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Proposed contribution to part 5: Implementation and case studies of Sustainable Project Management

Engineering service providers in the lead to implement Sustainable Project Management

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Abstract

In this chapter, obstacles and enablers for the implementation of sustainable project management are identified. Focus is given to the missing link between formulation of the sustainability strategy - corporate sustainable ambitions and vision - and the implementation on project level.

Focussing on a large engineering company, the factors affecting the implementation of sustainability on six projects are studied. This exploratory empirical study suggests that the clients largely determine the level of sustainability and that there is a gap between ambitions and intentions of the engineering company and actual implementation. A more pro-active approach of the engineering company revolves around the alignment of sustainability ambitions with the client, the explicit discussion of sustainability in the company and in project teams to stimulate a sustainability mind-set and show casing earlier sustainability achievements. A framework is provided giving sustainability a more central role in the practice of the engineering company

Keywords: *implementation of sustainability, project management, SDGs, engineering service provider*

1 Introduction

The publication of Sustainable Development Goals (SDGs) marks an important step in creating a more sustainable future (United Nations, 2015). The SDGs include broad themes ranging from ending poverty and ending hunger to promoting sustainable industrialisation and climate action. The development of the goals as such is not enough: their actual implementation is the next required step. The construction sector, known for its considerable energy footprint already for years (Spence & Mulligan, 1995) but also its potential for shaping our future, is focused at in this Chapter.

More specifically, this chapter sketches the case of an engineering consultancy organisation in the construction sector that struggles with the implementation of some of the SDGs in the projects they do for their clients. Traditionally, they behave according to the principal – agent theory: as a service provider they act to meet the client's wishes. Often such wishes were limited to schedule, budget, and quality considerations. With the introduction of Economic Most Advantageous Tendering (EMAT), clients can broaden the tender request to include elements related to sustainability (Džupka, Kubák, & Nemec, 2020). This does not automatically mean, however, that clients look beyond the traditional time, cost and quality requirements. **What could be the role of the service provider in case the client does not yet prioritise implementation of sustainability?** This question acts as the main research question of the current study and will be answered by investigating the following sub-questions:

1. Which factors affect the implementation of sustainability in projects?
2. How are these factors affecting the implementation of sustainability in projects?
3. What framework can help the implementation of sustainability in projects?

In the case study described in this chapter, obstacles and enablers for the implementation of sustainable project management are identified. As literature suggests a missing link between formulation of the sustainability strategy - corporate sustainable ambitions and vision - and the implementation on project level (Engert & Baumgartner, 2016), these different levels are specifically addressed.

This chapter[1] is structured as follows. First, a brief literature review sketches the scene including insights from the field of strategic management to explore factors affecting the implementation of sustainability in projects. Also the definition of sustainability is discussed. Next, the case study set-up within a project based organisation (PBO) is described including the selection of the projects and some details on the data gathering and analysis. From the projects, insights are gathered regarding the mechanisms and obstacles for the implementation of sustainability in project management. These insights are distilled from two levels: organisational level as well as project level. Next, a framework is proposed to overcome the identified obstacles. The results of the current study are discussed, leading to managerial implications of the research and finally, conclusions are drawn by answering the research questions posed.

2 Factors affecting the implementation of sustainability in projects

The theme of including sustainability in projects attracted the attention of numerous scholars in recent years (Kiani Mavi et al., 2021). The definition of the sustainable development goals, SDGs (United Nations, 2015), certainly contributed to this increased attention, but even earlier it was recognised that rethinking and redevelopment of business strategies, products/services, processes and resources would be required (Silvius, Schipper, Planko, & van den Brink, 2012). Similar to the implementation of project management in organisations, the implementation of sustainability in projects goes beyond the project level. The strategic, organisational and institutional context of projects all have an influence on project management methodologies adopted in projects and the content of projects.

A literature review by Engert, Rauter, and Baumgartner (2016) revealed 114 articles about the integration of sustainability in strategic management. They concluded that most studies considered a traditional business perspective, so prioritising financial and operational interests over sustainability. Such traditional business perspective would hamper the transition towards sustainable organisations, by favouring economic benefits over environmental and societal interests (Sullivan, Thomas, & Rosano, 2018). Another study by Engert and Baumgartner (2016) showed that attention for the implementation process lags behind the attention for the formulation of a sustainability strategy. The gap between the formulation of a sustainability strategy and its implementation in projects would be influenced by internal factors, such as organisational structure, organisational culture, leadership, management control, employee motivation and qualifications and communication, as well as external factors such as the coherence of a formulated strategy.

As part of the internal factors, the ethical responsibility of the project manager to integrate sustainability is mentioned (Silvius et al., 2012). This however assumes that the project manager has or can create room to manoeuvre.

The use of certificates could also be seen as an external factor or driver for implementing sustainability in projects, for example LEED, BREEAM or DGNB certificates. Although these certificates are not harmonised worldwide, such systemic assessments all do evaluate the sustainability of a construction project by analysing indicators like energy and water utilization, material and resource depletion and pollution (Orova & Reith, 2019). Different certificates are used in different regions of the world. LEED is known in the US and Canada, BREEAM was developed in the UK and the DGNB originates from Germany. As soon as such certificates become part of regulations, the industry has no other choice than adopting certificates or so-called eco-labels (Delmas, Lyon, & Maxwell, 2019). The question with any evaluation or assessment remains if the right measures are in place in the certifications. But we

[1] *This chapter builds upon a MSc research in which incorporation of sustainability in construction project development was investigated (Wijnands, 2021).*

cannot talk about measures without defining sustainability, as very different definitions of sustainability are commonly used.

Scholars make a distinction between 'weak' and 'strong' sustainability (Hallin, Karrbom-Gustavsson, & Dobers, 2021). An example of weak sustainability is a sole focus on a business case, thereby mainly addressing economic interests. The traditional definition of Elkington (1999) has the intention to split economic and environmental and social aspects. In practice, however, often economic interests prevail. The importance of balance is reflected in APM's definition of sustainability (APM, 2019): "*Sustainability in the project profession is an approach towards a business that balances the environmental, social, economic aspects of project-based working to meet the current needs of stakeholders without compromising or overburdening future generations*". Indeed, so called 'strong' sustainability would include broader views and also attempts to integrate these views (Barua & Khataniar, 2015). Such views might vary between the different actors involved in organisations and projects (Morrow & Mowatt, 2015). As these actors have their playing fields at different levels in the organisations and projects, also the implementation of the SDGs likely takes place on different levels. These different levels are therefore represented in the case study that is reported in this chapter.

Four strategic postures for sustainability in a project based organisation are defined in the work of Silvius and Schipper (2018). Based on the combinations of the sustainability strategy of client and that of the project based organisation (PBO), they distinguish:

- Sustainability for compliancy (both PBO and client adopt an inactive/reactive strategy),
- Sustainability on request (PBO has an inactive/reactive strategy, client is active/proactive),
- Sustainability as value (client has an inactive/reactive strategy, PBO is active/proactive).
- Sustainability as differentiator (both PBO and client adopt an active/proactive strategy),

In absence of any active sustainability strategy, compliancy provides a sort of basic driver for sustainability, but that lowest level of sustainability will be outdated soon (Silvius & Schipper, 2018). A more active strategy towards sustainability would be desired, on the side of either the client or the PBO, or at both sides. But even then a gap exists between the sustainable intentions of an organisation formulated on corporate level and its implementation at project level. Indeed, other scholars suggested further research into the actual implementation of sustainability in organisations (Arbolino, De Simone, Carlucci, Yigitcanlar, & Ioppolo, 2018), which this chapter aims to contribute to.

3 Research set-up

For gathering the relevant data, a multi-level case study design (Yin, 2014) was adopted with an internationally known Engineering Consultancy Organisation (ECO) as the highest level of analysis. Subsequently we zoom into the project level by an in-depth study into six projects of the ECO as the ECO is an example of a Project Based Organisation (PBO).

3.1 Sustainability strategy of the firm

The strategic embedding of the SDGs (United Nations, 2015) in the work processes of the firm, and/or its intention was studied based on annual reports and strategic documents. Data on the firm level regarding sustainability strategy was gathered by desk research and document analysis.

3.2 Sustainability in projects

The next level of analysis comprised the project level. For this research two types of construction projects are distinguished, using the typology of the ECO: type 1 projects refer to the development and construction of an industrial plant, type 2 projects refer to projects that focus on developing and

constructing the production processes of the industrial plant. These different types of projects allow for different kind of sustainability measures.

To capture diversity in terms of ideas, perceptions and opinions, in total six different projects were selected for the study. The ECO was involved in the design process of all of these projects. All selected projects needed to have a common focus, as this allows comparison (Yin, 2014). For this study, projects needed to have a link to sustainable development. Also, the projects were executed in the construction sector, which is known to be an important contributor to global Greenhouse gas emissions (Spence & Mulligan, 1995). Projects took place in the period 2016-2021, which is important as developments in the field of sustainability go fast. The starting year of 2016 was chosen as the ECO then started a more explicit sustainability strategy. In terms of budget, projects with a broad range between 1 to 500 million Euro could be selected as even the lower budget value would still allow for sustainability considerations in the project.

In total 15 interviews were held; two or three per project. The interviewees, all from the ECO, were selected based on their role in the project and their availability for the research. Amongst the interviewees were a sustainability consultant, project managers and involved engineers. An overview of the interviews and an overview of the sector of each project is given in Table 1. Studying the total set of six projects is assumed to provide a broad overview on the implementation of sustainability in practice with projects complying to the earlier defined selection criteria.

Table 1: Overview of projects and interviewees

Project ID	Sector	Interviewees
1	Pharmacy	Architect, Lead engineer
2	Food	Architect, HVAC engineer, Project manager
3	Food	Lead engineer CSA, Lead engineer HVAC, Project manager
4	Energy	Process engineer, Project manager / sustainability consultant
5	Chemical	Energy engineer, Project manager
6	Energy	3D mechanical engineer, Proces engineer, Project manager

To collect data from the projects, interviews were held using a semi-structured approach (Adams, 2015). This approach implied the use of a predefined list of focal areas for the interviews, with the possibility to deviate from this predefined list, based on the answers given by the interviewee. Still, the results from different interviews can be compared. The main questions included:

- What was the sustainability strategy of ECO?
- How was the strategy applied in the project?
- What factors influenced the implementation of sustainability?
- What can be done to stimulate this implementation?

All interviews were recorded and summarised. The interviewees approved the summaries before starting the analysis. Based on a qualitative analysis of the answers, obstacles for implementing sustainability were distilled and a framework was developed to stimulate the implementation of sustainability. This framework was evaluated in a focus group with 11 experts (not involved in the research before), finally resulting in the framework as described in Section 5.2.

3.3 Description of the selected projects

To get an overview of the six projects, these are briefly described first. To be able to evaluate the inclusion of sustainability, the six studied projects were in the tender phase or had passed the tender phase (see Table 2). Intrinsic sustainability refers to the explicit inclusion of sustainability in the scope. In project 2, for example, the client applied for a LEED certificate, which stimulates explicit attention for sustainability. The client demands on sustainability seem to go hand in hand with the intrinsic sustainability of the project. The influence of governmental regulations, however, seems not related to client demands nor to intrinsic sustainability of the projects that were investigated.

Table 2: Characteristics of the investigated projects

	Project phase	Intrinsic sustainability	Client demands sustainability	Influence of Governmental regulations
Project 1	Tender	Medium	Low	Medium
Project 2	Initiate and plan	High	High	Medium
Project 3	Execution	Medium	Low	Medium
Project 4	Execution	High	Medium	Medium
Project 5	Tender	Medium	Medium	High
Project 6	Initiate and plan	High	High	High

Project 1. Expansion of a pharmaceutical company

The goal of this project was to design an expansion for a pharmaceutical company. This company (client) has asked ECO to develop a plan for a new building that will contain two additional production lines. During the analysis phase of the current research, the first concept was communicated to the client. So this project was still in its early phases. As ECO is responsible for the new building, this project is considered a type 1 project – i.e. development and construction of a new plant.

Project 2. Design of Quality and Control laboratory

The goal of this project was to design an additional quality and control laboratory for a client in the food industry. To comply to all regulations, production companies have to check their product on food safety and health criteria. The client asked ECO for the design of this new lab, again a type 1 project. The client expressed explicit requirements and wishes regarding sustainability in the design to be made by ECO. The client for example applied for a LEED-certificate, clearly demonstrating these ambitions.

Project 3. Expansion of a plant in the food industry

The goal of this project was to design a new department of a food plant due to the lack of space for production equipment. While the client was arranging the mechanical processes itself, the design of the building needed to be done by ECO, again a type 1 project. In this project the client suggested the option of applying for a LEED-certificate to ECO.

Project 4. Biodiesel from waste streams on plant site

The task of ECO in this project was to link the conversion processes on the site, so a type 2 project. In this project most of the engineering solutions were proposed by the client, ECO served as calculator for the integration of the industrial processes.

Project 5. Design of chemical company

The goal of this project was to design a chemical factory and realise the governmental approval of this new factory for a client in the chemical industry. The client of this project approached ECO, as they needed an engineering organisation for both the design and governmental approval of a chemical company. ECO was thus involved in the design of the factory – both the building and equipment / processes (a combined type 1 and type 2 project) – and all issues regarding permits.

Project 6. Design of biomass pellets production company

This project contributes to the environment by its specific aim: to create biomass pellets that can be used for the production of energy. The project owner needed support for the design of their new company, although it was already clear what type of design was required. However, to make sure all the engineering issues were solved, ECO was involved. In addition, ECO analysed the design concept on improvement opportunities (type 1 and 2).

4 Results

The main business of the ECO comprises the provision of design and engineering services to global customers. The organisation, consisting of local organisations in different countries, puts primary emphasis on high safety and quality standards. Whereas the sustainable strategy of the firm is defined at corporate level, the implementation of this strategy typically happens in and through projects.

4.1 Sustainability strategy of the firm

The corporate social responsibility reports of 2011 and 2012 showed that by then, sustainability strategy was considered part of corporate social responsibility. In these CSR reports, some goals were set regarding sustainability:

- To increase the amount of meetings with customers on sustainability,
- To create a database with sustainable innovations,
- To disseminate and share the sustainable solutions,
- Develop and implement a training program for employees.

Indeed, at the end of 2012, several meeting on sustainability were held with clients, sustainable innovations were shared on the internal server of the company and the organisation initiated a training program for professionals. Referring back to the sustainability postures (Silvius & Schipper, 2018), it seems that ECO from that point in time was changing from a more reactive strategy towards a more pro-active strategy, at least on organisation level.

Building upon the 2011/2012 approaches, from 2018 onwards, the company explicitly focused on six of the sustainable development goals, divided over the two groups of organisational code of conduct (SDGs 4, 5, and 8) and construction project development (SDGs 6, 7, and 9), see Figure 1.

Organisational code of conduct | Construction project development

Figure 1: Focal SDG goals of ECO

In terms of *quality education* (SDG4), the ECO aims to stimulate the participation of employees in exercises to enhance the exchange of knowledge. *Gender equality* (SDG5) is a core value for ECO and part of their code of conduct, implying equal treatment of employees regarding hiring, promotion, remuneration and development. *Decent work and economic growth* (SDG8), i.e. guaranteeing safe and fair working conditions, is focused on not only for the ECO itself, but also for their suppliers.

In terms of *clean water and sanitation* (SDG6), the ECO is capable of offering services to develop seawater desalination plants to convert seawater to potable water. Regarding *affordable and clean energy* (SDG7), the life cycle of energy plants is evaluated on opportunities to reduce emissions and improve efficiency. And lastly, maybe *industry, innovation and infrastructure* (SDG9) is the most important for the ECO. Innovation is part of their corporate strategy and ECO aims for more sustainable industries by improving efficiency of assets and plants and reducing maintenance costs (e.g. adopting a life cycle costing approach).

Focussing on the SDGs that are related to construction project development also means that clients need to be convinced of the importance of these particular SDGs. The ECO therefore aims to work with clients who adopt a sustainable view and the ECO proactively supports the client in the implementation of improvements in the area of sustainability. To give some examples where the ECO demonstrates their sustainability focus in construction project development: life cycle analysis (LCA) is applied in order to analyse potential environmental improvements, industrial symbiosis (IS) is applied to explore industrial innovation and improve sustainability by partnering and supply chain positioning (SCP) is applied by evaluating the behaviour of upstream and downstream industrial actors. However, all in all, the strategy documents don't seem to include a formal or explicit translation of sustainability into a project strategy.

4.2 Sustainability in projects: current barriers

So what is happening in projects then? The ECO follows a rather general project approach with the following project phases:

1. Business development,
2. Tender,
3. Initiate and plan,
4. Execution,
5. Closeout.

In ECO's current practice, the inclusion of sustainability dominantly plays a role in the tender phase. In the tender phase, a concept project plan will be developed and explicit attention is given to the potential application of a circular production scan (referred to as SDG scan). For larger projects, a sustainability workshop can be organised to explore opportunities related to sustainably in the project. Attention for sustainability, however, seems underdeveloped in other phases of the project life-cycle. What barriers or obstacles were found in the projects we studied?

The service-oriented perspective of ECO

The primary goal of the ECO is to serve the client in its demands, however, a more pro-active approach by ECO would be required for successful sustainability implementation. In project 5, options for sustainable interventions were not communicated to the client because of the service-oriented role. In project 3, the client skipped the sustainability workshop as it was not required for the functionality. Even though the ECO proposed a sustainable intervention, they followed the client and easily lowered sustainable ambitions as its value was not clear. Implementing sustainability, however, requires that the ECO is more clear in agenda setting, prioritisation and following that agenda.

Difficulty of information exchange

Between client and ECO as well as within the project team, barriers were found related to information exchange with respect to scope definition. With a focus on a limited part of the project, required data, for example needed to explore sustainable improvements like energy usage, could be absent. Hence a wide view on the project is required to give sustainability considerations breeding ground. But breeding ground is not enough, dissemination of ideas is crucial as well. As project 3 showed, even though the SDG scan was available, it was not communicated with the project team, and hence was not used for further development of the project.

Standardisation as a hampering factor

Implementation of sustainability at this stage still requires non-standard methods and standard methods often do not allow deviations. The use of these standards can be a result of governmental regulations (strict hygiene conditions in the food and pharmaceutical industry, project 1) or because of high reliability standards in the sector (project 5). It doesn't help the introduction of new sustainable solutions.

Missed window of opportunity

Late involvement of the ECO and late changes in demands related to sustainability was shown to be problematic, yet common. As indicated earlier, the early project phases are crucial for the implementation of sustainability in the project. If the ECO is not involved in these early phases, or in case not sufficient attention is paid to sustainability in the early project phase it is difficult to proactively stimulate the implementation of sustainability (projects 1, 2, 3 and 5). Also late changes pose problems: as soon as execution has started, a no change mind-set hampers for example the implementation of improvements that could be suggested by a SDG scan.

No time for sustainability

Sustainability integration is referred to as an iterative process, for which sufficient time should be allocated in the project on a regular basis. Exploring sustainability options might be labour intensive and sufficient time is required for reflecting on new ideas and checking project guidance documents. In project 4, for example, the project owner did not reserve time to evaluate the project on sustainable improvements. However, if we compare this to a scenario in which the client emphasises sustainability demands, like in project 6, only little time was needed to discuss decisions on sustainability in the project. So the mind-set does play a role here.

Financial aspects

In fact, the lack of finance is a root cause for some of the other obstacles. For example, in project 3 there was no time reserved for sustainability considerations due to budget limitations. This is a notable difference with project 6, as within this project decisions on sustainability were easily made because

of governmental monetary support. So even more important than sole financial aspects as such, for a successful implementation of sustainability coupling of the economic and sustainable systems would be required. Finance seems a generic limitation: reserved budget is lacking in four projects.

ECO versus client

The main factor limiting the implementation of sustainability strategy seems the positioning of ECO in relation to the client. The initial demands of the client are often considered the main goal, without further discussions on exploring or exploiting sustainability. This limitation was found in five of the six projects that were investigated, suggesting it is a considerable limitation indeed. Project 6 seems to be the exception, with a focus on sustainability throughout the overall design of the project.

4.3 Examples of the implementation of sustainability

Explicit examples of the implementation of sustainability were rare in the six projects studied. Interestingly, implicit sustainable engineering was mentioned in five projects (not mentioned in project 3). Implicit means that suggestions for implementation of sustainability are done based on experience or technical expertise, rather than giving explicit attention to the implementation of sustainability. Sustainable options were proposed to the client in four of the six projects, but again without an explicit focus on sustainability as such. Only in one project and by one interviewee, an explicit example of an implemented sustainability strategy was given: the SDG scan (project 4), which however according to corporate strategy would be obligatory for all projects above 100k Euro.

Although the ECO intends to operationalise its sustainable corporate strategy to project strategy by means of pro-actively applying calculation tools and organising sustainability workshops, this seems not to happen in the six projects investigated in this study. Service provision as a main task for ECO seems to dominate ECO's behaviour on project level. This seems to match the strategic posture 'sustainability on request', in which the PBO just follows the clients' ambitions (Silvius & Schipper, 2018). At best, sustainability is considered a secondary goal which is implicitly addressed. Project managers, however, are in the position to translate the corporate ambitions into the individual projects. So what to do about it?

5 Improving the implementation of sustainability

To stimulate the implementation of sustainability in projects, this section proposes a supporting framework. Before the framework is introduced, first the relations between the observed barriers are discussed.

5.1 Dealing with the barriers

Several barriers were found that directly or indirectly affect the implementation of sustainability and although these barriers were observed at project level, their origins might be traced back to the corporate level.

On project level, the service-oriented perspective that the company adopts is a given, but if on corporate level there would be clearer ambitions set and expressed on value creation with a sustainability focus, it might be possible to explicitly discuss sustainability in the definition of the project with the client. Such translation of corporate ambitions into sustainability interventions on project level, however, do need organisational support which should also be aimed at improving the communication within the company and between the different levels. On the corporate level, organisational support could stimulate the value creation out of sustainability and could stimulate the communication between project teams within the company so that the ambitions on corporate level are known and felt within the organisation.

On project level, obviously, early involvement of the relevant parties is required, and people should be allowed to spend time in exploring sustainability options early in the project, in joint discussions on sustainability with the client. More flexibility is required to deal with the uncertainties related to the implementation of sustainable solutions, and the high degree of standardisation might jeopardise such flexibility.

As Figure 2 summarises, developing a (more) sustainable mind set amongst the project professionals, fed by corporate ambitions, seems required. How can this be done?

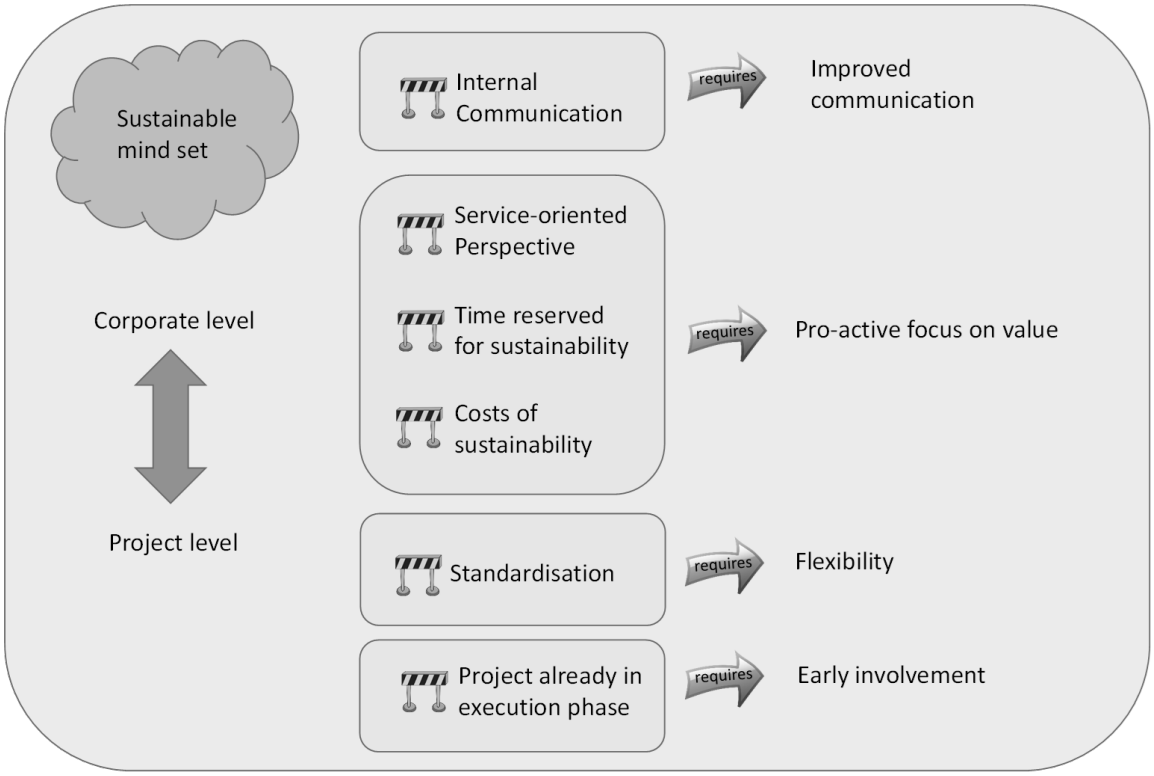

Figure 2: Barriers for implementing sustainability strategy and suggested counter measures

In the interviews, it was also discussed what would be required to implement a sustainability strategy. A clear and explicit definition of sustainability was mentioned in five of the six projects, but also optional sustainable project objectives were mentioned, that the project team could use as inspiration in their discussions. Last but not least, again communication and knowledge exchange were addressed.

Combining the requirements for implementing a sustainable strategy with the suggestions listed in Figure 2 provides three focal points for improvement: 1) creating a sustainable mind set, 2) focus on value creation out of sustainability and 3) improve the internal communication and knowledge sharing (Table 3). These improvements correspond to a shift from 'sustainability for compliance' or 'sustainability on request' towards 'sustainability as differentiator' or 'sustainability for value', based on the four postures of Silvius and Schipper (2018).

Table 3: Dealing with the barriers

Sustainable mind set	
	Formulation and definition of corporate sustainability strategy
	Reporting of performance of ECO on sustainable ambitions
	Empower all individuals to incorporate sustainability
Value creation out of sustainability	
	Scan and evaluate input, output and waste flows (material and energy) (Life Cycle Assessment)
	Explore reuse and recycling opportunities outside the project scope (Supply Chain)
	Explore internal/external exchange opportunities (Industrial symbiosis)
Internal communication	
	Alignment of ambitions and performance indicators (e.g. selection of SDGs)
	Alignment of project guidance
	Sharing of lessons learned and performance

To put these ideas into practice, they were brought together in a framework, which is presented next.

5.2 Framework for implementing a sustainability strategy

To support the development of the framework, a focus group was organised with 11 participants from the ECO. Participants were invited to join based on a broad coverage of experience, expertise and roles within ECO. The focus group first participated in a brainstorm on requirements for the inclusion of sustainability into ECO projects. Using the results of the brainstorm session, the final framework as presented in Figure 3 will be explained.

Organisational support acts as the spider in the web, and the organisational support is fed by the corporate sustainable strategy, ECO's sustainable ambitions and empowerment of all employees to embrace a sustainability mind set. On project level, it seems of utmost importance:

- To align sustainable ambitions and strategy with the client,
- That the project team and client should discuss sustainability from the early project phases onwards,
- To communicate successes and best practices, such that these can be used in similar cases or at least act as inspiration for other projects.
- To show the sustainable position of the client to the client and discuss options for improving this position.

The information exchange to the client aims for alignment of ambitions and sustainability strategy, such that sustainability becomes part of an explicit discussion. This framework, together with the barriers in Figure 2, can be followed to analyse potential hurdles and structure the thinking process during the definition of new projects. The goal of the framework is not to recommend specific practical interventions, but to facilitate the process for experts in construction project development to capture value in sustainability, communicate this with clients and convince clients on reserving time to work on sustainability. The ECO can show the client where value can be captured and how the client's market position could be positively influenced. Success stories as well as obstacles faced in the implementation of sustainability could be captured and shared, to act as sources of inspiration.

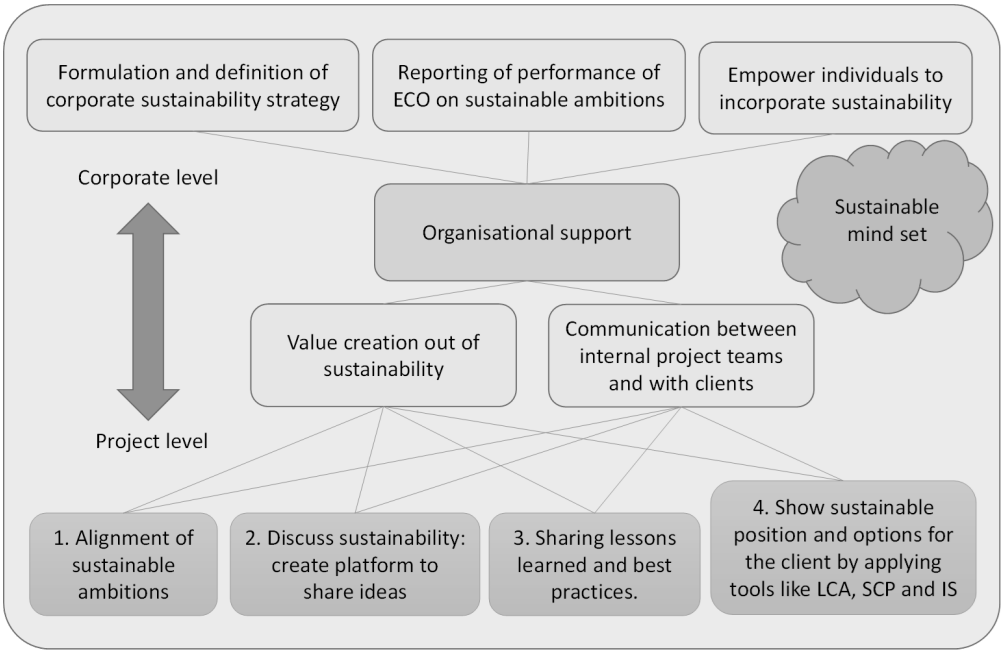

Figure 3: Framework for the implementation of sustainability strategy into construction project development

6 Discussion

This study shows that the ECO plays a rather traditional role as a reactive service provider, whereas they could and probably should be more pro-active towards the client. It seems they had adopted the 'sustainability on request' posture (Silvius and Schipper, 2018), which limits their sustainability initiatives. Their traditional engineering perspective favours economic value over sustainability (Sullivan et al., 2018), although corporate ambitions tell a different story. The implementation of sustainability in projects, however, is still hampered amongst others by the lack of explicitly discussing sustainability throughout the project life-cycle. Such explicit discussion of sustainability can only be effective if the meaning of sustainability is clear amongst those discussing.

Earlier research suggested that practitioners might have very different perspectives on sustainability (Gijzel, Bosch-Rekveldt, Schraven, & Hertogh, 2020). In the context of tunnel development, perspectives with a focus on energy, resilience, social or translational focus were identified in that study. Although the context of tunnel development projects may be different from the type of projects the ECO is typically involved in, Gijzel et al. (2020) show the importance of creating awareness for different perspectives on sustainability. Such awareness could be increased by organising sustainability workshops as part of corporate training programs or in the context of project teams, in the very early project phases. It is all about developing a sustainability mind-set, while acknowledging that the implementation of sustainability is also influenced by rules and regulations and the position a company has in the overall supply chain. Still, the service provider could act more pro-actively by adopting a sustainability mind-set and sharing knowledge, within the company but also as showcases to inspire current and future clients.

Limitations of this study include the single focus on one ECO. The study does only illustrate what happened in the six projects under investigation within the ECO that is a major player in the international market. Given the overall disappointing implementation of sustainability in projects in general, the study should not only be extended to other service providers, but also to other companies in the supply chain.

7 Conclusions

This exploratory empirical study within a single engineering service provider suggests that indeed the clients determine the level of sustainability included in projects to a large extent and that there is gap between ambitions and intention of the ECO and the actual implementation at the project level. A more pro-active approach of the ECO is proposed to stimulate the implementation of sustainability in projects. This pro-active approach, aligned with the more pro-active postures identified by Silvius and Schipper (2018), could revolve around the alignment of sustainability ambitions with the client, the explicit discussion of sustainability in the company and in project teams to stimulate a sustainability mind-set and showcasing earlier achievements in terms of sustainability. This study suggests a framework that could help giving sustainability a more central role in the practice of the ECO around those pillars of alignment, sharing, learning while bridging the gap between strategy and implementation.

The ECO could be more focused on aligning sustainability ambitions and strategy with the client and discuss sustainability from the early project phases onwards. Also, best practices and successes as well as failures could be shared for shaping thoughts on implementing sustainability. As improving the sustainability position of the client might also have strategic value, discussions with the client could be focused at improving their sustainability position.

Yes, so far clients are mostly in a leading role for implementing sustainability, for example by explicitly requesting it in their tenders. This may be a logical consequence from where we come from, but it takes two to tango and to tackle nowadays sustainability challenges. Engineering consultant organisations do have unique knowledge and expertise which they can use to further stimulate the implementation of sustainability. We do envision a more leading role for these engineering contractor/consultancy organisations in the transition to more sustainable project management in which companies, such as the ECO in our study, share showcases of sustainability and call clients to action!

8 References

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APPENDIX

In the data analysis, narratives were sought that indicated the implementation of sustainability in the projects and drivers for such implementation, or lack of implementation. In total 84 codes were obtained, that were subsequently merged into six main themes. Table 4 summarises the six main themes, the most important underlying codes and how often these were mentioned in the projects and the interviews.

Table 4: Main themes, underlying codes and how often mentioned in projects and interviews

Theme 1: Internal communication on the project		#Projects	#Interviews
1	Focus is on small scope of the project	2	3
2	Lack of information on equipment and ambitions of the project	3	4
3	Lack of internal knowledge exchange	2	2
Theme 2: Service-oriented perspective			
1	Considering demands of clients as leading	5	7
2	Operational tasks of a plant are most important	2	2
3	Practicality of sustainable interventions	2	2
4	Request a permit is primary task	1	1
5	Traditional engineering approach	2	4
Theme 3: Standardisation			
1	Reliability is in commonly applied methods	2	4
2	Use of standardised materials	2	4
3	Use of standardised methods of client	4	5
Theme 4: Project already in execution phase			
1	Change in (sustainable) demands after concept phase	4	4
2	Involved after concept phase	1	1
Theme 5: Time reserved for sustainability			
1	Iteration for sustainable improvements is time intensive	1	1
2	No additional time reserved for discovering sustainable options	3	4
3	No time to check project guidance documents	2	2
Theme 6: Costs of sustainability			
1	Affordability of sustainable investment	4	4
2	Reserved budget	4	7
3	Short payback periods are desired	4	5
4	Sustainability considered as a cost	2	3

Table 5: Sustainability strategy

	#projects	#interviews
Implicit sustainable engineering	5	7
Propose sustainable options to client	4	6
Experience as a strategy (ad hoc)	2	2
SDG-scan	1	1

Table 6: Requirements for implementing sustainability strategy

	#projects	#interviews
Explicit definition of sustainability	5	5
List for possible project objectives	4	6
Communication to the right person	2	2
Knowledge exchange on the project	2	2