COLLABORATION AND RELATIONSHIPS IN NORDIC INFRASTRUCTURE PROJECT NETWORKS

Anna af Hällström[1] and Petra Bosch-Sijtsema

Technology Management and Economics, Chalmers University of Technology, Chalmersplatsen 4, Gothenburg, Sweden

Since the turn of the millennium, project planners have tried reducing the adversity commonly seen in infrastructure construction projects by employing collaborative project management models, such as alliancing, early contractor involvement, or partnering. In the public sphere these models are utilised with the hope that public funds would be used efficiently to meet the needs of society through well-executed projects. One of the major drivers for these expectations is the practice inherent in the models of early-stage collaboration between all involved actors, e.g., client, design consultant, and contractor, which opens up the opportunity to focus more on intangible metrics, such as life-cycle perspectives, sustainability and societal good: factors that have recently become more significant through societal demands. In the Nordic countries, several different models are currently being applied in practice. Employing a project network perspective, we look at two infrastructure projects, employing collaborative project management models in the Nordic countries and study the expectations on collaboration models as well as the actual collaboration between the different actors in these project models. The empirical evidence, consisting of 41 semi-structured interviews, points to a discrepancy in the application of collaborative project management models as well as changing actor roles in the project network. There seem to be clear benefits realised through employing such models, such as time savings and resource use reduction, but as the benefits depend on the changing roles, it is uncertain if the projects will realise these. Results indicate a collective interest to produce a common good in all involved actors, i.e., a well-functioning, qualitative infrastructure project, while simultaneously highlighting the discrepancy between expectations and actions.

Keywords: Actors, collaboration, infrastructure, network, project management

INTRODUCTION

The impact of the Architecture, Engineering and Construction industry (AEC) industry is a relatively traditional, project-based field (Hastie *et al.,* 2017, Lundin *et al.,* 2015), which doesn't easily yield to outside influences (Lundin *et al.,* 2015) and has a slow adaptation rate of new ideas and processes. It is also characterised by adversity, disputes, and a lack of cooperation (Franz *et al.,* 2016, Hansen-Addy and Nunoo 2014). But increased focus on sustainability and resource efficiency in the AEC industry (Ryd 2014), the increasing inclusion of stakeholder views, as well as

[1] anna.af.hallstrom@gmail.com

af Hällström, A and Bosch-Sijtsema, P (2020) Collaboration and Relationships in Nordic Infrastructure Project Networks *In:* Scott, L and Neilson, C J (Eds) *Proceedings of the 36th Annual ARCOM Conference,* 7-8 September 2020, UK, Association of Researchers in Construction Management, 245-254

the growing size and scope of projects (Flyvbjerg 2014) are starting to change the way infrastructure projects are executed. There is therefore a pressing need to look closer at this changing industry.

Novel forms of interdependent and complex major, mega and tera projects (Flyvbjerg 2014) require novel ways of management (Volker *et al.,* 2018). New project governance models, focused on collaboration and relationship building, have been introduced in both project-supported organisations, such as manufacturing companies and public institutions (Lundin *et al.,* 2015), but also in construction and infrastructure projects (Bygballe *et al.,* 2010, Volker *et al.,* 2018), partly in order to be able to deal with the added complexity of developing large infrastructure. One of the major drivers for introducing collaborative project models, such as alliancing, early contractor involvement, and partnering, in infrastructure construction, has been to reduce adversity and improve project outcomes (Lundin *et al.,* 2015, Volker *et al.,* 2018).

The infrastructure development industry is, as is the AEC industry, project-based, where the project shapes a project network, formed around the project and consisting of organisations participating in the project with different roles and goals (Adami and Verschoore 2018). Large infrastructure projects require a temporary network of actors, in which value is created in large-scale inter-organisational cooperation that is temporally bound (van Fenema *et al.,* 2016). As collaborative project models have increased in popularity since the turn of the millennia (Volker *et al.,* 2018), there are implications for the roles of actors and the way they act in the project network and this changes the way infrastructure projects are delivered and governed. However, there is currently very little research on how these roles and relations change. While many studies primarily focus on the benefits of collaborative project models, few discuss the transition in ways of working and in the network relationships between the different involved actors. It is therefore interesting to see how the roles of the actors in a transitory project network can impact project delivery: how the actors utilise the network, manage resources available to them, and engage in activities (Håkansson *et al.,* 2010). Our aim is to describe changing actor roles in complex, large-scale, collaborative infrastructure development projects.

We first discuss the theoretical background and framework. In the methodology section, the data collection approach consisting of semi-structured interviews in two case studies is presented. The findings section discusses the qualitative data related to the different network actor roles and these findings are related to literature in the discussion section. The paper ends with a conclusion section, as well as recommendations for future research.

THEORY

A project network is here defined as the network created in and around a specific project. It can be viewed as a network of actors, in an infrastructure construction project constrained to the client of the project, the lead designer, and the contractor; connected by state and event ties, such as project meetings and the governing contract (Adami and Verschoore 2018, Borgatti and Halgin 2011, Hastie *et al.,* 2017). These actors are engaging in activities, determined according to their role in the project network, and strive to fulfil mutual goals, defined by the project (Adami and Verschoore 2018). The parties involved also have their own goals that dictate their participation in the project, funded on both project goals but also goals put forth by their parent company, such as profit (Adami and Verschoore 2018).

A project network view opens up for understanding the dynamics of systems, such as people, material, resources, and knowledge, connected to temporary organisations. Some project networks may be governed by distinctive roles, performed by project participants, and the functional interdependence between these roles (Steen *et al.,* 2018). Such networks and roles are often seen in the AEC industry, although there does not seem to be a commonly accepted allocation thereof, so changes may occur between and inside projects (Hastie *et al.,* 2017). While research has discussed distinct roles in AEC projects, there is little known about both the relationships and networks forming in the collaborative models of project management, as well as the changing roles these new relations define, that are increasingly used in the infrastructure construction industry (Chen *et al.,* 2018, Jelodar *et al.,* 2016, Pryke *et al.,* 2018). Thus, there is a need for further study in this field.

Attributes that make infrastructure construction projects especially challenging relate to their complexity (Pryke *et al.,* 2018) and the impact they have on their environment (Eriksson 2015). Collaborative project models consist of both contractual mechanisms and non-contractual mechanisms like leadership, collaboration, communication and integration (Chen *et al.,* 2018). Many of these collaborative project models share an aim of integrating different phases of the construction project (i.e. design and construction) and include an early involvement of all concerned actors, to foster collaboration and deliver increased value to the client compared to traditional models. Some of the collaborative models used in infrastructure construction include alliance, early contractor involvement (ECI), integrated project delivery (IPD), and partnering (Chen *et al.,* 2018, Lahdenperä 2012). These models are often divided into phase 1, design or planning, and phase 2, construction. The reported benefits of these models include lower costs and improved constructability, a lower risk of delays, improved teamwork, higher levels of trust within the project organisation, as well as reduced litigation and improved satisfaction (cf. Franz *et al.,* 2016, Hansen-Addy and Nunoo 2014, Volker *et al.,* 2018). It is therefore possible that a well-managed project, contributing to strong relationships within the project organisation, will both facilitate collaboration and lessen conflicts (Jelodar *et al.,* 2016).

The rising interest in collaborative project models, such as alliancing, early contractor involvement, and partnering, brings with it changing roles, activities and impacts on the project network, which relate to one of the main points of collaborative models: the relationships it promotes within the project network. These relationships can be seen as relationships in the project network itself, but also the relationships involving parent companies and subcontractors taking part in the project. The client is an organisation that initiates a project to fulfil an identified need. In a construction project, the client has to manage "requirements and conditions within building and construction projects" (Ryd 2014: 135). In infrastructure construction, the client is usually a public organisation or institution, as infrastructure projects generally are large-scale, society-impacting programs. The client does have a possibility to impact development of future fields, such as sustainability, through project requirements and involvement in the project (Lundin *et al.,* 2015, Ryd 2014). The role of the client depends much on the project context, as different models often require specific client input. A small-scale municipal construction project in a well-known field, such as building a school, doesn't need much client input as the goal is clear and construction process well-known. As the size of projects grow, so does the need for a more

involved client, as trust, commitment, and teamwork need involved actors to flourish (Jelodar *et al.,* 2016).

The lead designer is contracted to develop concepts and plans. The lead designer can be either a single firm with multiple specialties, or a combination of smaller companies, including architects, construction designers, and experts in different related fields. In the Nordic construction industry today, the role of the lead designer is focused in the planning phase of a construction project and many existing processes are based on plans being completed before the construction phase begins. The role changes with a deeper collaboration with the contractor in the planning phase, which impacts the design work. The contractor is engaged to realise the project. The contractor can subcontract parts or all of the construction work and thus create a separate network within the larger project network. A contractor is often viewed as a project-based organisation (Hastie *et al.,* 2017, Lundin *et al.,* 2015), where the network actors are focused on one project at a time and their home organisation is focused on managing a portfolio of projects. The contractor role has traditionally been focused in the execution phase of a construction project. As their involvement is demanded in the earlier stages of the project, the role changes from a purely executing one to include aspects of planning and facilitation.

In keeping with current international trends, public infrastructure project clients in the Nordics have started to apply collaborative models to their projects. This has raised interest in how the public actor's role is impacted in the project. As collaborative models become the norm, the roles of the different actors involved in the infrastructure project will change as well.

RESEARCH DESIGN

The study applies an inductive and interpretive approach in order to study the transitioning role of the main network actors in large-scale infrastructure projects that apply a collaborative project model. In order to fulfil the objectives of this study we studied two large and complex infrastructure projects in a Nordic setting, where document analysis and 41 semi-structured interviews (20 for case A and 21 for case B) with various project actors were carried out. All interviews were taped and transcribed. The projects were selected on the usage of a collaborative project model, and both projects are pilot projects. For the semi-structured interviews, a common interview guide was used that focused on questions concerning the role of the actors and their relationships, the project itself, and collaboration in the project. The interviews were conducted with respondents in both managerial positions, i.e., project manager or division head, as well as in positions like technical specialist and construction site manager. Interviews were conducted in the three actor segments of client, lead designer and contractor. In addition to the interviews, we carried out a number of observations of the collaborative spaces and collected secondary material in terms of project documents, e.g., organisational charts and contracts, for both cases. For the analysis, data was coded thematically in relation to the different actors in the project network, the relations between the actors, and activities for collaboration.

The case studies (see table 1) represent two Nordic infrastructure construction projects, implemented in an urban setting and employing a collaborative project model approach. The cases can be classified as major projects with respect to their projected cost and time span, as well as the number of stakeholders involved. Both projects employed a two-step process, where a design phase (phase 1) was followed by a client decision on whether to continue with construction (phase 2) or end the project. The

projects are applying different collaborative project management models and are performed in different countries which makes a direct comparison difficult. However, the differences in the cases help us highlight variances between the models, as the cases are comparable in both size and cultural framework.

Case A is a large-scale infrastructure construction project, constructing a new public transportation setting based on rail, where the public client and the contractor have a bilateral contract, with the contractor subcontracting planning, design and other aspects of project execution. Project planning started in 2014, phase 1 started in 2016, and phase 2 in 201. The project is still ongoing and is estimated to be completed in 2026. The project includes a reward system based on final price. The project is managed by a contractor who subcontracts planning and other aspects of the project. The contractor was chosen based on the contractor's total estimated production cost, but also on so-called soft parameters, such as collaboration and teamwork.

Case B is a large-scale infrastructure construction project, constructing a new public transportation setting based on light rail, where the public client, the contractor, and the lead designer (planner) all are part of the same contract (multi-party contract). In case B, project planning started in 2016, phase 1 in 2018, and phase 2 in 2019. The project is still ongoing and is estimated to be completed in 2024. project includes a reward system based on final price, as well as key performance indicators tied to project performance and established parameters.

Table 1: Case descriptions

	Case A	Case B
Length	9,5 years (estimated)	6,5 years (estimated)
Monetary value	475 million €	390 million €
Contract type	Bilateral (client-contractor)	Multi-party
Research methods	Interviews, document analysis	Interviews, document analysis, observation
Interviews	20 interviews	21 interviews
Interview lengths	1-1,5 hours	1-3 hours
Roles interviewed	Main actors in the project: client (8), contractor (6), lead designer/subcontractor (6)	Main actors in the project: client (5), lead designer (7), contractor/subcontractor (9)
Observations	Observations of meetings and big room activities	Observations of meetings and big room activities

FINDINGS

The main findings relate to the transitioning roles necessitated by the new collaborative project models, as all actors' roles are impacted by these changes. The largest difference was in the extent of transition achieved in the cases; in case A, the transition into a truly collaborative project model was only done to a limited extent and the actors had difficulty to transform their traditional roles, while case B showed that the different roles in the project transformed and all actors acknowledged this transition process. Below the three main actors and the changes in their roles and relationships are discussed.

In most infrastructure projects with more traditional project models, the public clients are not involved in the project team but have a role to define requirements and check if these requirements are met. However, for the collaborative project model the role of the client is changing. The two cases both perceived this changing role of the client but acted differently upon this. In case A, the relationship was fraught with tension and conflict related to how the actors' perceived the project model. In case A, several

interviewees mentioned the lack of expected collaboration and how especially the client and contractor had diverse expectations on each other's role as well as the interpretation of the governing contract. The client in case A stated the following: "[the project delivery process] was not as we expected it to be. Either we [client] have been very bad at explaining that what it was we wanted out of this, or for some reason, the contractor interpreted it not as we expected them to". In case B, the client role was clearer, and they took on an active role in both phase 1 and 2. In both cases, both the contractor party as well as the client party discussed the changing role of the client in the collaborative project model employed. It became clear from the interviews that this role still needs improvement as it is still somewhat ambiguous. One respondent of case B states, "what's special about this is that this is a very complex and unusual situation, as this [project] model is new to [the clients] […] and the model affects specifically the role of the client. And in my opinion, this is the biggest lesson in this collaborative model, the role of the client". Other respondents were of the opinion that it was a learning process for all. In both cases the transition in the client role was perceived as a major factor for the collaborative project model to work successfully. Interviewees mentioned that special care should be taken to ensure the client's active involvement in the early phases of the project, which was seen to potentially lead to less bureaucracy in the process. The biggest obstacle to active client involvement was insufficient human resources on the client organisations' part, such as specialists and people empowered to make decisions on their parent organisation's behalf.

Lead designers are, as opposed to the client, used to work collaboratively in projects and in a project network. However, many designers work in multiple projects and not always in one single project and they usually split their time between separate projects, which could be a problem in engaging full-time in a collaborative project model. One respondent in case B commented that it's easy for contractors, who are used to work with one project, but that "design firms have more of an '100 irons-in-the-fire' approach", which could lead to conflicts in the project network. The lead designers were, however, used to working in an iterative way with the client, when discussing and refining plans and were therefore quite comfortable with the collaborative models used.

In case A, the role of the lead designer was perceived as rather similar to traditional projects, as the project used a bilateral contract between the contractor and the client. In case A, the contractor hired the lead designers for phase 1 (design) and 2 (construction) and as the lead designer saw the contractor as their client and did not have a close relationship with the public client. For the design work, there had been some deeper collaboration with the client in the planning phase, but the majority of the lead designer's work was done at their home office. This was partly due to the resources available at the project office, such as peer knowledge and experience, well-functioning IT-connections, and support functions.

In case B, a multiparty contract was applied in which client, lead designer, and contractor had a joint contract. The biggest discussion point related to the lead designer's role in terms of the collaboration with the contractor and the need for more trust and communication with the contractor. As few designers had experience of such work settings, and the needs of the other party were unclear, as well as their own role, phase 1 (design) of the project had been characterised by smaller conflicts between designers and contractors. The conflicts had been exacerbated by a lack of resources from both sides, which was tied to project management and project resourcing in general. This continued into phase 2 (construction), where some of the

conflict persisted, mostly due to a lack of understanding of each other's roles. The designers felt that the contractor mainly focused on construction aspects, related to time and costs, while they wanted more time to design the complex solutions of the project. The contractors felt, however, that the designers needed too much time and wanted the planners to finalise their designs so that construction activities could start. This was visible in the iterative way plans and construction proceeded; many respondents used the term "hand-to-mouth" about the process, as construction sometimes had to commence with quite fresh plans and the lead time for construction sites was short.

Table 2: Project phases and roles

Transitions in role	Client	Lead Designer	Contractor
Case A - phase 1	Mismatch of expectations on role client and contractor - Aware of a needed change, but struggling to change their role and maintain their traditional role	Lead designer works mainly with contractor - no changes in role	Mismatch of expectations on role client and contractor - Aware of a needed change, but expects this of the client and maintains traditional role
Case A - phase 2	Traditional contract and falling back in traditional client role	Lead designer works mainly with contractor - no changes in role	Traditional contract and falling back in traditional contractor role
Case B - phase 1	Active role of client in project, recognizing new role	Lead designer's relation with contractors related to traditional role differences	New role of contractor in project not fully anticipated
Case B - phase 2	Active and engaged client interacting with designers and contractors	Iterative planning and short lead time create friction with contractor	Iterative planning and short lead time create friction with designer

The contractor saw no challenges related to project governance due to the collaborative model, although the contractors in both cases mentioned benefits related to using a collaborative model. The main mentioned benefit related to time savings, but also to improved constructability. The biggest difference between the cases could be seen in the perception of the contractor's role in the project network. In case A, the contractor states that things have changed and that they are working in a collaborative manner, but the client perceives their actions as following established patterns of traditional, adversary, project management. In case B, the challenge in developing the contractor's role was related to the inexperience of the actors with the project model and the inclusion of their input early on in the process. It was especially visible in the iterative nature of the early planning phase (phase 1), as the contractor was unfamiliar with this, and "just wanted to get to the real work". This was also remarked upon by respondents from both the client and the lead designer in case B. The biggest challenges to the contractor's role were found in the early phases of the project, where both lead designer and contractors commented on the need to increase communication and the lead designer's trust in the contractor, and to share unfinished work between the two actors, in order to fully utilise the benefits of the collaborative model.

There were also differences between the public client and private contractor in terms of a focus outside of the project. Both infrastructure projects have high impact on society and the environment in terms of social, economic and financial sustainability. The role of the public client also includes to take care of the surrounding environment of the project. In case B there was extensive communication to the surrounding environment from a joint communication group consisting of client, consultants and contractor representatives. In case A, there seemed to be different expectations

between the two parties on their engagement with the surrounding environment. Here, the client expected that the contractor would take part in this communication role, which the contractor did not expect or acknowledge.

DISCUSSION

Large urban infrastructure projects have a major impact on society and could support the common good through improved collaboration between multiple actors (Flyvbjerg 2014, Volker *et al.,* 2018). In recent years collaborative project models have been introduced with the aim of improving project outcomes in the challenging and complex environment of urban infrastructure projects (Volker *et al.,* 2018). These large projects are the source of temporary networks of actors cooperating over organisational boundaries (van Fenema *et al.,* 2016). While there has been substantial research on different forms of collaborative project models, the main focus has been on procurement, governance, benefits and hindrances of working with these models (Bygballe *et al.,* 2010, Volker *et al.,* 2018). However, few studies focus on the different actor roles and changes in their relationships from a network perspective. From the two cases studied, it was found that the collaborative models impact the relationships in the project, partly through the changing roles of actors and relationships between the actors in the networks.

The biggest role and relationship changes in the project network appear in the role of the client and the contractor in both phases of a collaborative project model. A collaborative project model would seem to indicate a need for the client's role to develop into a more active and participatory one, especially in the early phases of the project, as seen in case B where the client, lead designer, and contractor all were part of the same project contract and developed a more joint perception of the project model as well as clearer roles. The contractor's role is also changing, as the collaborative model requires more input from them in early phases and a need for the contractor to collaborate with both client and consultants in iterative ways which they are unaccustomed to. This would impact the project network, as the collaborative aspects impact project delivery and goal consensus (Steen *et al.,* 2018).

While the collaborative project models aim for a collaboration between all actors, the change in behaviour, practice and perception was not clear for all actors especially in case A. In case A both client and contractor were aware of a need to change their roles, but their actions are not in line with the necessary transition. Although both stated an interest in collaboration, they maintained their traditional approaches to the project as evidenced by the inability to agree on contract interpretation. This might be in line with other research discussing the difficulties in changing institutionalized practices and behaviour in the AEC industry (Bygballe and Swärd 2019). In case B, the application of the new model was clearer, and interviewees stated that they perceived changes in their roles. Although conflicts appeared also in case B, they were mainly related to the unfamiliarity of the new roles.

Lastly, the organisations in the project network are working towards both mutual project goals and their own goals for participating in the project as well as goals from their parent organisation (Adami and Verschoore 2018). In the cases studied, the public client has goals related to urbanization and sustainability, as well as an efficient use of public funds for the common good. The contractor and consultant, usually private corporations, mainly work towards shareholder profits, but sustainability is also a major driver amongst private organisations active in the infrastructure sector. The goals of the private and public actors might not always go hand in hand and even

though the project has a joint goal, these differences in the actor's organizational goals and roles can come forward in the project as well. In case A for example there were different expectations on the way the project actors should communicate with the surrounding environment. These expectations were not clearly discussed but come forth from the different organizational goals of the different actors.

Even though the collaborative project models have been increasingly used in the Nordic Scandinavian countries and clear benefits are found in literature for their usage, the transition of behaviour of the different actors involved will need additional attention in future research. From our research it becomes clear that the different actor roles and relationships between the actors need a transition and this transition is not always easy in a rather institutionalized industry as the AEC, as evidenced by the difficulties the project actors in case A had in transitioning to a collaborative network relationship, while in case B the project network's evolving transition was reflected upon and interviewees noticed changes in the different roles within the project. This might be connected to the chosen collaborative project model, but this aspect is outside the scope for this study and requires further research.

CONCLUSION

In an urbanising world, the impact of infrastructure construction projects is immense. In recent years, collaborative project models have been implemented to help with problems endemic to the industry. These models bring with them new requirements for actors participating in the project network, as they impact the roles and relationships forming in the project. In this study the focus has been on the transition of the actor roles in the project network in major infrastructure projects.

From the two cases we found that all members perceive that a transition in the different roles is needed, but not all actors are transitioning to a new role and some maintain their traditional role. The major transitions are found in the client and contractors' roles. The lead designer's role has the least changes to it, as they are both used to a project-based process, as well as iterative work processes and close collaboration with the client.

This study presents an insight in the transition of roles in more collaborative project models, but future research would need to study the project network, the different actors, the relationship between the actors, and transition in actors' roles in more detail with multiple cases and additional qualitative and quantitative data. Another interesting aspect would be to look at how the chosen collaborative project model shapes the project network.

REFERENCES

Adami, V S and Verschoore, J R (2018) Implications of network relations for the governance of complex projects, *Project Management Journal*, **49**(2), 71-88.

Borgatti, S and Halgin, D (2011) On network theory, *Organization Science*, **22**(5), 1168-1181.

Bryman, A and Bell, E (2015) *Business Research Methods*, Oxford: Oxford University Press.

Bygballe, L E, Jahre, M and Swärd, A (2010) Partnering relationships in construction: A literature review, *Journal of Purchasing and Supply Management*, **16**(4), 239–253.

Bygballe, L E and Swärd, A (2019) Collaborative project delivery models and the role of routines in institutionalizing partnering, *Project Management Journal*, **50**(2), 1-16.

Chen, L, Manley, K, Lewis, J, Helfer, F and Widen, K (2018) Procurement and governance choices for collaborative infrastructure projects, *Journal of Construction Engineering and Management*, **144**(8), 04018071, 1-10.

Eriksson, T (2015) Developing routines in large inter-organisational projects: A case study of an infrastructure megaproject, *Construction Economics and Building*, **15**(3), 4-18.

van Fenema, P C, Rietjens, S and van Baalen, P (2016) Stability and reconstruction operations as mega projects: Drivers of temporary network effectiveness, *International Journal of Project Management*, **34**(5), 839-861.

Flyvbjerg, B (2014) What you should know about megaprojects and why: An overview, *Project Management Journal*, **45**(2), 6-19.

Franz, B, Leicht, R, Molenaar, K and Messner, J (2016) Impact of team integration and group cohesion on project delivery performance, *Journal of Construction Engineering and Management*, **143**(1), 04016088.

Håkansson, H, Ford, D I and Gadde, L-E (2010) *Business in Networks*, London: Wiley.

Hansen-Addy, A and Nunoo, E (2014) Critical factors affecting trust in construction partnering in UK, *European Journal of Business and Management*, **6**(24), 40-50.

Hastie, J, Sutrisna, M and Egbu, C (2017) Modelling knowledge integration process in early contractor involvement procurement at tender stage – A Western Australian case study, *Construction Innovation*, **17**(4), 429-456.

Jelodar, M B, Yiu, T W and Wilkinson, S (2016) A conceptualisation of relationship quality in construction procurement, *International Journal of Project Management*, **34**(6), 997-1011.

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**(1), 57-79.

Lundin, R A, Arvidsson, N, Brady, T, Ekstedt, E, Midler, C and Sydow, J (2015) *Managing and Working in Project Society: Institutional Challenges of Temporary Organizations 1st Edition*, Cambridge: Cambridge University Press.

Pryke, S, Badi, S, Almadhoob, H, Soundararaj, B and Addyman, S (2018) Self-organizing networks in complex infrastructure projects, *Project Management Journal*, **49**(2), 18-41.

Ryd, N (2014) Construction clients challenges - Emphasizing early stages, *Procedia - Social and Behavioural Sciences*, 119, 134-141.

Steen, J, DeFillippi, R, Sydow, J, Pryke, S and Michelfelder, I (2018) Projects and networks: Understanding resource flows and governance of temporary organizations with quantitative and qualitative research methods, *Project Management Journal*, **49**(2), 3-17.

Volker, L, Eriksson, P E, Kadefors, A and Larsson, J (2018) A Case Based Comparison of the Efficiency and Innovation Potential of Integrative and Collaborative Procurement Strategies. *In:* Gorse, C and Neilson, C J (Eds.), *Proceedings 34th Annual ARCOM Conference*, 3-5 September 2018, Queen's University, Belfast, UK. Association of Researchers in Construction Management, 515–524.