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PERSPECTIVES ON ROLES AND RESPONSIBILITIES OF PROJECT TEAM MEMBERS TO ENABLE COLLABORATIVE DECISION-MAKING PROCESS

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ABSTRACT

The owners, architects, engineers, and contractors (OAEC) industry needs to enable a collaborative decision-making process to include different perspectives and thereby find the best solutions regarding some of the challenges we face, e.g., environmental impacts, social responsibilities, and economic pressure. Decision-making is a key element through which innovation and changes can be introduced to construction projects. The need for a collaborative decision-making process and the methods used to make decisions have been discussed in previous research. However, changing the way we make decisions calls for a new definition of the roles and responsibilities of the involved parties. In this paper, we analyze three different cases to identify the concerns of the different stakeholders and recommend how roles and responsibilities could be defined with the aim of making more collaborative, transparent, and value-adding decisions in the OAEC industry.

KEYWORDS

Collaborative decisions, choosing by advantages, roles, responsibilities, sustainability.

INTRODUCTION

This paper explores the need to change the way project team members make decisions in the owners, architects, engineers, and contractors (OAEC) industry to solve the challenges it faces, such as reducing environmental impact and improving performance. According to the World Green Building Council (2019), the construction industry is responsible for almost 40% of CO_2 emissions, and as explained by Flyvbjerg and Gardner (2023), megaprojects go over both budget and time again and again. One of the key elements to allowing for more innovation and improvements is to support more cross-disciplinary collaboration (Christensen, 2022). An idea is often born outside of the field of implementation. Therefore, to allow this cross-fertilization to happen, different disciplines or functions on the projects should meet, discuss, and agree on a way forward. However, the construction industry has a reputation for being somewhat conservative (Renz & Zafra Solas, 2016), and with the rapid changes to the constraints and context of the projects in the OAEC industry, this could work against the flexibility and change needed. Traditional organizational structures of the industry, and thereby the roles and responsibilities, do not allow for such flexibility and innovation, as many projects do not have

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a formal collaborative decision-making process, and others follow a hierarchical process (e.g., Schöttle, 2022; Whelton et al., 2001). More critical thinking is needed to question the choices we make and how we are organized to make them. It is necessary to shift from decision-making as a discrete event made by a single person in authority to a collaborative process that aligns different perspectives of a decision (Garvin & Roberto, 2013). Challenging a unique perspective better enables the recognition of the biases of others in a decision-making process (Kahneman et al., 2013). Decision-making is therefore a key element through which innovation and changes can be introduced in construction projects. Here, the authors argue for the need for more critical thinking to be introduced in projects through a well-designed process to avoid personal conflicts and biases.

With the introduction of lean construction, practitioners realized that the delivery system must shift towards a more collaborative system (e.g., integrated project delivery [IPD]). The implementation of lean methods also includes methods for decision-making, such as choosing by advantages (CBA), where teams can make decisions in a collaborative way and find innovative solutions. Tillman et al. (2012) show that IPD enables a collaborative environment in which value can be co-created, allowing for customer expectations and supplier assumptions to be challenged. Meanwhile, it has been shown that CBA is a system that allows for more innovative ideas and solutions to be integrated into the design and project execution (Christensen, 2022), potentially generating a social process in which debate, argumentation, and rhetoric play an important role in the final resolution (Martinez et al., 2016). Additionally, CBA enriches the decision-making process and cultivates a shared understanding among project team members, even when they have conflicting values, allowing for all perspectives to be included (Parrish & Tommelein, 2009). When compared with other traditional methods, CBA allows for reaching a consensus faster and with less frustration for the team (Arroyo et al., 2016). It can also foster psychological safety and inclusiveness within the project team to overcome group thinking (Schöttle et al., 2019). As such, CBA has the potential for allowing project teams to collaborate and find innovative ways to address the challenges faced by the OAEC industry. However, implementing CBA as a new lean tool can meet resistance from the project team, and there is a need to explore team members' perspectives to engage in such a collaborative decision-making process.

Without clarity on the roles and responsibilities in both preparation and governance, the introduction of new decision-making methods might lead to confusion and frustration as hierarchies and power balances shift to make room for collaboration. According to Schöttle et al. (2018), a decision-making process should consider: (1) a decision method, (2) the structure of the process, (3) governance, and (4) documentation of the decision. In the related literature, the focus has mainly been on the process of reaching a decision using different decision-making methods, while less attention has been given to participants' roles and responsibilities in relation to these methods. Some papers that look at the roles in the decision-making process are specific to a case study considering one decision on a project (e.g., Martinez et al., 2016, look at formwork system selection, and Parrish and Tommelein, 2009, discuss structural system selection). Few papers document the roles and responsibilities of multiple decisions (e.g., Arroyo and Long, 2018, who consider interiors, mechanical systems, and landscape decisions of an IT campus, and Kpamma et al., 2017, who explore participatory design).

Therefore, in this paper we focus on an initial study to assess the key elements of the roles and responsibilities in collaborative decision-making in the OAEC industry. The aim of this research is to enable better and more collaborative and transparent decision-making processes, which could allow for the integration of innovation into the projects. The study focuses on the key roles of the client, the engineers/architects, and the general contractor. The investigation is based on three cases in which we analyze the concerns of different stakeholders regarding

engaging in a collaborative decision-making process before drawing preliminary recommendations.

RESEARCH METHOD

This paper aims to answer the following research questions: (1) what are the concerns of the different stakeholders regarding implementing a collaborative decision-making process on projects, and (2) how do these concerns translate into recommendations for roles and responsibilities in a project to enable a collaborative decision-making process? The nature of these questions is best aligned with a case study methodology (Yin, 2014). To answer these questions, the authors conducted three case studies in which they had direct access to the project team and acted as either internal or external consultants, therefore using an action-research approach (Dickens & Watkins, 1999; O'Brien, 1998). The three cases cover a variety of construction markets and regions: a hospital project in Connecticut, the main station in Munich, and a port in Denmark. The sources of evidence used were (1) direct observation, since some of the authors were coaching the owner or design team to implement a collaborative decision-making process, (2) project documentation based on public media, meeting minutes, surveys, and A3 reports, (3) interviews with project team members, and (4) in one case, a lessons learned workshop. The data collection details of each case study are further specified in each of the following sections.

CASE STUDY 1: CHILDREN'S HOSPITAL

This case study presents the interaction between stakeholders for a children's hospital project in the United States. The following sections present the background, data collection, and key takeaways from different stakeholders' perspectives.

BACKGROUND

The project is an urban addition of an eight-story, 185,000-square-foot children's hospital in the United States. The project duration is expected to be approximately three years, and it is scheduled to open in mid-2025. The team is set up as an IPD-lite, where the owner is a private entity with strong incentives to finish the project on time and on budget to serve a growing community. Although the owner decided not to pursue any environmental certification, they are interested in evaluating decisions and considering improvements with regards to sustainability. The project team is currently in the design phase and is composed of the owner, owner's representative, architects, general contractor, and a dedicated lean consultant.

CASE STUDY PROTOCOL AND DATA COLLECTION

The following protocol was followed to learn about the roles and responsibilities of different stakeholders and their decision-making process. (1) The researcher met with the general contractor to understand the project background and current decision-making process. (2) A presentation was held in which the CBA system was explained to the entire project team, including the owner representative, architect, general contractor, and lean consultant. Both a recording and a transcript of the meeting were shared among the stakeholders. (3) The researcher met with the design manager, who led the internal decisions for the team. The researcher gave coaching and feedback on the first two decisions using CBA. The team documented these decisions using decision-making software that all stakeholders have access to and created A3 reports that can easily be shared with the owner and other stakeholders. (4) An interview with the design manager was conducted to evaluate the project's decision making process and provide feedback.

TEAM RESULTS

The researcher was able to document the stakeholders' reactions when reading the transcripts of the presentation regarding how to set up a collaborative decision-making process. In the presentation, the researcher covered (1) why CBA is a useful method for managing decisions; (2) a description of CBA basics, including principles, vocabulary, and methods; (3) a simple but practical example; (4) several case studies that were applicable to the project team; and (5) a guided discussion on the next steps for the team. There were several key takeaways from the discussions:

- The project manager from the general contractor was pleased to be able to explore alternatives and price them in parallel, as opposed to having to wait. He pointed out that they can change their previous strategy (wait for the pre-construction estimator to price some options, and then start the discussion on whether it makes sense to go for an alternative that was more expensive than the lowest priced one). After learning about CBA, they understood they could evaluate the alternatives simultaneously and therefore potentially cut the decision time in half.
- The architects were concerned with the time needed to implement the process and who would be responsible for creating the documentation and developing the A3 reports. One of the architects asked for proof that this method saves time and money on real projects, and the researcher presented a case study (Arroyo & Long, 2018).
- The project manager from the general contractor also pointed out the need for external support from both the CBA expert and the lean consultant to help facilitate this decision-making process, stating that "many people will feel uncomfortable leading a CBA decision with their cluster."
- The project superintendent seconded that idea, stating that the team must build their own success stories rather than simply learn about others' success stories and attempt to replicate them. He also proposed that each cluster identifies one or two decisions to be made as a team.
- The owner's representative was supportive of implementing the CBA method in the clusters.

After the discussion, the researcher met with the design integration manager of the project and helped guide the implementation of CBA for selecting the type of anchoring for footings and the pharmacy trailer location. At the time of writing, the team is still working on creating a more collaborative approach to making decisions. They defaulted to the design manager to oversee all decisions instead of having each cluster lead their decisions.

CASE STUDY 2: MUNICH MAIN STATION

This case study presents an owner's strategic decision to change the project delivery system from design-bid-build (DBB) to IPD by using CBA to develop the argumentation to obtain approval from the management board of the company.

BACKGROUND

Part of the expansion of the city train service involves the reconstruction of the main station. This megaproject includes the demolition of existing buildings and constructing new buildings and a new tunnel. The anticipated cost is estimated to be €1.2 billion. The owner's project team, Deutsche Bahn Netz AG (DB Netz AG), is organized in a matrix structure. Currently, the project delivery system remains DBB, with some early contractor involvement.

CASE STUDY PROTOCOL AND DATA COLLECTION

Action research was used to collect data, with the researcher facilitating a series of workshops. In this case study, the protocol was as follows. (1) The researcher briefly explained CBA to the

project lead. (2) The researcher met with the project lead and two cross-divisional leads to explain the procedure. (3) The team agreed to apply CBA for a strategic project decision (question 1: whether the project should be delivered with DBB or IPD, and question 2: if IPD was chosen, what the scope of the IPD [multiparty agreement] would be). (4) A series of five workshops were held over a period of two months (October–December) to address both questions. The workshop series started with introducing CBA via a presentation and brief examples. Different participants were involved in the workshops, based on their expert knowledge and availability. Table 1 presents an overview of the participants, including the researcher (A), different team leaders of a subproject/cross-division (B, C, D, G, H, I), one expert (E), and the project leads (F and J). The decisions were made using paper and post-its and documented via photos and an Excel spreadsheet. (5) Information on the final decision was collected in January to start the approval process. The consultant was not part of this meeting. (6) In February, the researcher interviewed both responsible project leads regarding their experience, as they had little to no involvement in the workshops. (7) In April, a survey evaluating the decision-making process was administered to all eight participants, and data were collected.

Table 1: Research Protocol

	Date & Duration	Participants	Content
Working on Q1	10/06/2022 3.0 hours	5 (A, B, C, D, E)	• Short introduction to CBA • Defining the decision steps based on questions • Defining factors, criteria, attributes, and advantages
	10/12/2022 9.5 hours	8 (A, B, C, D, E, F, G, H)	• Building knowledge regarding CBA & IPD • Adjusting factors and criteria • Defining attributes and advantages • Identifying the Paramount Advantage (PA), sequencing the highest advantages
	11/14/2022 3.0 hours	6 (A, B, C, D, E, H)	• Defining the importance of advantages • Writing down the argumentation • Defining the alternatives of Q2
Working on Q2	11/28/2022 2.0 hours	5 (A, B, C, H, I)	• Defining factors, criteria, and attributes for Q2
	12/05/2022 2.0 hours	3 (A, B, C, I)	• Determining the advantages • Defining the importance
	01/26/2023 1.0 hour	5 (B, C, D, F, J)	• Making the final call to start the approval process

TEAM RESULTS

As the researcher learned the current state of the owner's project organization, she could observe two major pain points reported by the project leads: the project managers and project engineers are afraid to make decisions, and doing so takes too long. These could be due to prior experience or the lack of a defined decision-making process. As the owner wants to change the delivery system from DBB to IPD, the decision-making process must be adapted to suit the collaborative approach and thereby enable the project engineers and project managers to take responsibility in making decisions.

After deciding on an alternative through the workshops, the team prepared an easily understandable presentation to start the approval process. The data from the interview with the project leads and from the survey indicated that, due to the transparent process and the common understanding the team created by going through the CBA Tabular method and considering different perspectives, the team felt confident enough to proceed with the argumentation to obtain approval and implement the decision.

Differentiating between DBB and IPD, the importance of having a faster decision-making process (which the team sees in IPD) was scored as 80 on a scale of 0–100. The consensus was, "The faster decisions are made, the better." Even though more people need to be integrated in the decision, the owner's project team understands that having a shared understanding created through the discussion of different perspectives will result in a stable outcome, as "everybody [will have] had a [say]" (J). This is essential, since excessive deliberations will delay decision-making and risk the project not being delivered on time. Furthermore, one survey participant pointed out that having a collaborative decision-making process helps everyone better understand the reasons for the decision, which is necessary for proper implementation. Another participant (G) replied that "conflicts or difficulties are identified and resolved at an early stage" by having an interdisciplinary team working together in a decision-making process. In addition to this data collection, the researcher facilitated production planning workshops with the owner's team. The operating division (Station & Service) also participated in these workshops, and the owner's project team experienced the value of having different perspectives working together on a plan.

CASE STUDY 3: PORT OF AALBORG

This case study presents the lessons learned from an extension of a port in Denmark. In this case, the owner had a strong focus on sustainability and therefore initiated a lessons learned workshop to bring experiences on making sustainable choices forward to subsequent projects.

Background

The 20,000 m^2 expansion of one terminal's quay is one of two test projects after the Port of Aalborg signed up for the standard ISO-14001 Environmental Management Systems (Dagens Byggeri, 2022). After realizing that Scopes 1 and 2 (operation emissions controlled by the port) only accounted for 4% of their total CO_2 emissions, they started focusing on reducing Scope 3, which includes the CO_2 emissions from the supply chain (e.g., building materials and construction processes). In this case, it was decided to use a partnering contract with the main partners (the engineer and the contractor) and use open-book accounting. The client had separate contracts with the main contractor and the engineers, and the partners were selected based on organization and collaboration (50%), personal references (30%), and overheads (20%). The CBA methods were not applied, but several important decisions were made collaboratively to make the project as sustainable as possible. The project resulted in a 40% reduction of CO2 emissions compared to a reference design (Dagens Byggeri, 2022) and a quay that was 40% stronger than prescribed, and the project was delivered on time and within budget (Molio, 2023).

Case Study Protocol and Data Collection

The client initiated a lessons learned workshop to identify key takeaways from this successfully delivered project to bring forward to subsequent projects. One of the researchers was engaged as an external facilitator for a lessons learned workshop following project delivery, using the following protocol. (1) The researcher met with one of the partners to discuss the scope of the workshop. (2) A survey was sent to the main team members (three from each of the three project partners) to collect individual insights (with a 100% response rate). (3) Analyzed data were

used as the basis for planning the lessons learned workshop. (4) The researcher led a full-day lessons learned workshop with the same people who responded to the surveys, in which budget, schedule, stakeholder management, collaboration, conflict management, and risk were discussed. 5) Key takeaways from the workshop were documented, which resulted in an A3 report that contained actions for each partner and was commented on by the participants. Furthermore, this case was built on available articles from public media (e.g., Dagens Byggeri, 2022), and a presentation made at Circular Build Forum 2023 (Molio, 2023).

TEAM RESULTS

In Dagens Byggeri (2022), Brian Dalby Rasmusen, Chief of Engineering, Port of Aalborg, noted: "The project became much more sustainable than we dared to hope for." The lessons learned workshop was initiated to identify key learnings as to why the project had been a success and what could be further improved.

Five out of nine responded in the survey that trust and collaboration were the main reasons for the success of this project. At the same time, six out of nine wrote that they were at unease with the contract and the risks owned by the client and pointed to the need for a more reliant contract in subsequent projects. Respondent 9 (client) stated that "We ended the project well, but for [the] next project we need a stronger contract to support the collaboration in case a conflict arises." Respondent 3 (engineer) suggested that "[the contract] needs to be made more bulletproof, so the client does not own the same economic risk." Therefore, it was concluded that in future, the client will require a decision log in which all partners anticipate future decisions, including risks related to the decisions and ownership of the risks. The engineers should be those responsible for planning the decisions. The contractor stated that they found it relevant that they managed the risk and budget but were also aware that this was a huge responsibility when working with open books, and it required clear roles and responsibilities (Respondent 2).

Another barrier was convincing suppliers that more sustainable solutions were valued. The suppliers automatically offered the alternatives with the lowest cost, despite a clear message that the project was focused on sustainability. They simply did not believe that cost was not the main constraint (Dagens Byggeri, 2022).

CROSS-CASE ANALYSIS

All three cases have different decision-making approaches, and in each case, the approach taken is a key element in the outcome of the project. In Case 1, the team started the discussion on roles and responsibilities to implement a more collaborative approach to making decisions, rather than simply asking the general contractor to focus on pricing alternatives and then asking the owner to make decisions. Even with the right stakeholders early in the project and an IPD-lite structure, most of the stakeholders did not know about CBA and needed support to implement it. They expressed the desire that every cluster presents a decision to the owner; however, in practice, this was delegated to the design integration manager of the project. Although training on CBA and support for people in leading roles is an investment of time and resources, it is essential to achieving collaboration in decision-making. Those who have the knowledge are not necessarily the same as those who have the authority to make decisions. The team needs architects/engineers who are willing to make decisions and cluster members willing to share their perspectives to evaluate the advantages of each alternative—the owner can then take that input into consideration in making the final decision. Finally, someone on the team must document the decisions (which in this case was the general contractor).

In Case 2, the project has a traditional delivery system and traditional contracts, and the team experienced the limits of transparency and collaboration that come with this traditional system. Furthermore, in this system, responsibilities cannot be transferred to the person/group

of people who are best able to make decisions. Roles are defined in a hierarchical way such that the team loses too much time in making decisions-making it difficult to stay on schedule and handle unforeseen situations that arise in any project (especially megaprojects). With this realization, the owner's project team made the decision based on CBA to change the delivery system to IPD, resulting in a clear structure of the decision-making process.

In Case 3, all the survey participants indicated that they were satisfied or extremely satisfied with the collaboration of the project and the outcome. In the survey responses and in the workshop discussions, it became clear that they were somewhat relieved and/or surprised that no major misunderstandings or conflicts had occurred. As one of the participants responded in the survey: "Exciting collaboration with great potential if we can just bottle it up [and bring it with us to the next project]." With the strong focus on collaboration, the roles and responsibilities shifted from what they were used to. They ultimately decided to focus on defining roles and responsibilities at the beginning of subsequent projects. As part of the actions agreed upon in the workshop, it was stated that for future projects, stricter risk management should be put in place to support better and more transparent decision-making. Furthermore, the client stated that the future would require a more systematic approach to decision-making, where benefits, risks, and financial consequences were more clearly stated and presented in a timely manner such that a final decision could be made.

In Table 2, the concerns of each stakeholder in each case are summarized and commonalities among the cases are highlighted. By focusing on concerns, we can identify where the focus should be directed to enable more efficient and transparent decision-making processes in the future.

DISCUSSION

In general, for all the stakeholders, we have seen that to move from traditional to recommended practices, an IPD (or IPD-like) contract is not enough to break the barriers for collaborative decision making. Collaborative behaviors need to be reinforced, and the team must be intentional and deliberate in creating new roles and responsibilities that allow for new ideas and concepts to be incorporated. In short, it all starts with the owner and the user. The owner must define and communicate their vision to provide direction regarding the project strategy and the embedded decisions. This means the owner must be involved in the decision making process early on (not only at the end by questioning the recommendations). For example, in Case 2, the owner realized that there is a gap in taking responsibility by project team members within their own organization, which in turn leads to slow decision making. By understanding the importance of roles and responsibilities, the team can work on the definition earlier in the project, and roles and responsibilities can change in long-term projects as new team members and partners join the project.

Table 2: Concerns of the different stakeholders that influence the decision-making process

	Case 1:	Case 2	Case 3
Owner	Finish on time and within budget. Obtain the right value for patients. Set up an effective decision-making process.	Finish on time. Have a stable schedule. Some are afraid of making decisions. Concerns over decision-making taking too long.	Integrate sustainability into the project as far as possible. Some concerns over the risk related to economy and quality.
Architects/ Engineers	Provide design solutions on time. Manage documentation. Decrease the time spent on meetings and decision-making.	NA	Concern for the client, as the client owned all the risk.
General Contractors	Manage team clusters efficiently. Provide budget and make decisions in a timely manner.	NA	Manage the budget on behalf of the team. Felt responsible for the trust shown by the client. Concerns over receiving the right input from suppliers.

In the three cases, we see the owners moving away from being focused primarily on cost and time, to focusing more on value creation within constraints and understanding cost and time as an output of collaboration. In Case 3, we saw that it was difficult for the rest of the supply chain to understand that the main constraint was not time or cost, but sustainability. In comparison, in Cases 1 and 2, the owner understands that the project's goal of finishing on time needs the integration of different stakeholders to find the best solutions by creating a common understanding of project needs. Therefore, the owner has a great responsibility in guiding the rest of the team to focus on values rather than only focusing on schedule and cost. If the focus is on sustainability or creating the best project for users, this should be communicated and followed through. For example, if focusing on sustainability, cost, and time cannot come across as the main constraints, they must be dealt with case by case unless the client defines a minimum criterion for these.

Engineers and architects seldom hold the main responsibility for risks related to time, cost, or quality, but they hold the main responsibility for informing the client of the alternatives available and the consequences, risks, and assumptions following a decision. It can be somewhat uncomfortable to focus on factors beyond cost or time, which may not be expressed in quantitative terms. Focusing on adding value to the project could be difficult for some to handle, as this is seen as more subjective and not as definitive as, say, cost and schedule. This is when a method such as CBA is important to allow teams to account for qualitative and quantitative information to describe the value of alternatives.

General contractors often have an overview of the cost, time, and opportunities for creating alternative solutions. They also have contact with many of the experts, such as subcontractors, superintendents, and craft workers. Furthermore, they have intel from suppliers and can provide advice to counter the volatility in the supply chain, especially on long lead items due to global challenges. Therefore, general contractors are also responsible for communicating the project's priorities to the wider team and gathering information on alternatives. In addition, general contractors can provide information to inform the design alternatives regarding constructability, maintenance, and long-term performance of facilities.

For users in a traditional setting, the feedback they provide is extremely difficult to incorporate without a structured decision-making process. Therefore, users need to be

proactively involved in the process to specify criteria based on "needs" and "wants" and not wait until the decision is made to provide input. If the expectations of the owner and users are clear, the architect, engineers, and contractors can work on specific decisions together. This means that from the very beginning, the decision-making process needs to be defined, the responsibility of every role must be clarified, and specific stages need to be determined to set up the process structure. Due to different perspectives, the team will need to adopt a method that helps them understand each other and see the overall impact of the decision within the project. Transparency and learning about the difference by comparing the attributes of the alternatives will help the team instill a constructive conversation. Table 3 presents an overview of the roles and responsibilities.

Table 3: Traditional vs. recommended roles and responsibilities

	Traditional	**Recommended**
Owners' responsibilities	Focus on time and budget. Unstructured and slow when making decisions.	Be specific in values and set a shared vision. Own the decision processes and related risks. Advocate for diverse perspectives and including users.
Architects'/engineers' responsibilities	Provide one design solution and push for acceptance (point-based decision-making). Make decisions *in silos* without gathering expert information.	Help structure a transparent process by setting up feasible alternatives (set-based decision-making). Include experts from the execution phase.
General contractors' responsibilities	Evaluate decisions based on cost and time. Make decisions *in silos* without gathering expert information.	Gather information on alternatives based on value creation. Add information on risk, opportunities, and cost. Include cluster experts in making decisions.
Users' responsibilities (if included in the decision-making process)	Feedback on decisions already made by others (reactive).	Be specific in must haves and nice to haves as input to decision-making (proactive).

CONCLUSION

This paper documents the concerns of different stakeholders in implementing a collaborative decision-making process. Our recommendations are based on the three case studies, and we reference the traditional decision-making process to demonstrate the contrast. In this research, we conclude that owners are responsible for defining a shared vision to guide decisions, architects/engineers are responsible for creating feasible design alternatives, general contractors/trade partners are responsible for providing their perspective in the evaluation of alternatives and providing pricing and schedule impacts, and users are responsible for distinguishing between "needs" and "wants." In addition, consultants and/or trainers to support the team are likely needed because (1) even when the stakeholders are aligned through a collaborative contract, teams struggle with decision-making, as roles and responsibilities are not defined in advance, and (2) most people will need to learn a sound decision-making method, such as CBA.

The discussion of the roles and responsibilities within a project team is relevant and far from being resolved. This research is somewhat limited, and we encourage other researchers to document and experiment with different roles and responsibilities among construction team members to allow them to draw knowledge and expertise from a variety of project participants and support the creation of value using innovation. The authors believe that only through this inclusive and collaborative process can more sustainable designs be created in construction projects.

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