Introduction

Project delivery methods is an important component of any project conducted. The topic is used in many contexts and is thus given different meanings based on context. According to Miller et al. (2000), a project delivery method is the chosen way of organising and financing the design, construction, operations and maintenance phases for a project. In these contexts, selecting the project delivery method is one of the most significant issues addressed by the project client. Consequently, the selection has an impact on the project's ability to succeed. Because each delivery method has its advantages and disadvantages the selection cannot be made in isolation (Mahdi and Alreshaid, 2005). Instead, selection should be made on several considerations, and particularly on the characteristics of the project under consideration (Hosseini et al., 2016).

As for most industries, there has been a shift in the construction industry towards more sustainable construction (Kibert, 2007). The consequence for the project characteristics is that new buildings need to perform better in terms of energy consumption, material usage, air emissions, indoor quality, waste generation, etc. Consequently, studies have shown that the emerging emphasis on sustainability adds another dimension to project complexity (Mollaoglu-Korkmaz et al., 2013; Magent et al., 2009). As of 2010, estimations indicated that buildings alone accounted for 32% of global energy use and 19% of energy-related greenhouse gas emissions (Lucon et al., 2014). Remarkably, The Intergovernmental Panel on Climate Change (2015) estimated that the use of energy in buildings globally could double or even triple by 2050.

As a response to the above, a shift in the construction industry towards a more sustainable built environment is needed. As this is taking place, a variety of terms have emerged to describe the “green-shift”, including *sustainable construction*, *green buildings*, *sustainable design*, *high performance building*, *whole building design*, *sustainable building* and *integrated design* (Robichaud and Anantatmula, 2010).

Fischer et al. (2017) define a **high-performance building** as a building that satisfies everyone who designs, constructs, operates, and uses the building as much as possible. There is at this time no unified methodology for developing sustainable building, making such endeavours a complex matter (Marszal et al., 2011; Sartori et al., 2012). Zero Energy Building (ZEB) is the concept of constructing buildings with the purpose of mitigating energy use and carbon emission. The Research Centre on Zero Emission Buildings in Norway has defined different levels of such buildings according to ambition: a ZEB-COM level means that the building’s renewable energy production compensates for greenhouse gas emissions stemming from the *construction*, *operation* and *production* of building materials.

It has been proposed that high-performance building projects improve their chances for success if a cross-discipline team is involved at the earliest stages and throughout the project (Robichaud and Anantatmula, 2010). To enable such involvement, an integrated team that seeks to harmonise all needed deliverables needs to be established. Such teams typically include the contractor, designers (including structural, mechanical, electrical, and civil workers), and architects, as well as others (Kubba, 2010). One way to establish such teams is by changing the project delivery methods from the focus on separation (DBB) towards integration (IPD).

To achieve the shift towards sustainable construction the industry must change the project delivery methods used. However, the literature provides few empirical examples of how such approaches have been realised. As stated in earlier publications future research should address the structure of the collaborative project delivery methods used in such projects, provide a more holistic picture of formal and informal relationships, and better understand the capability integration processes in temporary project teams (Wen et al., 2017; Mesa et al., 2019). There is a need to develop a tailored project delivery method based best practices of building construction to improve sustainable building success (Tang et al., 2019). Mesa et al. (2019) also calls for empirical studies that could inform decision makers in structuring the project delivery method. Lastly, much research focuses on the delivery methods themselves, but they are not necessarily the sole contributor to project success. Project delivery methods need to be considered alongside other factors such as team integration and group cohesion, to better understand their relationship with project performance (Franz et al., 2017).

Therefore, the purpose of this paper is to present findings from a study of a construction project that implemented a collaborative project delivery method aimed at creating an integrated team for delivering a high-performance building. Part of the research involved dividing the project delivery method into particular elements. Essentially, an element is defined as a discrete part of the project delivery method. Furthermore, these elements were categorised into contractual elements (e.g., Pain/gain share), cultural elements (i.e., seeking long-term relationships) and organisational elements (e.g., the use of ICE methodology). To further these contributions, this study extend to which contractual, cultural and organisational elements can be adapted for implementation in project delivery methods. This study examines the following research questions:

1. What were the most important contractual, cultural and organisational elements?

2. What were the effects from the selected elements on collaboration?

The research questions are addressed by analysing the contractual, cultural and organisational elements comprising the project delivery method. They are analysed according to perceived strengths and weaknesses, and whether they fulfil the needs required to achieve success in the design of a high-performance building.

Methodology

To study the contractual, cultural and organisational elements, with their consequences and effects, a longitudinal case study was adopted. Case studies typically require investigating a contemporary phenomenon or event in depth and within its real-life context (Yin, 2014). Consequently, case studies are often the preferred research strategy in organisational and managerial studies (Miles and Huberman, 1994). As for means of data collection, we adopted a multiple method strategy including document review, semi-structured interviews and observations.

The case

The project under investigation was at the time of the research an ongoing construction project in Trondheim, Norway. The project had a budget just above €12 million and was the outcome of a collaboration between The Norwegian University of Science and Technology, SINTEF and the Norwegian Research Council. The project has several ambitions that make it high-performance. Its main ambition is attaining ZEB-COM level, meaning that the building will compensates for all greenhouse gas emissions caused by construction, operation, and materials used. The next factor is the ambition to make it a so-called *Living Lab*. The living lab concept involves a test facility that is occupied by individuals using the building. The focus is on the occupants and their use of innovative building technologies such as the intelligent control of installations and equipment, interactive user interfaces and the interplay with the energy system (Finocchiaro et al., 2014; Goia et al., 2015).

Above and beyond its modest budget, the project was set to realise several highly ambitious features, such as being climate-adapted; using innovative materials, construction solutions and technology; being a flexible energy and climate system; having flexible working spaces; and having separate measuring and control systems and a flexible façade, the latter making it possible to remove and customise its designated parts to conduct research. As a result of these challenges, the client composed a project delivery method aimed bringing together a competent project group comprising personnel from nearly all parts of the supply chain. Thus, the ZEB-Flexible Lab project provides a potentially very promising case for an empirical inquiry of the use of a collaborative project delivery method. Its significant advantage is the project complexity coupled with the client's eagerness to try out an untraditional project delivery method.

Data collection and analysis

The study involved three different sources of data: first, a document study of project documents such as the contract, reports, notes and meeting referendums; second, observations of big-room/integrated concurrent engineering sessions, project meetings and workshops; and third, in-depth semi-structured interviews with both managerial and engineering personnel. We relied on a 'diary' perspective, as described by Saunders et al. (2016). The strength of this approach is demonstrated by its ability to study change and development over time. Phenomena such as 'project delivery methods' are best studied focusing on qualities unfit to be analysed quantitatively (i.e., measured). Second, project delivery methods are best examined over time due to the very nature of construction projects (changes occur during the process). Studying events as they unfold over time makes revealing the potential causes and effects of the different phenomena's easier. The data collection is summarised in Table 1.

[Table 1 near here]

The 'diary' perspective was put into practice through systematic observations of activities in the project. Observations were carried out on the weekly design meetings, between 08:30 and 15:00 each Wednesday. The aim was to form an overall impression of the project, then go deeper into how the discrete elements of the project delivery method affected collaboration and behaviour. The literature describes several means for conducting observations, but the two major categories seem to be the role of a participant observer and the role of a nonparticipant observer (Yin, 2014; Creswell and Poth, 2017). The main author took the role as a nonparticipant observer who did not become involved in the activities The observation study implemented a broad-to-narrow perspective strategy as prescribed by Creswell and Poth (2017). The initial observations focused on noting the general landscape, environment, case and setting. Later, the observations became more systematic and focused on specific aspects. Adler and Adler (1994) argue that initial observations primarily ought to be 'descriptive', i.e., unfocused and general in scope and then shift to 'focus observations' when the observer becomes familiar with the setting and the process studied. The types of data that collected from the observations was fieldnotes and sociograms. After the observations, a reflection (usually a one-page memo) was written. The memo served as a summary of the meeting and included what the researcher thought to be the main events that had occurred.

We conducted semi-structured interviews with key stakeholders involved in the project. The interviewees comprised of contractor, client, architect and consultant representatives. They key criteria was that they all had participated in the ICE-sessions. As the research group had full access to the project team, interviews were carried out until data saturation was reached, that was experienced after conducting 12 interviews. An interview guide, with questions included experience regarding participants' entering the collaborative relationship, their knowledge of the project delivery method, their experience of the process, and last, a request to assess the performance of the project and the process was used to guide the interviews. The interviews lasted from one to three hours, with a mean time of app. 90 min. The three-hour interviews were split into two sessions of one and a half hours each. The interviews provided the opportunity for the team members to fully elaborate on their experiences during the design phase. It was also a possibility for the authors to ask for confirmation on the findings from the observations and document study regarding the contractual, cultural, and organisational elements. Prior to the meetings, all interviewees received an email comprising a short introduction to the research topic, the research questions, and information about the interview procedure. Then, the interviews were conducted at a location and time convenient to them. They also received an interview guide comprising the list of interview questions.

In addition, we obtained access to documentary material that supplemented the research. This selection included, the procurement procedure documents, the contract, and full access to the web-hotel serving as an archive for all project documents. The document study was carried out that followed a systematic procedure for evaluating documents (Bowen, 2009). Document study is found to be particularly applicable to case studies, since documents provide rich descriptions and may help the researcher uncover, discover and develop insights.

The processing of the empirical data was based a thematic analysis approach. The method chosen emphasis on recognising patterns within the data (Bowen, 2009). In its generic form, thematic analysis involves coding the data to identify themes, categories, or general patterns (Saunders et al., 2016). The process started by becoming familiar with the data through the observations conducted, writing the reflection notes, and then transcribing the information.

The next step involved coding of the material, meaning labelling specific parts of the data. As the dataset was extensive, the labels applied were general and linked to rather broad segments. Practically, the procedure consisted of running through the data iteratively by moving back and forth between data and theory, specifically by linking the data to the contractual, cultural and organisational elements (themes) identified. Then they were divided into a general description of the elements, the consequences of implementing the elements, and their perceived strengths and weaknesses. The data collection process and analysis are summarised in figure 1. As the study is an in-depth study of a single case, maintaining confidentiality was desired. To achieve this, all names and identifying features was removed from the data, also including reciting direct quotations from the participants in the manuscript.

[Figure 1 near here]

Theoretical Framework

Project Delivery Methods

Project delivery methods describe how the project participants are organised to interact, transforming the owner's goals and objectives into finished facilities (American Society of Civil Engineers, 1997; Pinto et al., 2009). Examples are numerous, but the following are the traditional methods used in the industry: design-bid-build, design-build, and CM at risk.

When deciding how to organise project resources, the owner considers several factors, including past practices, traditions, and experiences; the advice of consultants; funding sources and constraints; the effective use of staff and working capital; and the interests of other project stakeholders (American Society of Civil Engineers 1997).

Fragmentation, adversarial relationships, separated design and construction focus on lowest-bid procurement and are typical transaction-based logics; in other words, they are compelling reasons to turn towards collaborative PDMs (Lahdenperä, 2012). A common characteristic for collaborative PDMs is the attention to measures seeking integration instead of separation. These derive from traditional methods by focusing on creating and maintaining a trusting relationship between relatively independent organisations (Lahdenperä, 2012), for instance, by using the co-location of the team or certain management procedures such as Integrated Concurrent Engineering. Table 2 lists the most widespread collaborative PDMs described in the literature.

[Table 2 near here]

In Norway, the most common collaborative PDMs are '*samspillsentreprise'* (roughly translated as collaborative design-build). EBA (2017) defines it as a collaborative PDM characterised by early involvement of the actors, dialogue, trust, and openness. Projects are carried out with shared objectives and shared financial interests, for example, by utilising an agreement on sharing potential savings or overruns according to a set target cost. Furthermore, such projects are often organised whereby the actors sign a formal collaboration agreement and a contract to collaborate in developing the project from the programming phase to the pre-project with the use of a target price principle. The contractor and the client then sign a contract, often based on a standardised contract with additional partnering regulations (Haugseth et al., 2014). For the use of a so-called multiparty contract, currently few projects in Norway has utilised such an agreement (Aslesen et al., 2018).

Sustainable, High-performance Buildings

Sustainable buildings, sometimes referred to as green buildings, differ from traditional buildings in terms of the design, materials, and processes (Hwang et al., 2017). As with all projects, some factors affect the construction of green buildings and the project delivery method has been found to be a critical factor (Hwang et al., 2017).

Sustainable high-performance buildings are different from ordinary buildings in that they optimise all parameters within the buildable, operable, usable, and sustainable categories (Fischer et al., 2017). While Fischer et al. (2017) names the Integrated Project Delivery (IPD) method as the preferable delivery method for such projects, other scholars have studied other delivery methods for delivering such projects. For example, Mollaoglu-Korkmaz et al. (2013) found that both CMR and DB can provide sufficient levels of integration, as they inherently facilitate builders' early involvement. Chen et al. (2015) conclude that DB has been adopted as a common delivery method for green building projects. However, Liu et al. (2016) state that traditional forms of PDMs are often selected based on experience, the knowledge of decision makers, and information about the project. However, their study showed that project scale, project complexity, project type, flexibility, scope definition, and disputes were the six key factors affecting PDM decision making.

Few studies have developed a comprehensive link between the choice of project delivery method and project characteristics in making the project apt for a collaborative PDM. The project delivery method influences the ability to build a sustainable high-performance building, as the method mediates the level of integration achieved in the delivery process (Mollaoglu-Korkmaz et al., 2013). Furthermore, owner commitment, timing of participant entry into the team, and team characteristics (such as collaboration, experience, and chemistry) can exert effects on the level of integration achieved (Korkmaz et al., 2010). Integration in construction projects is referred to as a mobilisation and continuously collaborative effort from each project member during the whole project (Rahman et al., 2007). In the design phase, errors made by the participants themselves, lack of coordination, lack of information, late changes introduced by the owner and the designers, inconsistency between drawings and specifications, and lack of construction knowledge are all principal problems related to the phase (Alarcón and Mardones, 1998). More integrated teams are one possible solution to the principal problems present in the design phase.

While more integration is a means of improving performance in the design phase of construction projects, there are significant barriers to achieving integration, including the short duration and temporality of projects (Baiden et al., 2006). At the same time, several studies have identified the positive effects of integration. For example, increased levels of integration have been shown to improve effectiveness of teamwork (Baiden and Price, 2011). In addition, the linkage between project delivery method and achieved level of team integration has been deemed significant (Franz et al., 2016). Factors having a positive influence on team integration are identified from selected studies and summarised in Table 3.

[Table 3 near here]

Team Theory – Effective Leadership

The design phase may be characterised as problem-solving through teamwork, where the outcome should be detailed drawings and specifications. However, due to factors such as complex supply chains, interfaces between organisations, actors and professions, and the fact that the project itself is a complex task, teamwork is challenging. When properly managed and developed, project teams can overcome all those challenges. According to Oakland and

Marosszeky (2017), good teamwork evolves from independence through improved communication, trust and free exchange of ideas, knowledge and information. Thus, the team eventually achieves a state of interdependence, where a common goal is established and real problem-solving can happen. An integral part of moving from independent individuals to an integrated team is establishing trust, which is viewed by many scholars and practitioners as a potential means to hindering opportunism and exploitation (See for example, Kadefors, 2004).

There are various forms and classifications of trust. A well-cited paper by Rousseau et al. (1998) describes trust in three basic forms: calculative, relational and institutional. Calculative trust is associated with economic incentives, relational trust with comfort level between actors, and institutional with legal, cultural or societal norms (Rousseau et al., 1998). Furthermore, trust is argued to improve relationships and to increase the willingness of stakeholders to cooperate in non-self-motivated ways (Pinto et al., 2009). According to Challender (2017) trust-building strategies are important in influencing the quality of trust in collaborative PDMs. However, the level of impact of such strategies depends on the characteristics of the project. Projects of longer duration allow more opportunity for trust to develop within project teams (Challender 2017).

Adair's Action-centred Leadership model describes three common needs that should be satisfied to achieve teamwork (Adair, 1988). These needs are summarised as *task needs*, or the need to accomplish something, *team needs*, or the need to develop and maintain working relationships among team members, and *individual needs*, which acknowledge that people work in teams to fulfil their individual needs and not only because of an interest in the task.

Figure 1 summarises Adair's Leadership model and indicates that if collaboration bogs down, one or more of the needs are not satisfied.

[Figure 2 near here]

The project delivery method undeniably establishes the framework for how actors come together in the design phase to generate tangible results. Since many projects struggle with the primary problems present in this phase, attaining design team integration in sustainable building projects should be further examined. As the industry continues to adopt new project delivery methods (e.g., integrated project delivery) to deliver sustainable buildings, opportunities to shed more light on this phenomenon will arise.

Results & Discussion

The design phase can be the key to understanding why some projects fail and others do not. This paper reports findings from a longitudinal case study of the project delivery method used in the design phase in a sustainable, high-performance building project. This section discusses the project delivery method's contractual, cultural and organisational elements, and the perceived effects thereof.

The client and the contractors signed a **collaborative Design-Build contract**, which is an option-based contract between the client and the contractor's teams. In addition, the contractor has individual contracts with each of the team members. The design-build contract formalises the intention to implement a collaborative PDM. Table 4 presents the observed elements from the design phase identified through the document study, interviews, and observations.

[Table 4 near here]

Furthermore, the elements are analysed according to perceived effects and are placed in the context of the Adair's leadership model.

Contractual Elements

The hierarchic model for achieving team integration in this project is illustrated in Figure 2. First, the contract used (in this case a **Design-Build contract**) should enable **early involvement of the contractor**, creating a framework for establishing an integrated team that includes the client, the contractor, the designers (structural, mechanical, electrical, civil) and the architect. In other words, the team should be an integrated team. Integrated teams are often suggested as the solution to complex problems, for example, in the military (McChrystal et al., 2015).

[Figure 3 near here]

Early involvement of contractor principle is tied to the specific contract type used by the client (Russell and Jaselskis, 1992). This practice enables the benefits of contractor participation in the design and constructability reviews (Dozzi et al., 1996). In this project, the downside of early contractor involvement was perceived to be the accumulation of costs early on. The promise of obtaining lower costs afterward represented an upside. One strength is that the team members came to know each other well and gained an understanding of each other's profession and its importance. For many participants, early involvement also meant a more personal involvement. Participants bonded by challenging and supporting each other in ways that contributed to trust; hence it became challenging to blame each other. The contract structure of the project is illustrated in Figure 3.

[Figure 4 near here]

After choosing a delivery method, the client must contemplate the **team composition**. In this project, the CVs of the individuals comprising the project team was one of the criteria in awarding the contract. Correspondingly, the client needs a team with assigned roles and the autonomy and authority required to make decisions. As prescribed by Baiden et al. (2006), the team must operate without perceived organisational defined boundaries to create mutually beneficial outcomes.

A **start-up seminar** was held during one of the first weekends after the signing of the first contract between the client and the contractor. In this project, the primary purpose of the seminar was to build team spirit and social bonds among project team members. Furthermore, the **formal collaboration agreement** was – iteratively – developed that weekend. It outlines the rules and guidelines with which the project team must comply. The perceived strengths of these elements are that they create personal commitment towards the goals of the project and thus contribute to fulfilling both **task** and **team needs**.

During the design phase, **shared decision making** was alleged to be a core element. Although not well-discussed in project management literature, this element is defined within the field of medicine as an approach whereby participants (*in our case the team members*) share the best available evidence when making decisions, and where patients (*in our case the client*) are informed when considering preferred options (Elwyn et al., 2010; Elwyn et al., 2012). Shared decision making was observed during the ICE-sessions, where interactive iterations occurred when representatives with technical, procedural and managerial expertise were present. The ever-present weakness of shared decision making is the inevitable occurrence of confusion regarding which individual has the authority to make the final decision. It was observed that the team was not always able to make these final decisions.

The decision was then forwarded to the **special meetings**, where either only representatives from the client – or from the contractor as well – met for discussions. The latter were necessary when the decision had consequences affecting the target price and/or the overall progress of the project.

Similar to shared decision making, **shared defined goals** (sometimes referred to as mutual objectives) may be a double-edged sword. As stated in the literature, every team must share a goal or objective to be effective (Cheng et al., 2000; Black et al., 2000; Walker et al., 2002). The business model of most consultants in Norway today is to work at hourly rates. The more hours a consultant bills, the higher the individual's bonus will be. Individual bonuses may lead to sub-optimisation. To avoid this, shared defined goals were closely coupled with a **target price** with a compensation structure and a shared risk/reward. This appeared to allow individual consultants to take a step back when decisions were made: *"choosing this solution reduces the scope of my work-package in the construction phase, but it will have an excessive positive effect on the ZEB-COM goal"*. Consequently, the consultants efficiently contributed to fulfilling **task needs**.

As described by Pinnell (1999), disputes and conflicts are inherent in the construction process and a part of human interaction; therefore, project participants must systematically think through their approach to a dispute resolution. The applied **conflict resolution mechanism** was developed by the team members. If a conflict cannot be solved within the team, it will be presented to a committee that includes a senior representative without connections to the project from the contractor and client. This mechanism has not been used, indicating that the project successfully managed to sustain collaboration and prevent disputes from escalating. While the possibility of making changes to organisations when collaboration breaks down is unrealistic, the **right to replace people** is a necessary and convenient element of the contract. This element significantly contributes to sharpening the team during the process, for example, in situations where someone does not grasp the team culture or is unwilling to commit. Given the possibility of terminating the commitment needed for sustaining the high-performance team, this element should not by any means be overused. However, properly used, the right to replace people will have a positive effect on **team needs** by setting the team above the individual.

Start-up workshops, **continuous workshops**, and **co-location** are somewhat connected elements. Studies use the term "workshop" inconsistently. For instance, in the partnering literature, "workshop" implies a procedure to create and maintain bonds between the partnering organisations (Eriksson, 2010; Bennett and Jayes, 1995). In alliancing and IPD, "workshop" implies co-location of the construction team (Thomsen et al., 2009; Lahdenperä, 2012). Workshops in this project were meant to introduce the project team to ZEB-COM requirements and topics such as climate accounts, emissions, and production. Overall, the workshops were used to provide the team with knowledge. Some of the consultants, at their own expense, even sent extra people to the workshops to learn. The use of workshops to educate project participants increases a project's time and cost. At the same time, ZEB-COM was an essential ambition for the project, and it was important that practical implications be well understood. The data indicate several positive effects from workshops. First, they provide a venue for teambuilding; second, they create a deeper anchoring of client ambitions in the project team; and third, they provide personal development for the individuals involved. In sum, workshops have a positive effect on **task**, **team**, and **individual needs**.

The intention of the project was to include the financial transparency that would enable the project organisation to track every single transaction. Disclosing cost data to partners is a practice, according to Kajüter and Kulmala (2005), that appeared with the spread of lean production in the 1990s. The contract stated that all work performed must be based on the **open book** principle (referred to as "open-book accounting"). Open book means that the parties, directly or indirectly, have access to relevant cost information within the project (Munday, 1992). The contractor had a transparent calculation system allowing the parties to continuously observe the calculation process. In addition, the client was regularly briefed on the project status and could openly discuss the calculated price. The inexperienced client perceived transparency as necessary to avoid the contractor consequently selecting the cheapest low-quality solutions. The most prominent weakness of the open book strategy was the risk of the contractor withholding information, for example, by showing estimates with an insufficient level of detail and/or by including risk premiums already included in the price.

The **target price** element, with shared risk/reward, is coupled with open book since they both concern finances. Target price may be described as an agreement among actors working cooperatively, based on sharing project risk and reward, to achieve agreed-upon outcomes (Abrahams and Cullen, 1998). In this project, the team developed the target price using a risk and reward sharing arrangement for the second phase during the first contract phase. If the parties were unable to agree on the target price, they would not enter the second contract phase. The development was not a straightforward success. A systematic explanation may be attributed to the "traditional way of thinking", i.e., the contractor expected the client to want to achieve as many square metres as possible. However, in this project, it took time before the contractor understood that the client prioritised quality over square metres. Another weakness with the use of target price (shared risk/reward) was the fact that neither the client nor the contractor fully understood the concept. More precisely, both parties had their own idea of what to include or exclude from the target price, as well as how the shared risk/reward worked in practice. At this point, the client, regardless of whether or not there was an agreed-upon target price, could initiate the second contract phase with another contractor. The real strength of the integrated team emerged because both parties negotiated and worked together for a prolonged period to achieve an acceptable target price.

Continuity of key personnel is probably a success factor for any project delivery method and for ensuring the efficiency of the integrated team (Ibrahim et al., 2011; Rahman and Kumaraswamy, 2008). Therefore, the client established in the contract certain economic sanctions for the contractor's key personnel in the event they would be unable to fulfil their role until the completion of the project. However, as the project underwent significant delays, the client did not exercise the option to sanction the contractor when the project manager and design manager were replaced after the one-year delay. The delay was due to circumstances beyond the control of the project team, as the municipality went back on their decision to grant a building permit. In retrospect, the contractual element added to ensure the **continuity of key personnel** might be viewed as more expressive than practical. However, it is a critical success factor for sustaining an integrated team and thus affects both **task** and **team needs**.

Cultural Elements

A good project culture aligns its organisational goals and objectives with those of the individual actors (Thomas et al., 2002). Moreover, the actors in the collaboration must make efforts to make the collaboration work and to establish a culture based on trust (Smith and Thomasson, 2018).

A robust cultural element stated both in the literature and observed in this project is the need for both **support from management at a project *or* team level** and **at the organisational level** (Chan et al., 2004; Nevstad et al., 2018). This element should be seen as comprising a **strategic thinking** element, as top management are those who formulate the strategy. Their support and commitment are vital to project culture. In the project, support from top management became visible when the project met unforeseen obstacles, such as a construction shut-down by the municipality. At this critical moment, management from both the client and contractor stood by the construction team and the project even when the whole process was delayed by more than a year. It is evident that top management support is a critical success factor that affects **team needs** by providing a supportive climate as well as **individual needs** by creating acceptance.

Long-term thinking, **seeking long-term relations** and **shared interests**/"for the best of the project": these types of strategic thinking differ from operational thinking in terms of aspects concerning time horizon and initiatives (Easterby-Smith and Davies, 1983). Thus, there is a gap between the operational reality that project participants experience and the strategy of their respective organisations. As the organisation enters into a strategic partnership with the intent to secure future projects with the same actors, this is not necessarily what the individuals working day-today within the project are concerned about.

The need for a **responsible (process) facilitator** is highlighted in design management literature, particularly for operationalising client value (Thyssen et al., 2010). Formally, the project had one facilitator: an external consultant hired by the client. However, through the interviews, the contractor's design manager was often perceived to be the responsible facilitator. Both served critical roles: the facilitator was of utmost help to the inexperienced client, while the design manager was crucial to the effective performance of the project team. Both were therefore vital for driving the process, as one had expertise related to the client's delivery method, while the other had expertise related to the contractor's delivery. Hence, both contributed to fulfilling both **task** and **team needs**.

Very little has been written about **mutual assessment** and **speed dates** in project management literature. In this project, mutual assessment and speed dates were organised by a specialist working for the contractor. These are tools for developing effective teamwork, better relationships and a basis for benchmark progress. The assessment is based on the common goals established, which are then assessed during the process by using surveys or meetings. The assessment evaluates the progress towards the team's agreed-upon goals, and each individual contributes to the evaluation. Thus, the assessment should improve the team in the current phase and provide input for the next phase of the project, thus helping to fulfil both **task** and **team needs**. During the **speed date**, all project participants sat down one-to-one with each other and provided honest feedback, both constructive criticism and praise. The **speed date** is a suitable tool for fulfilling individual needs, as it creates clear expectations for everyone.

Identity-building activities are often tied to contractual or organisational elements such as teambuilding seminars and workshops. An important **identity-building activity** in this project was the fact that the team always ate lunch (provided by the client) together. According to Ochs and Shohet (2006), meals are cultural sites where individuals come to learn, reinforce, undermine, or transform each other's ways of acting, thinking, and feeling in the world. Thus, the half-hour designated for lunch (**mealtime socialisation**) was perceived to be a success factor for the integrated team, beyond the mere re-energising effect provided by the meal. It has an impact both on the individuals, as a networking opportunity, and on the team, as a chance to socialise.

Little/no disputes/conflicts, **no-blame culture**, and **mutual respect**. A no-blame culture could assist the project team in learning from events by widening and enriching its capabilities to grasp the rewards of unique experiences, thus making the organisations involved less exposed to a ‘root cause seduction’ trap (Provera et al., 2010). A no-blame culture is one in which individuals do not fear repercussions from risk-taking or problem identification, where employees feel free to contribute to discussions and to raise issues (Lloyd-Walker et al., 2014). The absence of repercussions was a key indicator of a trustful environment. Closely related to the contractual element **conflict resolution mechanism**, the cultural element involving no disputes emphasises establishing a positive dispute prevention culture during project performance. In this project, the project team successfully went from what might be labelled a ‘traditional adversarial relationship’ to a collaborative approach that prevented disputes from escalating beyond professional disagreements.

Knowledge sharing, **pro-active communication** and **knowledge integration**. A primary challenge of any project is to create new knowledge (i.e., solutions to problems, new products, etc.) by integrating knowledge from various sources (Carlile and Rebentisch, 2003). In complex projects, each specialised professional must create new knowledge to meet the more challenging new requirements. Hence, this is vital for archiving **task needs**.

Competence, **commitment**, and **dependence**. Some scholars believe that commitment, coordination, and competence are critical success factors. Jha and Iyer (2007) found ‘competence’, ‘commitment’ and ‘coordination’ to be key factors for project success. It is therefore important that project management emphasise these three factors to improve overall performance. According to Carlile and Rebentisch (2003), dependencies constrain solutions to circumstances; thus, no actors are entirely free to pursue an agenda that exclusively benefits their area of specialisation. This was observed throughout the project stage, where each individual continuously had to give or take not only to match the complexity of the task undertaken but also in iteration with every specialisation present.

CV-building. Contracting a project team using more than just a low bid criterion is gaining momentum in the industry, particularly for collaborative PDMs. The emergence of concepts such as Best Value Procurement supports this proposition (Molenaar et al., 2010; Storteboom et al., 2017). Selecting the lowest bid price alone in complex projects may well lead to higher costs in the long term and to bypassing any opportunities of acquiring added benefits and better value for money (Palaneeswaran and Kumaraswamy, 2000). The other side of the coin is the element of winning such projects in the future by achieving competency through already-won projects of a similar type. In this project, some of the willingness shown by the team may be attributed to the fact that the uniqueness of the project undertaken was more valuable to them than just the possibility of monetary profit. Thus, the **CV-building** element should ideally result in a "win-win" setting for both the client and the team. Hence, this element will fulfil **individual needs** through the personalisation reward, and there is also an apparent organisational reward.

Organisational Elements

Collaborative PDMs in the construction industry might be fragile phenomena, as they depend on factors beyond contractual agreements and often rely on meeting several commercial and organisational supporting conditions (Bresnen, 2007). Therefore, practitioners must be judicious in selecting appropriate organisational and procedural elements to achieve success.

Building Information Modelling (BIM). The application of BIM is welcomed as a vehicle for collaboration (Elmualim and Gilder, 2014). Thus, in terms of collaboration, **BIM** may be a critical element for ensuring information transparency and thus preventing unethical yet lucrative practices (Guo et al., 2019). We observed no unwillingness to share information or use BIM outside the usual constraints, such as “the model not being mature enough to share …”. From a collaboration perspective, BIM was viewed as facilitating better communication and enhancing the individual’s understanding of the project. Practically, the model enables all parties involved (both professionals and non-professionals) to quickly grasp the issues, changes, and updates presented. Furthermore, the actors shared their data (models) continuously even though their data were ‘incomplete’. Thus, they avoided restricting the flow of information during the process by looking to protect ownership of BIM-generated output (Bryde et al., 2013).

ICE, or **Integrated Concurrent Engineering**, is a way of organising and conducting project work. The methodology involved differs from traditional approaches in terms of the composition of the design team, the reliance on teamwork, and its client-driven nature (Love et al., 1998). Although the approach is currently enjoying an increase in popularity within the construction industry, how and to what extent it is being implemented seems to vary a great deal. A central principle is **co-location**, as discussed earlier, but ICE as an organisational element entails more than merely having the team physically present. A systematic weakness in seeking to implement ICE in the construction industry is the organisational boundaries and those ever-present boundaries between the professions. As mentioned, the consultant must be 100% billable and consequently working on several projects at once. To encourage them to commit 100% to one project at one physical location seems to be unrealistic given the constraints of the current state of the industry, especially for Norwegian projects, which are generally too small to obtain a 100% commitment from individuals. However, the solution of meeting once a week for one full day’s work session seemed to work satisfactorily in this project. The main challenge is to avoid the pitfall of traditionally designed meetings and to engage every actor present. Another constraint is that the engineering work in this phase of the project is so closely interwoven into the conceptual model developed by the architect, the decisions made by the client, and the time and money constraints set by the contractor. All these factors make it nearly impossible to perform actual engineering work, and the sessions tend to fall back on being meetings where the actors offer clarifications and plan the work to be done. In sum, **Integrated Concurrent Engineering** has a positive effect on **task** and **team needs**. From a theoretical perspective, it should also have a positive effect on **individual needs** for the individuals involved, but this effect is only observed when the sessions are able to **engage** all actors.

Standardised Performance Measures. According to Dainty et al. (2003), construction has some specific characteristics that demand performance measures, particularly performance related to managing complex team-based working and leadership qualities required within such an environment. Furthermore, measurements are important for tracking progress, identifying opportunities, and performance improvement (Oakland and Marosszeky, 2017). The contractor had a standardised system for measuring progress called PPC (Percent Planned Complete), a system that measures activities done by each actor against activities planned (expressed in %). The design manager used approximately one hour of each ICE session to ask team members about their activities. If they did not finish their activity, team members were given the opportunity to do so; however, their activity was measured as incomplete. Finding a way to measure progress in the design is perceived as essential when working on such a complex endeavour. However, measures must be coupled with a purpose: one must not measure only for the sake of measuring. The design manager paid attention to coupling the PPC with the achievement of the shared goals the team had set out to complete.

Individuals were not penalised for not completing their tasks, but they had to rationalise their actions in front of the rest of the team. This created a culture where everybody wanted to have a PPC of 100%; at the same time, individuals were met with support and understanding when they rationalised why they had not finished certain activities (for example lacking information, changes made by actors, lack of relevance, etc.). **Standardised performance measures** will have a positive effect on **task needs**. From a theoretical perspective it should also influence **individual needs**; however, the effect could be both negative and effective depending on the character of the individual (some respond better to critical feedback than others).

Dispute Resolution Board and **conflict escalation ladder**. As Love et al. (2010) have noted, clients perceive that disputes occur mainly due to the nature of the task being performed, people's deliberate practices, the opportunistic behaviour of contractors, incomplete documentation, and the poor planning and resources of consultants and contractors. Because of the expense and lengthy delays associated with litigating construction disputes, clients are increasingly opting for an alternative means of resolving disputes (Treacy, 1995). The goal of establishing organisational elements is to manage conflicts and prevent them from escalating into disputes and lawsuits (Ng et al., 2007).

Standardisation (standardised processes) may be closely coupled with the paradigm of lean construction. From the perspective **organisational elements** to enhance collaboration, standardisation may be closely coupled with processes by searching to improve everything related to process, such as communication and information sharing. A construction project that lacks standardised processes makes collaboration among actors a very complicated process (Athanasios et al., 2007).

Conclusion

Sustainable high-performance buildings, as an emerging phenomenon, have been studied from a project delivery methods perspective before. However, empirical case studies on formal and informal relationships, better understanding of the integration processes in temporary project teams, and empirical studies that could inform decision makers in structuring the project delivery method were lacking (Wen et al., 2017; Mesa et al., 2019; Tang et al., 2019). This paper has reported a take on collaborative PDMs for sustainable, high-performance projects by providing a systematic analysis of all observed collaboration-enhancing elements in a longitudinal case study. In this respect, contractual, cultural and organisational elements have been studied in the light of the adopted leadership model provided by Adair (1988); see Table 5.

[Table 5 near here]

The result provides the following contributions. Firstly, the analysis builds on existing studies by showing that organisational and cultural elements can be used to facilitate collaboration – which consecutively leads to more integrated teams within the constraints of being both temporary and inter-organisational. Secondly, the client, as the principal, can enhance the collaborative PDM by being thoughtful in the selection of contractual elements. While the principal sets the contractual boundaries, the agent (contractor team) should be intentional in the selection and use of organisational and cultural elements. Thirdly, it shows that a set of contractual elements are not enough for establishing collaboration and creating an efficient integrated team. Therefore, the contracting parties needs to exploit the untapped potential that lies within organisational and cultural elements.

From both a practical and theoretical viewpoint, the analysis builds on existing studies by showing that organisational and cultural elements can be used to facilitate collaboration. It shows how the client can create a collaborative PDM using the right contractual elements implemented. The client has significant power and influence on the delivery method through the contractual elements applied. However, contractual elements alone are no guarantee of ensured collaboration. Collaboration does not automatically occur just because the contract is aligned towards it. The client must be present and engaged throughout the project, contributing actively to the project culture and organisation. Conversely, the downsides of such methods occur when inexperienced clients assume that a collaborative project delivery method will deliver a high-performance building that satisfies all their needs just by signing a collaborative contract and then letting the contractor assume all responsibility. Therefore, as the client sets the boundaries by deciding the contractual elements, the contractor team can influence the organisational and cultural elements. Consequently, the contractor team must be judicious in selecting appropriate organisational and cultural elements to achieve success. It also shows how the contractor can influence the project delivery method.

It is evident that contractual elements alone are not enough to ensure collaboration. Individual needs seem to obtain the least attention, possibly due to constraints related to the construction industry. Attention to cultural elements seem to have a positive effect on individual needs, while the corresponding effects of contractual and, to a certain extent, organisational elements appear to be limited. Therefore, the chosen elements must contribute towards 1) establishing a project culture that aligns the project goals with those of the individual actors so that the group achieves a shared goal (task needs), 2) establishing a team with the necessary level of team integration that is maintained throughout the process (team needs), and 3) developing and motivating all the individuals involved in establishing commitment and satisfaction (individual needs).

The result provides practitioners with a better understanding how a collaborative project delivery method for the design phase emphasises team integration through systematically selecting appropriate contractual, cultural and organisational elements that support task, team and individual needs. A collaborative project delivery method that systematically seeks to create an effective integrated team requires contractual elements such as early involvement coupled with a team composition that seeks to attract the right expertise in order to take full advantage of value creation and the team's collective "knowledge pool". Implementing the right organisational elements will build and sustain good communication, information sharing, continuous interaction, and ultimately lead to a trusting project environment. Cultural elements emphasise "best for project" decisions, commitment and shared interest (strategic thinking).

Future work should provide in-depth knowledge regarding the effects of specific elements, particularly cultural ones, which appear to be underreported in project management research. In addition, the systematic approach should be used in comparative studies of other collaborative PDMs. Practitioners wishing to deliver sustainable, high-performance projects can use a similar systematic approach when deciding which elements to include in their project delivery method.

Data Availability Statement

Some or all data, models, or code generated or used during the study are available from the corresponding author by request.

References

Abrahams, A. & Cullen, A. 1998. Project Alliances in the Construction Industry. *Australian Construction Law Newsletter,* 62**,** 31-36.

Adair, J. 1988. *The Action-Centred Leader*, Industrial Society London.

Adler, P. & Adler, P. 1994. „Observational Techniques"[W:] Denzin Norman, Lincoln Ywonne Handbook of Qualitative Research. Sage Publications.

Aki, A., Maila, H., Aki, P. & Harri, H. 2013. The Characteristics of and Cornerstones for Creating Integrated Teams. *International Journal of Managing Projects in Business,* 6**,** 695-713.

Alarcón, L. F. & Mardones, D. A. Improving the Design-Construction Interface. Proceedings of the 6th Annual Meeting of the International Group for Lean Construction, 1998. 1-12.

American Society of Civil Engineers 1997. Project Delivery Systems. *Quality in the Constructed Project.*

Aslesen, A. R., Nordheim, R., Varegg, B. & Lædre, O. Ipd in Norway. 26th Annual Conference of the International Group for Lean Construction, 2018/07/18 2018 Chennai, India. Chennai, India, 326-336.

Athanasios, N., Angeliki, P. & Panagioths, K. 2007. Investigating Antecedents and Drivers Affecting the Adoption of Collaboration Technologies in the Construction Industry. *Automation in Construction,* 16**,** 632-641.

Baiden, B. K. & Price, A. D. F. 2011. The Effect of Integration on Project Delivery Team Effectiveness. *International Journal of Project Management,* 29**,** 129-136.

Baiden, B. K., Price, A. D. F. & Dainty, A. R. J. 2006. The Extent of Team Integration within Construction Projects. *International Journal of Project Management,* 24**,** 13-23.

Bennett, J. & Jayes, S. 1995. *Trusting the Team: The Best Practice Guide to Partnering in Construction*, Thomas Telford.

Black, C., Akintoye, A. & Fitzgerald, E. 2000. An Analysis of Success Factors and Benefits of Partnering in Construction. *International Journal of Project Management,* 18**,** 423-434.

Bowen, G. A. 2009. Document Analysis as a Qualitative Research Method. *Qualitative research journal,* 9**,** 27-40.

Bresnen, M. 2007. Deconstructing Partnering in Project-Based Organisation: Seven Pillars, Seven Paradoxes and Seven Deadly Sins. *International Journal of Project Management,* 25**,** 365-374.

Bresnen, M. & Marshall, N. 2000. Partnering in Construction: A Critical Review of Issues, Problems and Dilemmas. *Construction Management & Economics,* 18**,** 229-237.

Bryde, D., Broquetas, M. & Volm, J. M. 2013. The Project Benefits of Building Information Modelling (Bim). *International Journal of Project Management,* 31**,** 971-980.

Bygballe, L. E., Jahre, M. & Swärd, A. 2010. Partnering Relationships in Construction: A Literature Review. *Journal of Purchasing and Supply Management,* 16**,** 239-253.

Børve, S., Rolstadås, A., Andersen, B. & Aarseth, W. 2017. Defining Project Partnering. *International Journal of Managing Projects in Business,* 10**,** 666-699.

Carlile, P. R. & Rebentisch, E. S. 2003. Into the Black Box: The Knowledge Transformation Cycle. *Management science,* 49**,** 1180-1195.

Challender, J. 2017. Trust in Collaborative Construction Procurement Strategies. *Proceedings of the Institution of Civil Engineers - Management, Procurement and Law,* 170**,** 115-124.

Chan, A. P. C., Chan, D. W. M., Chiang, Y. H., Tang, B. S., Chan, E. H. W. & Ho, K. S. K. 2004. Exploring Critical Success Factors for Partnering in Construction Projects. *Journal of Construction Engineering and Management,* 130, 188-198.

Chen, Q., Xia, B., Jin, Z., Wu, P. & Hu, Y. 2015. Choosing Appropriate Contract Methods for Design-Build Projects. *Journal of Management in Engineering,* 32, 04015029.

Cheng, E. W. L. & Li, H. 2004. Development of a Practical Model of Partnering for Construction Projects. *Journal of Construction Engineering and Management,* 130, 790-798.

Cheng, E. W. L., Li, H., Drew, D. S. & Yeung, N. 2001. Infrastructure of Partnering for Construction Projects. *Journal of Management in Engineering,* 17, 229-237.

Cheng, E. W. L., Li, H. & Love, P. E. D. 2000. Establishment of Critical Success Factors for Construction Partnering. *Journal of Management in Engineering,* 16, 84-92.

Conley, M. A. & Gregory, R. A. 1999. Partnering on Small Construction Projects. *Journal of Construction Engineering and Management,* 125, 320-324.

Creswell, J. W. & Poth, C. N. 2017. *Qualitative Inquiry and Research Design: Choosing among Five Approaches*, Sage publications.

Dainty, A. R. J., Cheng, M.-I. & Moore, D. R. 2003. Redefining Performance Measures for Construction Project Managers: An Empirical Evaluation. *Construction Management and Economics,* 21, 209-218.

Dozzi, P., Hartman, F., Tidsbury, N. & Ashrafi, R. 1996. More-Stable Owner-Contractor Relationships. *Journal of Construction Engineering and Management,* 122, 30-35.

Easterby-Smith, M. & Davies, J. 1983. Developing Strategic Thinking. *Long Range Planning,* 16, 39-48.

EBA 2017. Veileder Om Samspillsentreprise. https://www.anskaffelser.no/: Entreprenørforeningen-Bygg og Anlegg,

Avdeling for offentlige anskaffelser (Difi).

Elmualim, A. & Gilder, J. 2014. Bim: Innovation in Design Management, Influence and Challenges of Implementation. *Architectural Engineering and Design Management,* 10, 183-199.

Elwyn, G., Frosch, D., Thomson, R., Joseph-Williams, N., Lloyd, A., Kinnersley, P., Cording, E., Tomson, D., Dodd, C., Rollnick, S., Edwards, A. & Barry, M. 2012. Shared Decision Making: A Model for Clinical Practice. *Journal of General Internal Medicine,* 27, 1361-1367.

Elwyn, G., Laitner, S., Coulter, A., Walker, E., Watson, P. & Thomson, R. 2010. Implementing Shared Decision Making in the Nhs. *Bmj,* 341, c5146.

Eriksson, P. E. 2010. Partnering: What Is It, When Should It Be Used, and How Should It Be Implemented? *Construction Management and Economics,* 28, 905-917.

Finocchiaro, L., Goia, F., Grynning, S. & Gustavsen, A. The Zeb Living Lab: A Multi-Purpose Experimental Facility. Paper for Gent Expert Meeting, April, 2014.

Fischer, M., Khanzode, A., Reed, D. & Ashcraft, H. W. 2017. *Integrating Project Delivery*, John Wiley & Sons.

Franz, B., Leicht, R., Molenaar, K. & Messner, J. 2016. Impact of Team Integration and Group Cohesion on Project Delivery Performance. *Journal of Construction Engineering and Management,* 143, 04016088.

Franz, B., Leicht, R., Molenaar, K. & Messner, J. 2017. Impact of Team Integration and Group Cohesion on Project Delivery Performance. *Journal of Construction Engineering and Management,* 143, 04016088.

Goia, F., Finocchiaro, L. & Gustavsen, A. The Zeb Living Laboratory at the Norwegian University of Science and Technology: A Zero Emission House for Engineering and Social Science Experiments. Proceedings of the Conference, 2015.

Guo, H., Yu, R. & Fang, Y. 2019. Analysis of Negative Impacts of Bim-Enabled Information Transparency on Contractors' Interests. *Automation in Construction,* 103, 67-79.

Hartmann, A. & Bresnen, M. 2011. The Emergence of Partnering in Construction Practice: An Activity Theory Perspective. *Engineering Project Organization Journal,* 1, 41-52.

Haugseth, N., Lohne, J., Jensen, G. & Lædre, O. Partnering in Statsbygg. 22nd Annual Conference of the International Group for Lean Construction: Understanding and Improving Project Based Production, IGLC, 2014. 1343-1356.

Hosseini, A., Lædre, O., Andersen, B., Torp, O., Olsson, N. & Lohne, J. 2016. Selection Criteria for Delivery Methods for Infrastructure Projects. *Procedia - Social and Behavioral Sciences,* 226, 260-268.

Hosseini, A., Wondimu, P. A., Klakegg, O. J., Andersen, B. & Laedre, O. 2018. Project Partnering in the Construction Industry: Theory Vs. Practice. *Engineering Project Organization Journal,* 8, 13-35.

Hwang, B.-g., Shan, M. & Supa'at, N. N. B. 2017. Green Commercial Building Projects in Singapore: Critical Risk Factors and Mitigation Measures. *Sustainable Cities and Society,* 30, 237-247.

Ibrahim, C., Costello, S. & Wilkinson, S. 2011. Key Relationship Oriented Indicators of Team Integration in Construction Projects. *International Journal of Innovation, Management and Technology,* 2, 441.

Intergovernmental Panel on Climate Change 2015. *Climate Change 2014: Mitigation of Climate Change*, Cambridge University Press.

Jha, K. N. & Iyer, K. C. 2007. Commitment, Coordination, Competence and the Iron Triangle. *International Journal of Project Management,* 25, 527-540.

Johnson, T. R., Feng, P., Sitzabee, W. & Jernigan, M. 2013. Federal Acquisition Regulation Applied to Alliancing Contract Practices. *Journal of Construction Engineering and Management,* 139, 480-487.

Kadefors, A. 2004. Trust in Project Relationships—inside the Black Box. *International Journal of Project Management,* 22, 175-182.

Kajüter, P. & Kulmala, H. I. 2005. Open-Book Accounting in Networks: Potential Achievements and Reasons for Failures. *Management Accounting Research,* 16, 179-204.

Kantola, M. & Saari, A. 2016. Project Delivery Systems for Nzeb Projects. *Facilities,* 34, 85-100.

Kibert, C. J. 2007. The Next Generation of Sustainable Construction. Taylor & Francis.

Korkmaz, S., Riley, D. & Horman, M. 2010. Piloting Evaluation Metrics for Sustainable High-Performance Building Project Delivery. *Journal of Construction Engineering and Management,* 136, 877-885.

Kubba, S. 2010. Chapter 3 - Green Project Requirements and Strategies. *In:* KUBBA, S. (ed.) *Green Construction Project Management and Cost Oversight.* Boston: Architectural Press.

Lahdenperä, P. 2012. Making Sense of the Multi-Party Contractual Arrangements of Project Partnering, Project Alliancing and Integrated Project Delivery. *Construction Management and Economics,* 30, 57-79.

Lahdenperä, P. 2017. Towards a Coherent Theory of Project Alliancing: Discovering the System's Complex Mechanisms Yielding Value for Money. *Construction Economics and Building,* 17, 41.

Liu, B., Huo, T., Liang, Y., Sun, Y. & Hu, X. 2016. Key Factors of Project Characteristics Affecting Project Delivery System Decision Making in the Chinese Construction Industry: Case Study Using Chinese Data Based on Rough Set Theory. *Journal of Professional Issues in Engineering Education and Practice,* 142, 05016003.

Lloyd-Walker, B. M., Mills, A. J. & Walker, D. H. T. 2014. Enabling Construction Innovation: The Role of a No-Blame Culture as a Collaboration Behavioural Driver in Project Alliances. *Construction Management and Economics,* 32**,** 229-245.

Love, P., Davis, P., Ellis, J. & On Cheung, S. 2010. Dispute Causation: Identification of Pathogenic Influences in Construction. *Engineering, Construction and Architectural Management,* 17**,** 404-423.

Love, P. E. D., Gunasekaran, A. & Li, H. 1998. Concurrent Engineering: A Strategy for Procuring Construction Projects. *International Journal of Project Management,* 16**,** 375-383.

Lucon, O., Ürge-Vorsatz, D., Ahmed, A. Z., Akbari, H., Bertoldi, P., Cabeza, L. F., Eyre, N., Gadgil, A., Harvey, L. & Jiang, Y. 2014. Buildings.

Magent, C. S., Korkmaz, S., Klotz, L. E. & Riley, D. R. 2009. A Design Process Evaluation Method for Sustainable Buildings. *Architectural Engineering and Design Management,* 5**,** 62-74.

Mahdi, I. M. & Alreshaid, K. 2005. Decision Support System for Selecting the Proper Project Delivery Method Using Analytical Hierarchy Process (Ahp). *International Journal of Project Management,* 23**,** 564-572.

Marszal, A. J., Heiselberg, P., Bourrelle, J. S., Musall, E., Voss, K., Sartori, I. & Napolitano, A. 2011. Zero Energy Building – a Review of Definitions and Calculation Methodologies. *Energy and Buildings,* 43**,** 971-979.

Matthews, O. & Howell, G. A. 2005. Integrated Project Delivery an Example of Relational Contracting. *Lean construction journal,* 2**,** 46-61.

McChrystal, G. S., Collins, T., Silverman, D. & Fussell, C. 2015. *Team of Teams: New Rules of Engagement for a Complex World*, Penguin.

Mesa, H. A., Molenaar, K. R. & Alarcón, L. F. 2019. Comparative Analysis between Integrated Project Delivery and Lean Project Delivery. *International Journal of Project Management,* 37**,** 395-409.

Miles, M. B. & Huberman, A. M. 1994. *Qualitative Data Analysis: An Expanded Sourcebook*, sage.

Miller, J. B., Garvin, M. J., Ibbs, C. W. & Mahoney, S. E. 2000. Toward a New Paradigm: Simultaneous Use of Multiple Project Delivery Methods. *Journal of Management in Engineering,* 16**,** 58-67.

Molenaar, K. R., Sobin, N. & Antillón, E. I. 2010. A Synthesis of Best-Value Procurement Practices for Sustainable Design-Build Projects in the Public Sector. *Journal of Green Building,* 5**,** 148-157.

Mollaoglu-Korkmaz, S., Swarup, L. & Riley, D. 2013. Delivering Sustainable, High-Performance Buildings: Influence of Project Delivery Methods on Integration and Project Outcomes. 29**,** 71-78.

Munday, M. 1992. Accounting Cost Data Disclosure and Buyer-Supplier Partnerships—a Research Note. *Management Accounting Research,* 3**,** 245-250.

Naoum, S. 2003. An Overview into the Concept of Partnering. *International Journal of Project Management,* 21**,** 71-76.

Nevstad, K., Børve, S., Karlsen, A. T. & Aarseth, W. 2018. Understanding How to Succeed with Project Partnering. *International Journal of Managing Projects in Business,* 11**,** 1044-1065.

Ng, H. S., Peña-Mora, F. & Tamaki, T. 2007. Dynamic Conflict Management in Large-Scale Design and Construction Projects. *Journal of Management in Engineering,* 23**,** 52-66.

Oakland, J. & Marosszeky, M. 2017. *Total Construction Management: Lean Quality in Construction Project Delivery*, Routledge.

Ochs, E. & Shohet, M. 2006. The Cultural Structuring of Mealtime Socialization. *New Directions for Child and Adolescent Development,* 2006, 35-49.

Palaneeswaran, E. & Kumaraswamy, M. M. 2000. Contractor Selection for Design/Build Projects. *Journal of Construction Engineering and Management,* 126, 331-339.

Pinnell, S. 1999. Partnering and the Management of Construction Disputes. *Dispute Resolution Journal,* 54, 16-22.

Pinto, J. K., Slevin, D. P. & English, B. 2009. Trust in Projects: An Empirical Assessment of Owner/Contractor Relationships. *International Journal of Project Management,* 27, 638-648.

Provera, B., Montefusco, A. & Canato, A. 2010. A 'No Blame' Approach to Organizational Learning. *British Journal of Management,* 21, 1057-1074.

Rahman, M. M. & Kumaraswamy, M. M. 2005. Relational Selection for Collaborative Working Arrangements. *Journal of Construction Engineering and Management,* 131, 1087-1098.

Rahman, M. M. & Kumaraswamy, M. M. 2008. Relational Contracting and Teambuilding: Assessing Potential Contractual and Noncontractual Incentives. *Journal of Management in Engineering,* 24, 48-63.

Rahman, M. M., Kumaraswamy, M. M. & Ling, F. Y. Y. 2007. Building a Relational Contracting Culture and Integrated Teams. *Canadian Journal of Civil Engineering,* 34, 75-88.

Robichaud, L. B. & Anantatmula, V. S. J. J. o. M. i. E. 2010. Greening Project Management Practices for Sustainable Construction. 27, 48-57.

Rousseau, D. M., Sitkin, S. B., Burt, R. S. & Camerer, C. 1998. Not So Different after All: A Cross-Discipline View of Trust. *Academy of management review,* 23, 393-404.

Russell, J. S. & Jaselskis, E. J. 1992. Predicting Construction Contractor Failure Prior to Contract Award. *Journal of Construction Engineering and Management,* 118, 791-811.

Sakal, M. W. 2005. Project Alliancing: A Relational Contracting Mechanism for Dynamic Projects. *Lean Construction Journal,* 2, 67-79.

Sarkar, D. 2015. A Framework for Development of Lean Integrated Project Delivery Model for Infrastructure Road Projects. *International Journal of civil and structural Engineering,* 5, 261.

Sarkar, D. & Mangrola, M. 2016. Development of Lean Integrated Project Delivery Model for Highway Projects. *International Journal of Construction Project Management,* 8, 25.

Sartori, I., Napolitano, A. & Voss, K. 2012. Net Zero Energy Buildings: A Consistent Definition Framework. *Energy and Buildings,* 48, 220-232.

Saunders, M., Lewis, P. & Thornhill, A. 2016. *Research Methods for Business Students*, Pearson education.

Smith, E. M. & Thomasson, A. 2018. The Use of the Partnering Concept for Public–Private Collaboration: How Well Does It Really Work? *Public Organization Review,* 18, 191-206.

Sparkling, A., E., Mollaoglu, S. & Kirca, A. 2017. Research Synthesis Connecting Trends in Architecture, Engineering, and Construction Project Partnering. *Journal of Management in Engineering,* 33, 04016033.

Storteboom, A., Wondimu, P., Lohne, J. & Lædre, O. 2017. Best Value Procurement-the Practical Approach in the Netherlands. *Procedia computer science,* 121, 398-406.

Tang, Z. W., Ng, S. T. & Skitmore, M. 2019. Influence of Procurement Systems to the Success of Sustainable Buildings. *Journal of Cleaner Production,* 218, 1007-1030.

Thomas, R., Marosszeky, M., Karim, K., Davis, S. & McGeorge, D. The Importance of Project Culture in Achieving Quality Outcomes in Construction. Proceedings IGLC, 2002. 1-13.

Thomsen, C., Darrington, J., Dunne, D. & Lichtig, W. 2009. Managing Integrated Project Delivery. *Construction Management Association of America (CMAA), McLean, VA,* 105.

Thyssen, M. H., Emmitt, S., Bonke, S. & Kirk-Christoffersen, A. 2010. Facilitating Client Value Creation in the Conceptual Design Phase of Construction Projects: A Workshop Approach. *Architectural Engineering and Design Management,* 6**,** 18-30.

Treacy, T. B. 1995. Use of Alternative Dispute Resolution in the Construction Industry. *Journal of Management in Engineering,* 11**,** 58-63.

Vilasini, N., Neitzert, T. & Rotimi, J. 2014. Developing and Evaluating a Framework for Process Improvement in an Alliance Project: A New Zealand Case Study. *Construction Management and Economics,* 32**,** 625-640.

Walker, D. H. T., Hampson, K. & Peters, R. 2002. Project Alliancing Vs Project Partnering: A Case Study of the Australian National Museum Project. *Supply Chain Management: An International Journal,* 7**,** 83-91.

Wen, Q., Qiang, M. & An, N. 2017. Collaborating with Construction Management Consultants in Project Execution: Responsibility Delegation and Capability Integration. *Journal of Construction Engineering and Management,* 143**,** 04017021.

Yeung, J. F. Y., Chan, A. P. C. & Chan, D. W. M. 2007. The Definition of Alliancing in Construction as a Wittgenstein Family-Resemblance Concept. *International Journal of Project Management,* 25**,** 219-231.

Yin, R. K. 2014. *Case Study Research: Design and Methods,* Los Angeles, USA, SAGE Publications Inc.

Young, B., Hosseini, A. & Lædre, O. 2016. The Characteristics of Australian Infrastructure Alliance Projects. *Energy Procedia,* 96**,** 833-844.

Zhang, L.-Y., Cheng, J. & Fan, W. 2016. Party Selection for Integrated Project Delivery Based on Interorganizational Transactive Memory System. *Journal of Construction Engineering and Management,* 142**,** 04015089.