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Abstract

Purpose – Collaborative models of delivering construction projects have proved to be very effective and mostly successful. However, due to the limited research-based knowledge, we still have limited understanding on deep collaboration and trust building process in this context. Hence, this study aims to explore characteristics and enablers of deep collaboration and to reveal the process through which mutual trust is created in inter-organizational construction projects with collaborative delivery models.

Design/methodology/approach– A qualitative study was conducted, and the required data was collected through semi-structured interviews with project managers of completed alliance construction projects in Finland. The collected data was then analyzed through content analysis method.

Findings– The findings suggest nine characteristics and eight key enablers for deep collaboration. In addition, the obtained results suggest that there are six key factors behind mutual trust. Furthermore, a framework was developed that reveals the four-step process through which mutual trust is established in inter-organizational construction projects with collaborative delivery models.

Research limitations/implications– Although the findings of this study significantly contribute to theory and practice in the field of collaborative and sustainable construction project delivery, it is acknowledged that these findings are mostly based on Finnish professionals' input, and expanding this research to other regions is a potential area for future studies. Moreover, the developed model, although validated in Finland, needs to be tested in a broader context as well to gain wider generalizability.

Originality– The findings of this study provide a substantial contribution toward collaboration and mutual trust in inter-organizational construction projects.

Keywords: collaborative project delivery, collaboration in construction, inter-organizational construction projects, mutual trust in construction.

Introduction

Construction industry in every country is considered as one of the means for strategic and sustainable development due to its considerable contribution to the economy (Hasan *et al.*, 2018). Construction industry tackles this challenge through a transformational and change-making mechanism, which is called the project. The project, with an ontological perspective and from a holistic view, is defined here as a temporary means for fulfilling a relatively risky need via a limited number of people and resources to realize a change-making as well as value adding end.

Construction projects, due to their strong dependence on the people as the subject of all activities, all the time face uncertainties, complexities, and interdependencies (Moradi and Sormunen, 2023a). These emanate from different people-oriented sources, including diversity of stakeholders, their needs, capabilities, and limits; competition between project participants; diversity of knowledge fields and working methods; opportunism; and risks. These challenges imply the necessity of collaboration in construction projects, a topic which has gained an unprecedented attention in the research community in the recent 10 years.

Research on collaborative project delivery in construction and its impacts has come a long way (Moradi *et al.*, 2024 a,b). As mentioned earlier, the significance of collaboration in construction projects is increasing all the time along with their growing interdependency, complexity, and uncertainties. Although this may emphasize the importance of collaboration in complex construction projects, it doesn't dilute its positive impact on small and simple construction projects with relatively high predictability. In fact, collaboration is a value-adding mechanism which supports the success chance of the project regardless of its size (Moradi and Sormunen, 2023b).

The reason for the high importance of collaboration lies in its ontology which involves people, process, and technology as its components, which are also seen as three main aspects of construction projects. And just like the construction, people are also the subject of collaboration as well. Since construction projects are highly dependent on people, they subsequently become dependent on collaboration in order to take the best advantage of the people working on the project for the sake of the project.

As much as the collaboration between people in construction projects is important, it is also challenging. The first challenge is that there is still a lack of in-depth understanding of the characteristics and enablers of deep collaboration; a foundation that can help project participants to share a common understanding regarding deep collaboration and to commit themselves to achieving it. Although we have an initial understanding of collaborative project delivery and its characteristics (e.g., mutual trust, the share of risk-reward, open communication, unanimous decision making) (Fischer *et al.*, 2017; Lloyd-Walker and Walker, 2015; Oakland and Marosszeky, 2017), there is still more to explore on what deep collaboration actually means and how it can be realized.

The second challenge is related to our limited understanding of mutual trust establishment process in construction projects which have been frequently mentioned in the literature as one of the characteristics and enablers of collaboration. Thus, it seems imperative to explore the main factors behind mutual trust and their interplay in inter-organizational construction projects with collaborative delivery models. Hence, this study aims to do fill the mentioned knowledge gaps through answering the following questions:

RQ1. What are the characteristics of deep collaboration in inter-organizational construction projects with collaborative delivery models?
RQ2. What are the enablers of deep collaboration in inter-organizational construction projects with collaborative delivery models?
RQ3. What are the main factors behind mutual trust in inter-organizational construction projects with collaborative delivery models?
RQ4. What kind of framework can show the establishment process of mutual trust in in inter-organizational construction projects with collaborative delivery models?

The resultant article is structured in six sections, including this introduction, which is followed by theoretical background section. Then, the research design, data collection and analysis are explained in the methodology section which is followed the presenting the obtained results in the findings section. The discussion and conclusions wrap up the findings, uncover their key messages and show the future direction.

Literature review

Collaboration in construction

As mentioned earlier, collaboration in construction projects has been an interesting topic for the research community in the recent years. Consequently, a few scholars have tried to define collaboration in general and in the context of construction. Table 1 shows those definitions/descriptions.

Table 1. Definitions of collaboration in the literature

2012	The term collaboration is used as a term to describe any type of working together. Collaboration aims to achieve optimal results in a cost-effective and timely manner by bringing together a variety of people and resources, harnessing their collective knowledge and abilities to complete tasks that a sole organization would find difficult to accomplish by themselves (Hughes *et al.,* 2012)
2014	Collaboration refers to the process undertaken by a number of individuals in sharing their collective knowledge, expertise and skills (Van Gassel, Láscaris-Comneno, and Maas, 2014)
2017	Collaboration occurs when a group of autonomous stakeholders of a problem domain engage in an interactive process, using shared rules, norms, and structures, to act or decide on issues related to that domain. Collaboration requires negotiations among the parties involved to jointly create rules and structures for mutually beneficial relationships (Oraee *et al.,* 2017).
2018	Collaboration concerns the interpersonal processes and reflects the level of trust and commitment between people and also the sense of belonging to a team in the supply chain (Koolwijk *et al.,* 2018)
2020	There are three different conceptions of collaboration in construction. These conceptions are mechanism, organism, social construct. The first two conceptions address collaboration as problem solving activity while the last one addresses collaboration as interactions to promote change. Accordingly, collaboration has three functions of information processing, relationship management, and co-production (the ability to act collectively towards common goals) (Gomes and Tzortzopoulos, 2020).
2021	Trust, commitment, and reliability are the enablers of collaboration in construction projects (Deep *et al.,* 2021).

2021	Collaboration characteristics: (i) Members belong to one system, (ii) Communication is frequent and characterized by mutual trust, and (iii) Consensus is reached on all decisions (Elsayegh and El-Adaway, 2021).
2021	Collaboration is working together (Moradi *et al.,* 2021).
2024	Collaboration refers to the application, adoption, and/or integration of disciplinary knowledge and method for a common goal, and happens in three forms of intra, inter, and trans-disciplinary. Intra-disciplinary Collaboration refers to a group of people in one discipline which use their disciplinary knowledge and method. Inter-disciplinary Collaboration refers to a group of people from similar/different disciplines which adopt knowledge and methods of each other's disciplines. And Trans-disciplinary Collaboration refers to a group of people from different disciplines which integrate their disciplinary knowledge and methods (Moradi and Klakegg, 2024 a,b).

Most of the definitions listed in Table 1 refer to collaboration in a rather general manner by explaining it as working together which is true in essence, but collaboration seems to be a more nuanced concept than it has been defined by different scholars, particularly in the context of construction projects. In this regard, Moradi and Klakegg (2024 a,b) made an attempt to develop an ontological conceptualization of the collaboration and its accompanying terms (cooperation and coordination). Building on the theory of collaboration depth and breadth developed by Kobarg et al. (2019), Moradi and Klakegg (2024 a,b) conceptualized collaboration in the context of construction. Their conceptualization is as follows:

> *"Collaboration refers to the application, adoption, and/or integration of knowledge and/or method for a common goal, which happens in three forms of intra, inter, and trans-disciplinary.*
>
> - *Intra-disciplinary Collaboration refers to a group of people in one discipline which use/apply their disciplinary knowledge and method for a common goal.*
> - *Inter-disciplinary Collaboration refers to a group of people from similar/different disciplines which adopt each other's disciplinary knowledge and/or working methods for a common goal.*
> - *Trans-disciplinary Collaboration refers to a group of people from different disciplines that integrate their disciplinary knowledge and/or working methods for a common goal (Moradi and Klakegg, 2024 a,b)."*
>
> - *The common goal in the above-mentioned definitions refers to the project success.*

This study adopts the above-mentioned conceptualization of collaboration in construction projects.

Mutual trust in construction

Previous studies addressing collaborative project delivery models and collaboration in construction have frequently stated that mutual trust is one of the main characteristics and key enablers of collaboration in construction. The significance of trust, in a holistic view, is twofold. First, it enables individuals, to be dependent on each other's capabilities and to plan the work accordingly. Second, it enables them to exchange their information and knowledge with each other for a common good, which is the project success. Hence, trust in construction projects has been an important topic for the research community. Accordingly, there have been several studies addressing trust in the context of both collaborative (e.g., alliance, partnering) and traditional construction projects (e.g., design-bid-build, design-build). However, majority

of these studies seem to have focused on the impact of trust and its relationship with other important factors in construction project delivery (e.g., Lau & Rowlinson, 2011; Li *et al.,* 2021a; Haq and Aziz Khan, 2021). Having said that, there are a few studies which have tried to look into the requirements for building trust. The study conducted by Khalfan *et al.* (2007) showed that there are factors and instruments that enable trust to be built and allow for more effective working. They stated that experience (working with people on a day-to-day basis), problem solving (how sharing and solving problems helps communications), shared goals (a joint understanding of the roles and aims of project work), reciprocity (team members supporting and rewarding each other's trusting behavior), and reasonable behavior (working fairly and professionally with the people in the project team) are five main ways of building trust (Khalfan *et al.,* 2007). Two years later, a study conducted by Lau and Rowlinson (2009) addressed interpersonal trust and inter-firm trust in construction projects and found out that inter-firm trust is better understood than interpersonal trust; but both are associated with keeping commitments and demonstrating cooperation, even though interpersonal trust is considered more important. They also stated that partnering does not necessarily exhibit more trust than non-partnering projects whereas clients and contractors have different emphasis on interpersonal and inter-firm trust. Therefore, to promote trusting relationships in multi-parties is to fulfil not only the technological and economical goals, but also the moral and social goals as expressed in people relationships such that a socially safe working place can be created (Lau and Rowlinson, 2009).

These efforts were followed by a study conducted in 2012 which focused on ingredients for engendering trust in construction project teams in Vietnam. This study identified five effective attributes for building trust. These attributes included partner's good problem-solving skills; partner's sense of unity; partner's respects for project management system; partner's frequent as well as effective communication, and partner's effectiveness in providing sufficient information (Yean and Tran, 2012). In addition to these efforts, two more studies were conducted in 2014 and 2016, which addressed the factors on trust between owners and contractors of construction projects in China. They discovered eight factors behind trust which were interaction history, information sharing and communication, contract and institution, relation-specific investment, reputation, integrity, competence, and opportunistic behaviour (Tai *et al.,* 2016; Wang *et al.,* 2014). Few years later, findings of another study, conducted in China, revealed influencing factors on inter-organizational trust asymmetry behavior in construction projects. The results of this study showed that the power imbalance, information asymmetry and cognitive difference have a positive influence on both upward-trust behavior and downward-trust behavior in the construction organization, while the competence, performance capacity and relationship satisfaction have negative effects (Li *et al.,* 2021b).

The efforts for addressing establishment of trust in construction projects has continued in the recent years. In this regard, a recently completed study employed a psychological perspective for developing a dual-attribution model of trust establishment between contracting parties in construction projects. The findings of this study suggested that the counterparty's relational behaviors—which are cooperative behaviors outside of contractual enforcement—will trigger individuals' dispositional attribution, resulting in positive expectations for their counterparty's trustworthiness (Zhang *et al.,* 2021). In addition, another study, which was conducted in 2021, addressed the interrelationships between behavioral elements of collaborative project delivery models for construction projects. The results of this study presented a pyramid model based on which the mutual trust in collaborative construction projects seem to be the outcome of

organizational as well as contractual equality and mutual respect which are enabled through multiples factors including fair share of risk reward, commitment to common goals, and joint governance (Moradi *et al.,* 2022).

Finally, the most recent study, performed by Zhang *et al.* (2022) addressed how embeddedness of relational behavior in contractual relations influence inter-organizational trust in construction projects. Their findings validated the role of relational behaviors in boosting trust expectation, with the contractual context dampening the positive effect only slightly. However, they also discovered that the impact of the embedded relational behaviors on trust intention seemed to be contingent on the equality of outcome meaning that relational behaviors make an impact on trust intention opposite to what the equality of outcome makes. Hence, the combination of relational behaviors and the equality of outcome finally was found to have a positive impact on trust intention. Accordingly, they concluded that the relational behaviors embedded in contractual relations would help reduce distrust or improve trust when the outcome is perceived equal (Zhang *et al.,* 2022).

As can be understood from the earlier explanation of previous studies, there is currently limited research-based knowledge concerning how actually that mutual trust is established in the mentioned context and in construction projects in general. Hence, this study aims to fill this knowledge gap by answering RQ3 and RQ4 which were mentioned earlier in the Introduction section.

Methodology

Research design

This study aims to explore characteristics and enablers of deep collaboration, discover the main factors behind mutual trust, and reveal the process of establishing mutual trust in inter-organizational construction projects with collaborative delivery models. The deductive approach was adopted due to the existence of literature related to the topic under study (Saunders *et al.,* 2019). Consequently, semi-structured interviews were selected as the data collection methods. Semi-structured interview, as a qualitative data collection method, is a combination of structured and unstructured interview types. Accordingly, the interviewer prepares a set of questions ahead of time, but they can adjust the order, skip any question, or create new ones (i.e., follow-up questions). The choice of semi-structured interviews in this study was justified based on the exploratory purpose of the research which required an in-depth investigation of the topic under study (Saunders *et al.,* 2019).

The next step in the research design was determining the context of the study. Considering the purpose of this study, construction projects with alliance delivery model were selected as the focus area of the study. Finally, the third step in the research design was the selection of the sampling method. In this regard, the purposive sampling technique was utilized in this study through which the research team identified and invited 15 project managers of ongoing or recently completed alliance construction projects in Finland for interview. The invited project managers represented both the client and contractor. The choice of having 15 interviews was made according to the data collection possibilities and available time as well as resources.

Data collection

The completion of the research design was followed by the formulation of the protocol and questions of the semi-structured interviews. The protocol of the interview included three steps first of which was a short explanation of the purpose of the interview and obtaining

interviewee's consent for audio recording the interview. The second step was outlining the structure of the interview to the interviewee in terms of demographic and main questions. And the third step included asking the prepared demographic and main questions. The main questions aimed to the explore characteristics and enablers of deep collaboration, the key factors behind mutual trust and their interrelationships. The interview questions were as follows.

- Demographic Questions
  - Q1: How old are you?
  - Q2: What is your educational degree?
  - Q3: How many years of professional work experience do you have in the construction industry?
  - Q4: How many alliance projects have you experienced so far?
  - Q5: What was your role in your latest alliance project?
  - Q6: What was the type, duration, and total budget of your latest alliance project?
- Main Questions
  - Q7. How do you understand collaboration in construction projects?
    - Follow up question 1: How do you think we can define collaboration?
    - Follow up question 2: How do you think collaboration happens?
    - Follow up question 3: What are the characteristics of collaboration in your point of view?
  - Q8. Did you experience collaboration in your latest alliance project?
    - Follow up question 1: Who were the collaborators?
    - Follow up question 2: How the collaboration happened?
    - Follow up question 3: Did you use any tools or technique for facilitating collaboration?
    - Follow up question 4: What were the enablers of collaboration? What was needed for the collaboration to happen?
  - Q9: How mutual trust between project participants is created in alliance construction projects? What is the main factor behind that mutual trust?
    - Follow up question 1: What kind of sequence or cause-and-effect relationship do you think exist between the factors which you mentioned?
  - Q10. Is there anything which we may have overlooked in our questions about collaboration in construction, and you would like to say something about it?

In the first three interviews, the developed interview protocol and questions were piloted to obtain feedback from the interviewees. Those three interviews were analyzed in the data analysis stage since there was neither negative feedback nor any major changes in the interview protocol and questions, those interviews, which had been conducted for piloting purposes. Then, 15 semi-structured interviews were conducted online via Microsoft Teams with the selected group of project managers of completed alliance construction projects in Finland. In terms of the construction category, the interviewees' latest projects represented institutional buildings (i.e., school and hospital, church), infrastructure (i.e., airport terminal building, road, tramway), and commercial buildings (i.e. shopping mall and office building). Although the

decision on the number of interviews to be conducted had been already made in the research design stage, the achieved data saturation in the conducted interviews was seen an indication on the adequacy of 15 interviews for data collection. The interview panel consisted of two individuals of which the first one was the leading researcher (i.e. first/main author of this article), the second one was a native Finnish-speaking research assistant who asked the main and follow-up questions in Finnish language. The interviews were audio recorded based on the obtained consent from the interviewees. The demographic information of the interviewees can be seen in Figure 1.

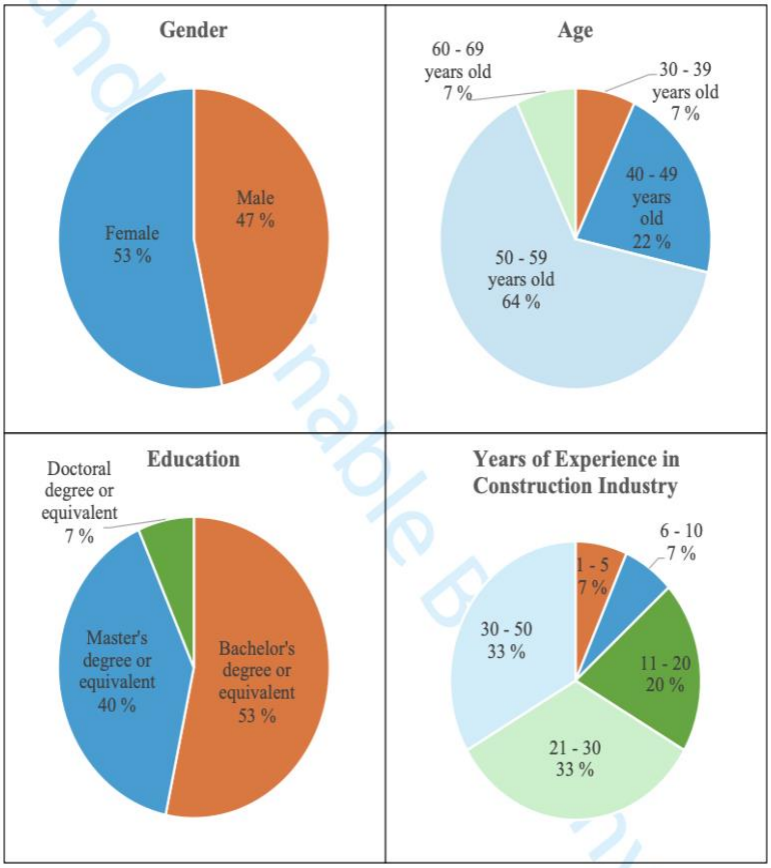

Figure 1. Demographic information of the interviewees

Data analysis and results validation

The data analysis process started with transcribing and translating the conducted interviews to English language by the native Finnish-speaking member of the research team. Then, the translated transcripts were reviewed by the leading researcher to explore characteristics and enablers of deep collaboration, to identify the key factors behind mutual trust and to discover their interrelationships in order to reveal the process of establishing mutual trust in inter-organizational construction projects with collaborative delivery models. This was accomplished in three steps:

- First, the interviewees' responses to each question in the interview were reviewed to identify and underline those words/sentences/statements that were fully relevant to the question.
- Next, the extracted data from interviewees' responses to each question were then compiled and listed separately. In result of this effort, three lists were developed which included:
    - mentioned characteristics and enablers by the interviewees for deep collaboration,
    - mentioned enablers by the interviewees for deep collaboration, and
    - mentioned key factors (and their interrelationships) by the interviewees for the establishment of mutual trust in construction projects.
- Finally, a synthesis of each list was developed separately. The developed ranking within each synthesis was done based on the number of interviewees mentioning that title.

The developed syntheses resulted in exploring characteristics as well as enablers of deep collaboration, revealing key factors behind mutual trust, and conceptualizing the process of establishing mutual trust in construction by discovering the interrelationships between those key factors. Finally, a framework was developed for revealing the process of establishing mutual trust. This was accomplished according to the responses which interviewees gave to Q9 and its follow-up question in the interview. The obtained results from content analysis and developed framework were then shown to the interviewees to ensure the interpretations made in the analysis process were valid. The interviewees unanimously approved the analysis results which are reported in four groups within the Results section.

Findings

Characteristics of deep collaboration

The first groups of findings reveal nine characteristics of deep collaboration four of which seem to be new compared to what have been mentioned in the previous studies (please Figure 2 and also Appendix A for more details). Those four characteristics include financial transparency (i.e., open book cost estimation and management), problem-solving attitude, active interaction, and good team spirit. These four characteristics are seen here as the ones which seem to distinguish deep collaboration from typical collaboration. The presented characteristics in Figure 2 also seem to reveal that deep collaboration in interorganizational construction projects with collaborative delivery models is not only the result of interpersonal relationships, which are a key in its formation, but also is the outcome of appropriate contractual framework, which supports and facilitates financial transparency as well as fair share of risk and rewards among project parties.

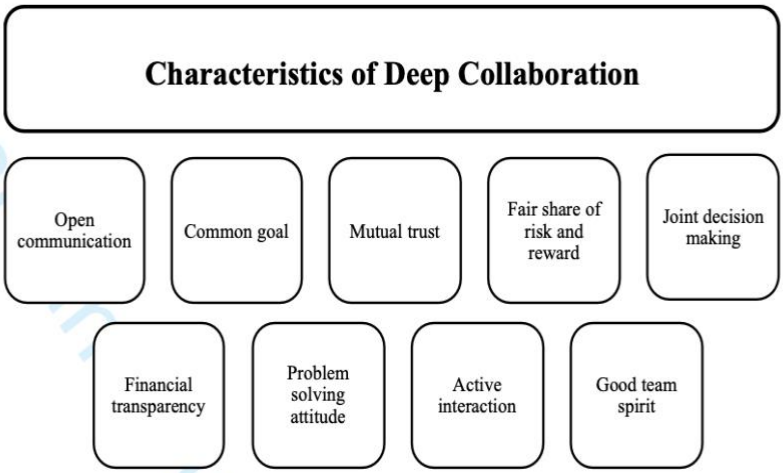

Figure 2. Characteristics of deep collaboration in inter-organizational construction projects

Enablers of collaboration

The second group of findings includes 20 enablers of collaboration which were discovered in result of analyzing the interview transcripts (see Appendix B for more details). This group of findings suggests that nine out of those 20 enablers, which were mentioned by the majority of the interviewees substantially contribute to the realization of deep collaboration in construction projects (see Figure 3). Three out of these eight enablers, namely open communication, common goal, share of risk and reward are actually common with the presented characteristics of deep collaboration, which is understandable given the impact they have on the creation of collaboration. The listed key enablers in Figure 3, from a conceptual perspective, highlight the significance of constructive interpersonal relationships, particularly at the beginning of project and of course also later, in enabling deep collaboration.

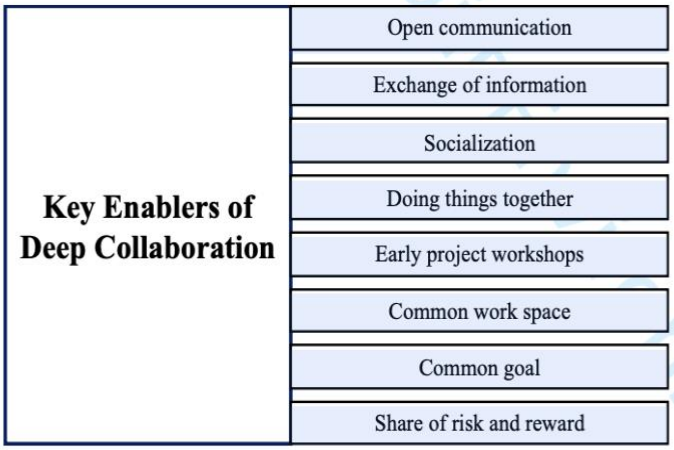

Figure 3. Key enablers of deep collaboration in inter-organizational construction projects

Main factors behind mutual trust in construction projects

The third group of findings shows the discovered factors behind the establishment of mutual trust among project participants. As can be seen in Figure 4, there are six main factors behind mutual trust (see Appendix C for more details).

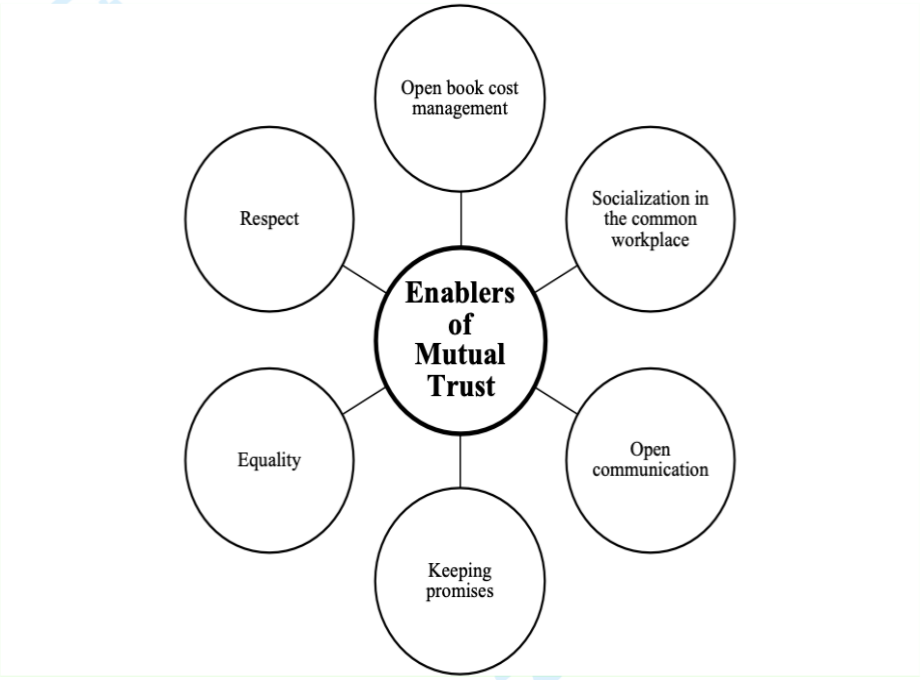

Figure 4. Key factors behind mutual trust in inter-organizational construction projects

A framework for establishment of mutual trust in interorganizational construction projects

The first, second, and third group of findings which were reported earlier, provided a basis for further conceptualization and development of a framework, called IIAC, that reveals the process of building mutual trust in interorganizational construction projects. IIAC is an acronym which refers to four steps in the establishment of mutual trust as they are explained in the following.

As can be seen in Figure 5, mutual trust in interorganizational construction projects is built in four steps which have been labeled here as (i) Intention, (ii) Interaction, (iii) Attention, and (iv) Creation. The *Intention* step involves financial transparency between project parties and fair share of risk-reward among them which indicate their commitment toward project success as the common goal. This intention step is then followed by the *Interaction* step in which direct as well as indirect socialization combined with open communication between project participants complement the indicated intention in the first step. The first and second steps are then followed and reinforced by the third one (i.e., *Attention*) in which project participants respect each other, feel equal, and keep their promises, eventually resulting in step four, which is the *Creation* of mutual trust.

This process of building trust, as shown in Figure 5, seems to be iterative in nature and starts in the project definition phase and repeats in design & planning as well as construction (i.e., execution) phases. However, if the established trust is damaged or lost for any reason (e.g., opportunism, change of stakeholders), then the process needs to start again from the *Intention* step.

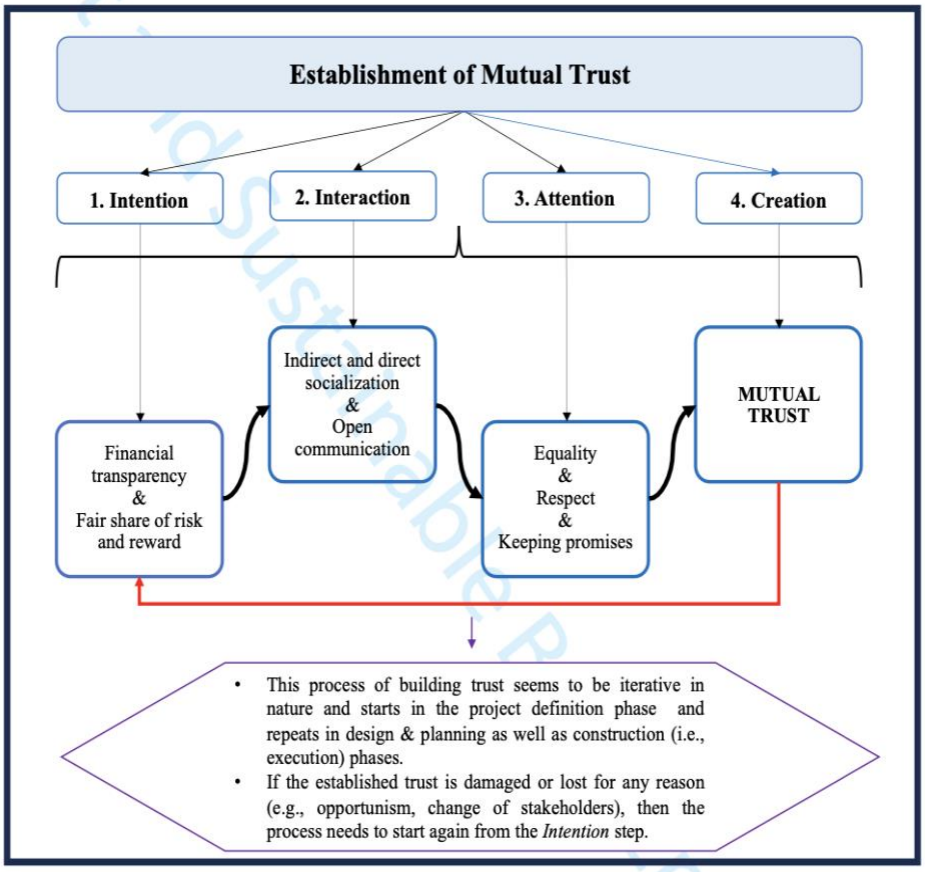

Figure 5. IIAC framework for the establishment of mutual trust in inter-organizational construction projects with collaborative delivery models

Discussion

Wrap-up of findings

The results section reported four groups of findings which are discussed here. The first group of findings presented characteristics of deep collaboration in inter-organizational construction projects with collaborative delivery models. This group reveals nine characteristics of deep collaboration four of which seem to have been discovered in this study. Those four characteristics were financial transparency, problem-solving attitude, active interaction, and good team spirit are novel characteristics. Financial transparency, which can be seen through the lens of project organization (as one of project delivery elements, outlined in this study and previous ones), seems to be a trigger for the realization of fair share of risk-reward which is

among frequently mentioned characteristics of collaboration in the literature (e.g., Oakland and Marosszeky, 2017; Engebo *et al.,* 2020; Moradi and Kähkönen, 2022). Problem solving attitude and good team spirit are two behavioral competencies which have been found of prime importance for collaboration in construction (Moradi and Kähkönen, 2024). These two competencies as two characteristics for deep collaboration can also be explained through the lens of complexity and interdependency in projects. According to Moradi and Klakegg (2024 a,b), the higher the complexity of the project, the heavier interdependency emerges among project participants for which good team spirit, problem-solving attitude, and active interaction are essential.

The second group of results, which revealed enablers of collaboration, implies the significance of direct and indirect socialization of project participants in the early and later stages of the project through a common workspace, common goal, and early project workshops. This interpretation is supported by the findings of the study conducted by Aaltonen and Turkulainen (2018). The third group of results presented key factors behind mutual trust, which is a key element in the realization of collaboration. According to Figure 4, open book cost management, open communication, and socialization, equality, respect, and keeping promises are the key factors behind mutual trust in construction projects. These findings seem to validate the pyramid model developed by Moradi *et al.* (2022) in which equality and mutual respect were presented as the causes of mutual trust.

Finally, the fourth group of results presented a framework that reveals a four-step process for establishing mutual trust in interorganizational construction projects. IIAC (Intention, Interaction, Attention, and Creation) framework revealed that financial transparency and fair share of risk-reward are the indicators of project parties' Intention for the development of mutual trust. The *Intention* step then needs to be complemented by the *Interaction* step in which direct as well as in-direct socialization and open communication are required. The next step before the actual creation of mutual trust is the *Attention* step in which project participants respect each other, keep their promises, and feel equal compared to each other. These three steps finally result in the creation of mutual trust in the fourth step which is named *Creation*. This framework is very well aligned and supported by previously conducted studies by Khalfan *et al.* (2007), Rau and Rowlinson (2009), Moradi *et al.* (2022) and Zhang *et al.* (2021 & 2022).

Implications for theory

The findings of this study contribute to the theory by discovering characteristics of deep collaboration and revealing the key factors and their sequence in the creation of mutual trust in in inter-organizational construction projects with collaborative project delivery models. The developed framework for mutual trust provides a significant contribution also to the domain of mutual trust in temporary organizations.

Implications for practice

Practically, the findings of this study are of prime importance because they provide two important insights for realizing collaboration in construction. The first insight comes from Figure 2 which informs clients on characteristics of deep collaboration in construction. Accordingly, they need to pay attention to see if the project team members represent any of those characteristics. The second insight is that financial transparency and a fair share of risk-reward, which can be materialized only as a contractual clause, are fundamental requirements

for the journey resulting in the creation of mutual trust among project participants, which is crucial for collaboration. This means that the culture and soft elements of collaborative construction projects are partly the positive consequences of relational contracting which inherently features those two elements (i.e., financial transparency and fair share of risk-reward). This also means that the realization of mutual trust and collaboration in traditional construction projects (which do not inherently feature relational contracting) is dependent on the incorporation of financial transparency and fair share of risk-reward in the contract and then the cultivation of constructive interpersonal relationships among project team members.

Conclusions

This study aimed to explore characteristics as well as enablers of deep collaboration, discover key factors behind mutual trust and reveal the process of establishing mutual trust as the key enabler of deep collaboration in construction. This was accomplished through a qualitative study in which 15 semi-structured interviews were conducted to collect the required data which were then analyzed through the content analysis method. The obtained findings provided the basis for the following conclusions in the context of interorganizational construction projects with collaborative delivery models:

- Financial transparency, joint problem-solving attitude, active interaction, and good team spirit are four characteristics which seem to distinguish deep collaboration from collaboration in general.
- Deep collaboration is not just the result of interpersonal relationships, which are essential in its formation, but it is also the outcome of appropriate contractual framework, which supports and facilitates financial transparency as well as fair share of risk and reward among project parties.
- Establishment of mutual trust is a prerequisite for deep collaboration, not an enabler, and happens in a four-stage process of (i) Intention (involving financial transparency + fair share of risk-reward), (ii) Interaction (indirect as well as direct socialization + open communication), (iii) Attention (involving equality + respect + keeping promises), and (iv) Creation (involving the establishment of mutual trust).
- The process of establishing mutual trust seems to be iterative in nature. This iterative nature implies two key points:
    - Establishment of mutual trust is not a one-off activity. It continues throughout the project as new participants enter the team in definition, design-planning and construction phases of the project.
    - If the established trust is damaged or lost for any reason (e.g., opportunism, change of stakeholders), the process needs to be started again.

The findings of this study substantially contribute toward the further development of theory and practice in the field of collaborative construction. However, it is acknowledged that the findings of this study are based on the input of project professionals in Finland (originating from a certain number of interviews conducted with them), which might affect the generalizability of the results. Consequently, conducting similar studies in other countries is a potential area for further research. In this regard, the obtained findings led to the following two questions which can provide a direction for the future research about trust and collaboration in construction projects:

- Is trust all good and always value-adding in construction project delivery? Can too much trust in construction project have a negative effect? What then would be our definition from too much trust?
- How can we quantitatively measure mutual trust and collaboration in construction projects in an objective manner?

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Appendix A. Characteristics of deep collaboration

	Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4	Interviewee 5	Interviewee 6	Interviewee 7	Interviewee 8	Interviewee 9	Interviewee 10	Interviewee 11	Interviewee 12	Interviewee 13	Interviewee 14	Interviewee 15
Open communication	x			x	x	x		x	x	x	x	x	x	x	x
Financial transparency	x			x	x	x		x	x	x	x	x	x	x	x
Mutual trust	x		x		x	x		x	x	x			x	x	x
Common goal	x		x	x			x	x	x				x		
Problem solving attitude		x	x												
Joint decision making	x		x		x		x	x	x		x	x		x	x
Sharing risk and reward	x		x	x	x		x		x	x		x	x	x	x
Interaction		x					x				x		x	x	
Good team spirit		x	x								x				

Appendix B. Enablers of collaboration

	Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4	Interviewee 5	Interviewee 6	Interviewee 7	Interviewee 8	Interviewee 9	Interviewee 10	Interviewee 11	Interviewee 12	Interviewee 13	Interviewee 14	Interviewee 15
Open communication		x	x		_	x	x	x	x			x	x	x	x
Doing things together		x			_	x	x	x	x			x	x	x	x
Socialization		x			_	x	x	x	x			x	x	x	x

Exchange of information		x	x		x	x	x	x				x	x	x	x
Common goal			x		x		x		x		x	x		x	x
Fair share of risk and reward		x		x		x			x		x	x		x	x
Early project workshops				x		x				x		x	x	x	x
Common work space (co-location)				x		x	x	x	x						x
Creating culture of working together	x														
Continuous improvement attitude	x														
Peer-support	x														
Financial transparency		x	x			x									
Joint problem solving attitude		x	x												
Forgetting old habits of working in silo				x											x
Selecting the right people for the project					x	x									x
Early involvement of contractor(s)			x							x					
Previous experience			x												
Facilitation			x												
Client's choice				x											
Training									x						x

Appendix C. Main factors behind mutual trust

	Interviewee 1	**Interviewee 2**	**Interviewee 3**	**Interviewee 4**	**Interviewee 5**	**Interviewee 6**	**Interviewee 7**	**Interviewee 8**	**Interviewee 9**	**Interviewee 10**	**Interviewee 11**	**Interviewee 12**	**Interviewee 13**	**Interviewee 14**	**Interviewee 15**
Financial transparency	x	x	x	x		x	x	x	x	x	x	x	x	x	x
Socialization in common work place	x			x	x		x			x		x	x	x	x
Open communication				x		x				x			x	x	
Keeping promises		x				x		x						x	
Equality										x	x	x	x		
Respect			x			x			x					x	

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