant issues, analyse and plan, strengthen engagement capacities, design the process and engage, and act, review and report".

According to Silvius and Schipper (2019), the project manager should focus on the planning and control aspects of the project, of which selecting stakeholders is a crucial point. The four distinct stakeholder groups are social (i.e. governments, society), financial (i.e. financiers, investors and clients), users and executors (subcontractors) (Keeris, 2001). In addition, the end-user is getting a more prominent role in the development process. Nozeman (2010) acknowledges this and states that the end-user or buyers are an increasingly important stakeholder in the development process. A successful project development depends on managing both internal and external stakeholders. Unfortunately, these stakeholders are often selected on the lowest contract price instead of quality (Nozeman, 2010). In order to successfully select these stakeholders, it is essential to map the interests of stakeholders, their possible contributions, level of interest and the preferred engagement methods and not on lowest price. Research conducted by (Eikelenboom et al., 2021) partly agrees and goes as far as to say that there are four tiers of influence in traditional project development. He further states that only the project management board, municipality and resident committees directly influence the project. This implies that all other stakeholders, both users and subcontractors, would have less influence and are not actively involved in decision making. However, Silvius et al. (2017) strongly disagree and plead for a decision-making process, whereas many stakeholders as possible influence the possible outcome of a project. He also states that the project manager is the most influential stakeholder in the process and can influence sustainability and other factors of the projects because of his central position in the project. According to Silvius and Schipper (2014), taking responsibility for sustainable construction implies a significant mind shift and has a considerable overall influence on project management.

Major threats of circular construction that need solving are the lack of interest, awareness and business case. Hussain and Malik (2020) agree and state that a clear, persuasive narrative, together with strong leadership, is necessary to transition towards a circular economy. Habbekot (2020) confirms this and even says that fragmentation in the supply chain is the primary reason why circular project development is not widely accepted. So, what are the key elements for all these groups of stakeholders to enable successful stakeholders participation in a circular construction sector? Adams

et al. (2017) suggest that systems thinking and collaboration is vital. Together with identifying synergy, interest and divergences within the project team, the result will be a great collaboration with all stakeholders. Silvius et al. (2017) agrees and states that decision-making skills, both technical and in selecting stakeholders, is one of the most critical skills in a project team to enable sustainable construction.

According to Geissdoerfer et al. (2020), business model innovation is crucial in implementing circularity on an organisational level, mainly because this can lead to a shift in the perception of the circular economy and its alignment of incentives for different stakeholders. He also states that the focus on value proposition is a significant step for all stakeholders, especially the client. The most significant barrier to new business models is the bottlenecks at the organisational level, and good collaboration between all stakeholders is vital for creating a closed-loop supply chain.

### **Information**

As previously stated by Adams et al. (2017), information and other metrics are critical enablers for circular construction. However, Xue et al. (2021) suggest BIM as the correct life cycle information management tool. BIM is best described as a widely adopted digital design tool to minimise errors, select and quantify materials, and develop the construction schedule. Xue et al. (2021) also state that BIM is a valuable tool for collaboration and sharing information in a life cycle assessment. This will bring benefits in evaluating a whole-building life cycle of a building, especially if all stakeholders collaborate in BIM. The problem here is that the life cycle analysis is often placed at the end of the development process, instead of interwoven into the development process, wherefore better decisions can be made. Kumar (2019) agrees and states that the decision-making process can be fully integrated into BIM, especially during life cycle activities from demolition to facility management (Kumar, 2019). BIM is also a convenient communication tool as open communication, transparency and accountability are essential in successful stakeholder management (Silvius and Schipper, 2019). This is backed up by Xue et al. (2021), which states that BIM is suitable for collaborating and communicating amongst project stakeholders and beneficial for a smooth construction process. It could improve project information flow and achieve an overall better quality and performance of the building on sustainability aspects.

### **Motivation**

As Adams et al. (2017) mentioned, the lack of awareness and interest in circular construction is one of the most significant bottlenecks. Habbekot (2020) suggests that the real estate investor could use its power as a financial risk-taker to stimulate the project stakeholders by providing a financial budget when a project meets all sustainability requirements. Bauer, R. & Kok, N. (2011) agree and state that institutional investors have not created great financial instruments to provide external capital to accomplish circular buildings. Another method is to link sustainable Key Performance Indicators (KPIs) to project financing and cash flow; these KPIs will be used by architects and project developers (ING, 2017). In this way, there is a top-down kind of approach needed for circular project development. The lack of a top-down approach is an important issue; research in England showed that the second most mentioned barrier for sustainable development is that sustainability is simply not required by the client. A top-down approach can create such sustainability awareness and close the gap in stakeholder engagement (Williams and Diar, 2007). Research by Pomponi and Moncaster (2016) showed that research is quite divided when it comes to choosing a top-down approach or

bottom-up approach, and even states that both are needed for a booming circular construction sector. The top-down approach starts with governments (legislation) and economic circumstances, bottom-up from society or behavioural changes. Hussain and Malik (2020) agree more with the top-down approach and says that leaders can influence the behaviours and attitude of their employees. As Silvius and Schipper (2019) state, your employees are among the most important stakeholders to get on board with the transition. Williams and Diar (2007) also found that costs of sustainability or circularity are a commonly mentioned barrier, product as a service can limit initial investments and spread the costs over time. Bauer, R. & Kok, N. (2011) refutes this as a possible cause because environmental performance is positively related to financial performance.

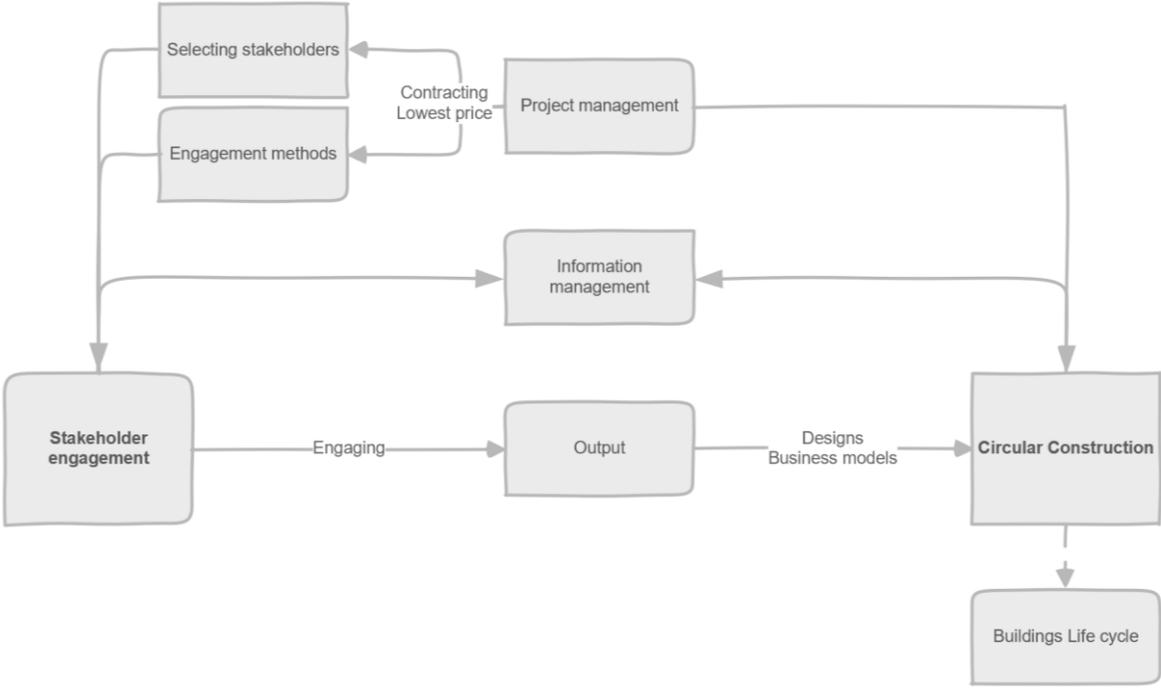


Figure 1: Conceptual model

The figure above shows the conceptual model, with stakeholder engagement and circular construction being the main two concepts. The project manager selects stakeholders and engagement methods on his terms and lowest price and works via the top-down approach. They condone stakeholder engagement, resulting in output and creating immediate design solutions for circular construction, whilst the end-user is missing. Information management is entirely separate and only flows within a project, which is not solving the lack of awareness in the industry, and feeds only data from the stakeholder engagement to the construction phase. Information management stops when the building is complete and does not cover the entire life cycle of the building.

### Methodology

This research has a very clear structure and consists of two main parts. Firstly, a comprehensive literature study is conducted on secondary data from published and peer-reviewed research, official national data, policy documents, and advisory reports. This is of great importance, as it shows what research is already performed, essential findings on this particular topic and where a research gap arises. All sources will be critically examined on validity and only reputable sources will be used. The literature study will result in a theoretical framework and thus forms the basis of answering all corresponding subquestions.

Secondly, a qualitative research is conducted using semi-structured interviews with prominent and significant stakeholders in the construction sector, mainly focussed on project managers. Semi-structured interviews give the respondent room to elaborate more on specific topics, go more in-depth, share their experiences and take the interview in particular directions that the interviewer has not thought about. The main goal of these interviews is to find the key enablers in the circular value chain and find the detailed processes of stakeholder participation. The research will focus mainly on The Randstad area; most circular project developments occur in this metropolitan area like Circl by ABN Amro, and other key stakeholders of these prominent projects have been approached for an interview. To arrange these interviews, the respondents in question will be emailed, asked if they want to cooperate, and sent the questions in advance. Due to the Covid-19 pandemic, all of these interviews have been held via videoconferencing.

After collecting the primary data, all interviews are transcribed and coded with only the vital information, following the "codes". It is inspired by the constant comparison analysis technique by Glaser and Strauss (1967). The codes will consist of the following elements, with the focus on keywords and reoccurring concepts as follows:

Theme	Elements to be coded	Codes
<b>Stakeholders &amp; development process</b>	Stakeholders in project	Selecting stakeholders
	Stakeholder participation in circular project development	Development process
		Prioritising circularity
		New business models
<b>Stakeholder engagement</b>	Engaging & motivation to engage	Contracting
		Engaging methods
		Motivate
	Information management	Top-down vs bottom-up
		Life cycle information management
		BIM

Table 1: Data analysing scheme

To answer the main research question and corresponding subquestions, both the literature study (secondary data) and primary data are used. The literature review will provide theoretical support to answering the subquestions, and the semi-structured interviews are used to answer all the subquestion. The use of multiple methods helps in the validity, verifiability and reliability of this research. Combining the theoretical framework and the interview whilst using an analysing data scheme gave a very clear overview of all the data. Afterwards, discussing, comparing and analysing the data will help to answer the main question. The collected data is overall of excellent quality, and this is mainly due to the use of semi-structured interviews and the quality and experience of the respondents. However, a few sections of the collected data focussed too much on the technical construction side of the process, and it was hard to focus on the actual engagement process. However, both are vital in the development process.

During the research, a few ethical considerations are made, for which the most important is the absolute precluding of any fraud or misleading. The researcher will follow the ethos of justice, beneficence and respect and will have a deontological approach. The author declares that there is in

no way a conflict of interest. In addition, the interviewee's privacy is fully respected and will remain anonymous, and the contact info of the respondents is known to the auteur.

## Results

In order to conclude both the primary and secondary data collection, the research results are presented. All data was first organised and reviewed; after that, the transcribed interviews, containing only helpful information, have been coded with the codes from the data analysing scheme and then analysed per element (see table 2). The following stakeholders have been interviewed during this research:

Resp.	Function	Organization	Significance & relevance
A	Director Real Estate	Eindhoven University of Technology	Led multiple circular project developments
B	Lead Impact Collaborations CIRCL	ABN AMRO	Responsible for sustainability vision and specialised in contracting & partnerships, Circl
C	Advisor circular economy & founder of the circular economy foundation	KplusV	Specialises in facilitating transitions, business administration and new business models
D	Co-founder & advisor circular economy	PHI Factory	Specialises in business management and organisational transitions, creating awareness, motivational keynotes & umbrella organisations.

Table 2: List of respondents

The respondents all work on complex inner-city projects, as shown in the map below.

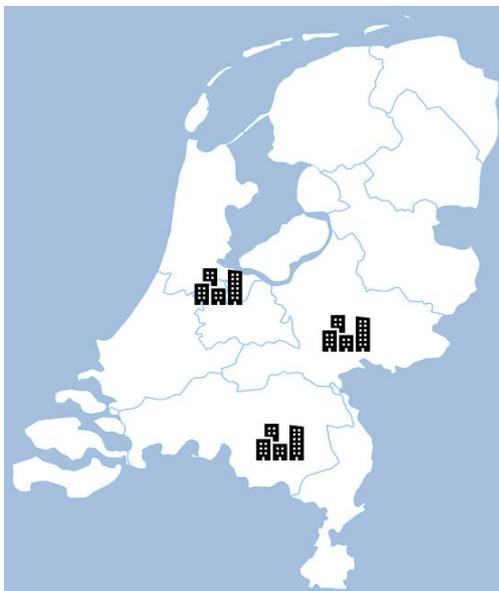


Figure 2: GIS map: Locations of the research (belastingaangifte, 2017). Modified by author.

### Sustainable stakeholder participation

The stakeholders that are at play obviously from project to project, but the four distinct stakeholder groups that are always present are social, financial, users and executors, with the end-user getting more important (Keeris, 2001). Respondent A is of the same opinion but adds a few key stakeholders in circular project development: lawyers, demolition companies, consultancies, and parties that

provide subsidies. Furthermore, he emphasises the importance of the financial group of stakeholders, as they enable the circular project through financing and are needed to change the financial model in terms of residual value and new business models. Respondent B agrees with the four distinct stakeholders groups but adds that the architect plays a predominant role in the design process because of the added complexity of dismantlable construction and the Dutch universities as a source of knowledge. Furthermore, these projects are getting so complex, Respondent D states that expertise agencies and consultancies should be hired and use their knowledge. However, Respondent C states that all stakeholders are equally important in the process because all stakeholders should be treated equally in the decision-making process. They add that every stakeholder is meant to use its knowledge and experience to its full potential and helps to bring the process forwards. This can even include the neighbours, directly influencing decision-making because they have the best knowledge of construction site surroundings. Finally, respondent D takes this even a step further, as states that all stakeholders in the value chain are stakeholders and need to contribute towards a circular future. This approach incorporates a much more comprehensive approach and transcends the project level because it cannot always make a significant impact with one single project.

In contrast to parallel phasing, a project with simultaneous phasing is necessary as project developments get more complicated (Nozeman, 2010). In the design phase, incorporating circular design is essential, according to respondent A. This will result in more dismantlable constructions, with needs to be executed in the construction phase and become handy in the demolition phase at the end of the building's lifespan. As respondent C states, the whole project team should indulge in a creative process together, where design solutions are the outcome. In contrast to traditional project development, where the solutions are already there, and the other stakeholders simply have to execute these design decisions. However, all Respondents agree that a circular project development process is continuous instead of the traditional phasing, which limits innovation according to Respondent C. There is no phasing in these continuous design processes, but "micro-changes" are made per theme. This also implies that the design phase is never completed and more innovative solutions are created.

As respondent A stated, when prioritising circularity, the choice is really up to the project developer or client. Respondent B agrees that the prioritising of circularity is up to the developer. However, respondent C and D disagree and state that the whole project team is responsible for the levels of circularity, and they need to come to complete consent. That is why respondent D let stakeholders express their commitment before a project starts. Loads of participation is necessary between the project developer and the executors to commit to a certain level of circularity and other ambitions. All four Respondent agree that the project team have to set specific ambitions that the project team wants to achieve.

Furthermore, the project team uses the knowledge of the executors to invent the best solution to achieve these ambitions. Finding the correct stakeholders that share the overarching ambitions of a project team can be challenging, so each Respondent copes differently. Respondent A and D uses predominantly contacts via networking or umbrella organisations. Respondent B placed vacancies to find the find fitting stakeholders, and respondent C used tenders to find stakeholders that could

match the ambitions set by the project developer. According to Respondent D, these ambitions should be converted into KPIs, how are measurable and timely.

### **Engagement methods & motivate stakeholders**

As research by Eskerod & Huemann (2013) showed, not all project management methods are suitable for sustainable stakeholder engagement. To reach optimal engagement in a project team, respondent A suggests "scrum sessions" as the preferred method, while Respondent B used "round-table" decision-making. The main difference between the two is that in scrum sessions, one member has the lead, and in a round table every stakeholder is equal in its input. Both methods have the advantage that stakeholders have more room to give their perspectives. Respondent C has a very similar viewpoint on the engagement method as respondent B. The method he mentioned is called Rapid Circle Contracting, by which all stakeholders have to reach consent on all decisions. This also makes every stakeholder equally important. Even if one stakeholder does not give his consent, the project team will move back to the drawing board and design a better solution.

Furthermore, this creates an environment in which every stakeholder feels responsible for other stakeholders and the project as a whole. Respondent B, C and D all agree with Silvius et al. (2017) that decision-making skills, both technical and selecting stakeholders, are essential skills for a project manager. Respondent B and D add that the project manager should not force one single engagement method for decision making; this should be viewed per project and adjusted per project team. According to respondent D, during the decision-making process, the project team can never lose sight of the interests and concerns of other stakeholders.

In order to motivate stakeholder to participate, Adams et al. (2017) suggest synergy and divergences within the project team, as Hussain and Malik (2020) adds a straightforward persuasive narrative, together with strong leadership is vital. Respondent A and C agree strongly with solid leadership from one or two people with great passion, drive and mainly persuasiveness. The most commonly mentioned factor in motivating stakeholders is to work with ambitions and goals. All Respondent agree that if the project team has set those ambitions, the level of circularity increases, the project team designs more innovative solutions and social sustainability increases. This is right in line with Adams et al. (2017) suggest that systems thinking and collaboration is vital. Respondent B and C particularly add that realising circular projects helps convince other stakeholders that circular project is indeed feasible, creates awareness and interest, and proves to change the mindset of stakeholders that were sceptical at first. Another benefit is learning by doing, so circular project management can only get better if multiple projects can be reviewed and analysed for improvements. Respondent B and C said that most sceptical stakeholders at the start of circular projects were the most enthusiastic.

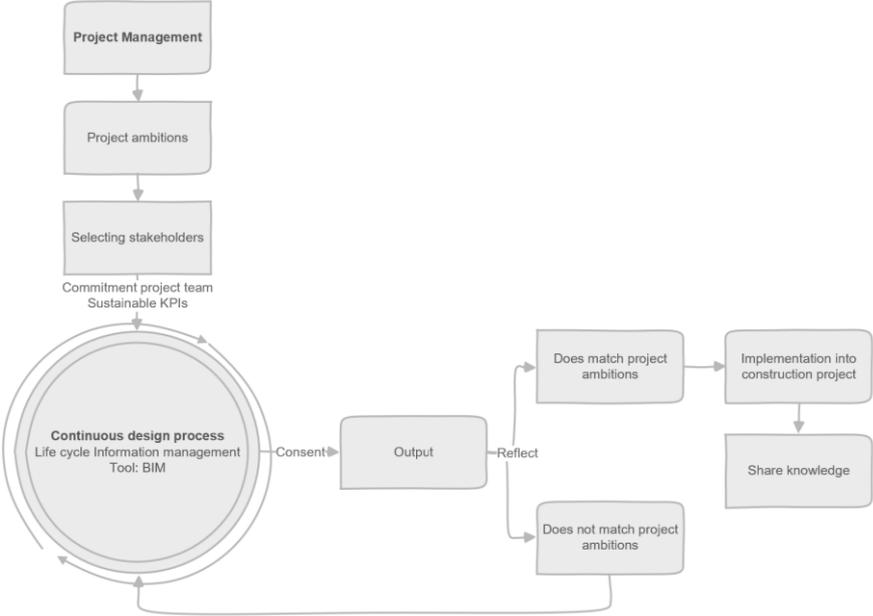
Therefore, the primary factor is that stakeholders can focus on their profession, skills, and experience to construct a building, instead of the lowest contract prizes. They felt appreciated and acknowledged for their craftsmanship; they experienced these new forms of stakeholder engagement much more likeable and did not want to go back to traditional stakeholder engagement. Giving stakeholders these "honorary positions", participation based on quality and not price gives vast satisfaction and leads better achieving even greater ambitions and creates more value besides budget. However, respondent D has an entirely other viewpoints on this matter, namely that

stakeholders do not have to be motivated. Respondent D is convinced of the "good nature" of stakeholders and that everyone is aware of the necessary changes that lie ahead regarding climate change but are not sure about the correct execution thereof. She believes that stakeholders should only be helped with the "how" instead of the "why" and suggest that sharing knowledge about concrete solutions of implementing circularity is a crucial success factor. Showing stakeholders how they could contribute here is most inspiring to stakeholders; a top-down approach is not needed here. As for a top-down versus a bottom-up approach, research by Pomponi and Moncaster (2016) stated that a project needs both, but respondent A contradicts that and states that a top-down approach is the superior approach because you have to motivate stakeholders first. Respondents B and C agree and state that motivation is best by intrinsic motivation rather than financial stimuli.

**Information**

According to Xue et al. (2021), BIM is the best tool for collaboration and sharing life cycle information. Respondent A and D agree to centralise information and open communication, as Silvius and Schipper (2019) also find very important. BIM can also prove helpful in managing information about material passports. Respondent B, C and D agree and state that BIM can prove helpful in managing life cycle information, especially in material passports and future renovations of constructions. Respondent C remarked that the project developer should not force one single information management tool, but the whole project team should consent on a method that everybody feels comfortable with; otherwise, it would cause more trouble than solutions. However, setting ambitions and targets is most important here; instead of forcing the executors what information to manage and how to present it, that is up to the executors. It should be part of a more significant ambition like transparency because BIM is accessible for everyone within a project. Respondents B and C also agree to incorporate BIM as early as the contracting phase to prevent future issues in information management.

After carefully interpreting and analysing the results (both to each other and the theoretical framework), a new framework for stakeholder participation is presented during a circular project development process. This framework combines new insights into the critical enablers for optimal stakeholder participation:



The model core of the new framework is the project management and the continuous design process with a feedback loop, as the respondents indicated. The role of the project management proved vital for optimal stakeholder participation. The project management should not delegate towards other stakeholders but should boost in terms of inspiring and setting clear project ambitions for other stakeholders to follow. Lead by example is an excellent method of how the project manager should engage with other stakeholders. The management selects the project team based on these ambitions and finds stakeholders are willing to realise these ambitions in the continuous design process using KPIs. According to all respondents, this process ensures the highest levels of innovations that could match or exceed these ambitions and should always be reflected on, which is not the case in the traditional design process, as Nozeman (2010) described. This process also ensures that, by all giving consent, every stakeholder's underlying values are taken into account and equally treated. A top-down limits creativity, and it not the solutions to creating awareness and motivating stakeholders. Although Geissdoerfer et al. (2020) states that new business models are essential for organisational change, the respondents find this not critical for stakeholder participation as they are often results of innovative thinking and life cycle analysis. A feedback loop ensures that all ambitions are met, and if not, a more innovative solution should results from the design process until the desired levels of circularity are matched. Only then can these solutions be implemented into the construction project, and can the gathered knowledge and concrete solutions be shared with the industry.

## Conclusion

This thesis contributed to stakeholder participation in the circular construction sector by researching the key enablers in the circular development process. This qualitative research resulted in a new framework and a more optimised stakeholder participation model for circular construction projects. Stakeholder participation is central in the circular development process, which is based around a continuous design process. The project team should always have the space to reflect on their set ambitions, compared to the traditional phasing, and this freedom enhances the level of innovative solutions. The project team consists of both internal and external stakeholders, selected based on knowledge and experience to ensure the highest level of innovations. This should even include a more prominent role for the clients and end-user.

In order to achieve the highest level of circularity, the decision-making process needs to take into account all interests and perspectives of all stakeholders in the project team. Modern engagement methods do take this into account, and together with the freedom for all stakeholders to give input for the design process ensures the highest level of innovation. The next best step is a design process where every stakeholder has to give their consent on a particular topic, where a level playing field is created for all stakeholders and can raise the ambitions set by the project manager even further. The most prominent role in the development process is reserved for the project management, which main task is to set high project ambitions for other stakeholders to follow. Having a clear narrative and passion for these ambitions will motive other stakeholders to push innovation. Furthermore, creating synergy within the project team is vital for optimal stakeholder collaboration. It is regarded as one of the few ways stakeholders can be pushed for more innovative solutions regarding circularity. Synergy can be achieved by setting those ambitions and lettings stakeholders express their commitment; this creates a feeling of shared responsibility.

Managing communication and the information streams between all stakeholders over the complete life cycle of a building is a real challenge. Good information management is central in building relationships and trust within the project team. BIM came forward as one of the best tools for managing information and creating openness for all information, especially over the life cycle. Important here is that all stakeholders should be comfortable with every method and the project management should never force a method, and all should be in consent with the complete project team.

In the end, the project manager is the key enabler for optimal stakeholder participation for a circular construction process. A project manager should set the project ambitions for the entire project, resulting in great synergy and motivation within the project team. The project manager should also set up a process with continuous designing, instead of traditional phasing, to boost innovative and circular ideas until the project ambitions are achieved. Choosing the suitable engagement method for which every stakeholder feels comfortable, appreciated, equal and able to use its knowledge should result in the desired level of circularity and innovation. Sharing knowledge and information, both internal and external, is vital for open communication, creating awareness and presenting concrete solutions to enable circular construction. However, new business models proved less influential for enabling circular construction and resulted from innovative and life cycle thinking.

The limitations of this research are that not all aspects of the buildings life cycle could be covered. However, this research accomplished a clear overview of the development process and all the key findings for stakeholder participation to complete a circular development process. For future research, the focus could be more in-depth on the information streams between stakeholders or focus on experiences from the executing stakeholders instead of the project management.

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