Project value creation: sensemaking, shaping, and monitoring in a project network

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Abstract

Value creation in projects is especially challenging when it deals with a complex system and multiple stakeholders are involved. Complex systems require careful consideration of the processes of value creation in a project network. Each stakeholder may have its own expectations of value, processes of value delivery, and criteria for assessing project success. Yet, stakeholders need to collaborate, share their views, and adhere to joint rules of governance in a project network, when pursuing project value creation. This chapter explores project value creation in project networks and introduces a conceptual framework of its three modes: sensemaking and negotiation, shaping and co-creation, and monitoring and control. Attention is drawn to the cognitive, operative, and evaluative processes of value creation in project networks as well as material and immaterial nature of value creation. Future research is proposed, both concerning the conceptual framework as a whole and its three modes separately.

Keywords: Project value; project network; sensemaking; shaping; monitoring

Introduction

Projects are considered as vehicles for value creation (Winter & Szczepanek, 2008), besides their role in solving a specific problem and fulfilling a customer need. While contractors typically may put resources and effort to creating value into a solution (for example, a building, an infrastructure, a technical process, or a piece of equipment), the solution owners as customers are interested in how the solution creates value in their business over time. Contractors and customers necessarily interact to co-create value over the project lifecycle, to fulfill both partners' expectations of value. This idea of key actors' different value expectations and their need for co-creation is already well understood and to some extent researched (Fuentes et al., 2019; Liu et al., 2019).

In complex projects, however, a complex system is delivered and requires versatile capabilities and resources, so this single-organizational or dyadic view to value creation is overly simplistic. Complex projects involve multiple organizations in a project network, the configuration of the network may evolve over time, and each stakeholder contributes to the project's value creation in some ways. The dispersion of knowledge and work tasks in this network creates challenges, both in terms of uncertainty and organizational complexity. Stakeholders also have different value priorities that need to be understood, negotiated, and coordinated, to establish a shared idea of what value is being created and how (Martinsuo, 2020), and to ensure value-oriented monitoring and control (Martinsuo et al., 2019). Value is co-produced together, instead of added by one stakeholder (Ramirez, 1999). The starting point for this chapter is the need to understand project value creation and value-oriented control in complex projects, when multiple stakeholders are involved.

This chapter concentrates on project value creation within the project, i.e., the ways in which stakeholders create value in and during the design and delivery of a complex system in a project

network. The project lifecycle from the front end to implementation and closure is covered, and the link to post-project operations is mentioned briefly. Thereby, the aspect of the customer creating value through and after the project and stakeholders' views to value capture are purposely excluded. The goal is to expand the concept of project value creation toward the project network level and specify value creation as network-level processes of sensemaking, shaping, and monitoring. As the focus is on complex project organizing, complexity, uncertainty, projectivity and temporality are inherent features in the system to be delivered as well as the project network and its value creation processes. This chapter reviews previous research on the involvement of stakeholders in project value creation, maps three dominant modes of value creation during the project and develops a conceptual framework on value creation in project networks. Future pathways for research are proposed, especially for theorizing project value creation from the perspectives of strategy and sensemaking, technology management and material aspects of actor-network theory, and organizational control and behavioral decision making.

Value for multiple stakeholders in a project network

When projects are seen as vehicles for value creation, we can immediately ask: what value, and for whom? The concept of project value is inherently multidimensional (Ahola et al., 2008; Flyvbjerg, 2017; Eskerod & Ang, 2017; Martinsuo & Killen, 2014; Martinsuo, Vuorinen & Killen, 2019; Vuorinen & Martinsuo, 2019), so the financial value of a project has to be considered in light of many other value dimensions such as technical, social, ecological, emotional, aesthetic, and so on. Also, value may be observed on multiple levels; value experienced at the project level will appear differently for the firm, relationship, or business network level (Martinsuo, 2019), and regional, national, and user levels (Zerjav et al., 2021). Besides multidimensionality, previous research increasingly acknowledges that different stakeholders may have different ideas of project value (Ahola et al., 2008; Eskerod & Ang, 2017), and the stakeholders' conceptions of value may evolve over the lifecycle of the project when they accumulate knowledge (Martinsuo, 2020). Laursen (2018) has specifically concentrated on value creation in project networks, and Martinsuo (2020) encouraged further research to look into different stakeholders' different value priorities and related negotiation and decision making.

Project networks include multiple different organizations, each with their expectations toward the project. Different stakeholders may have their own idea of why they participate in projects and what they expect from the projects, potentially depending on their position in the project network, their strategies, and types of investments they make in the project. Zerjav (2021, building on the three domains of organizing by Winch, 2014) divides between owner, project-based organization as the core contractor, and the temporary project organization as key value domains of project organizing and also acknowledges the possible involvement of other stakeholders in them. Project network may take shape in very different kinds of constellations of value creation, depending on who are the recipients of value (Laursen, 2018). Also timing of value creation may be crucial for some stakeholders (Svejvig et al., 2019).

Among the key challenges concerning value management in project networks relates to the emergence of value and the plurality of stakeholders' perspectives over the project lifecycle (Artto et al., 2016; Eskerod & Ang, 2017; Martinsuo, 2020). Each stakeholder invests in the project in some ways (through allocating money, materials and tools, work effort, and time), and these investments accumulate as costs over time. Similarly, each stakeholder receives various benefits from the projects (in terms of outputs, knowledge and learning, feelings of satisfaction, and income), and these benefits accumulate over time. Individuals and organizations each have their unique experiences both during and after the delivery of the complex system (Eskerod & Ang, 2017), potentially reflected in the reputation and brand image of the project in the institutional field (Ninan

et al., 2019). In this way, each project can be considered to have multiple value streams (processes of creating value). However, one stakeholder's cost may not produce benefits to that stakeholder directly, but through another stakeholder's benefits or investments only. This implies that the stakeholders' value streams are linked and even interdependent.

Zerjav (2021) emphasizes that owner, project-based organization and temporary project domains of project organizing each have a different approach to value creation and capture: asset investment, service provision, and collaboration on joint outputs. While the dominant focus of research is often either on the owner's or contractor's project outcome-related value stream, the context of the project network may be much more complex due to the stakeholders' interconnected value streams. Therefore, there is a need to understand value creation specifically in project networks and identify episodes where multiple stakeholders' value priorities may clash.

Value creation through sensemaking and negotiation

Particularly in the early phases of the project, value creation takes place in the cognitive and social processes of involved stakeholders, as tacit thoughts and explicit expressions of what is important and valuable in the project. Even if each stakeholder would have well-established strategies and espoused values, they always make sense of project-specific possibilities and circumstances, to specify project-specific value expectations. Stakeholders frame their lifecycle value expectations differently, for example based on uncertainty, timing of cost and benefit realization, project relations, and external sponsorship (Martinsuo, Vuorinen & Killen, 2019). These early value considerations are then the foundation for justifying the project (Zerjav et al., 2021) and later value generation (Kolltveit & Grønhaug, 2004). The project front end activities typically concentrate on immaterial activities – thoughts, wishes, projections of the future - although the planning and negotiations are also documented into project-related artifacts such as project charters, plans, and contracts.

Each stakeholder in the project network may have its own idea of what is of value and what to expect from the project throughout its lifecycle (Martinsuo, 2020). While it is customary to concentrate on the customer's (owner's) requirements as guidance to what is done in the project and acknowledge the contractor's expectations and priorities, also the suppliers and subcontractors, end-users, common public, and any third parties all have their value conceptions, when joining a project. At the front end of complex projects, only limited information is available, and uncertainty prevails, so conceptions of value reflect opportunities and risks that need to be managed, to achieve value (Kolltveit & Grønhaug, 2004). When complex projects are defined in conditions of risks and opportunities, managers use their accumulated previous understanding, intuition, and confidence when making decisions (Chenger & Voiceshyn, 2021).

When multiple stakeholders are involved, they will need to negotiate how value will be created and delivered in the project, and to build shared understanding and agree on goals (Edkins et al., 2013; Liu et al., 2019; Martinsuo, 2019; Matinheikki et al., 2016; Williams & Samset, 2010). The shared goal could be explicated in the project's value proposition or business case, not just in financial terms but more generally. Matinheikki et al. (2016) emphasize the relational and cognitive activities of early-phase project networks as mechanisms for building trust and devising a shared vision, which are necessary for creating relationship value. There is a need for the stakeholders to share their views and align their different goals and expectations to help move the project forward (Artto et al., 2016; Matinheikki et al., 2016) and create a shared image and identity for the project (Artto et al., 2016). One of the key tasks then is the readiness for stakeholders to voice their value expectations and concerns, already early in the project. The use of discursive and rhetorical tactics are central in the

cognitive and social processes of value creation and will deserve further research attention (Zerjav et al., 2021). Any implicit, unmentioned value expectations are likely to cause problems and errors later in the project as other stakeholders cannot guess and acknowledge them in their work.

Sensemaking and negotiation of value priorities continue throughout the project and influence the project activities also throughout its later lifecycle (Martinsuo, 2020). Artto et al. (2016) reported that project stakeholders' expectations evolve over time and they continue to create visions of the future and should continue to share them throughout the project, so that the evolving needs can be responded to in a flexible manner. They also emphasized the necessity to anticipate the operations phase in the project's lifecycle: operations will bring in new stakeholders to the project network also later in the project, with new value priorities and expectations that need to be acknowledged.

Value shaping and co-creation

During project implementation, value creation occurs through various behavioral and operational processes among the involved stakeholders, in the form of resource and material access, use, consumption, and transfer. Different stakeholders involve in value creation by procuring, shaping, and consuming resources and materials – including human resources, technologies, raw materials, components etc. - in various ways. While these activities are at the center of all projects, the mechanisms of value creation in these activities are surprisingly weakly discussed in research. In value shaping and co-creation, material activities and processes dominate: resources and materials are purposely accessed, consumed, molded, and transferred. However, it is necessary to acknowledge both material-centric and knowledge-centric value creation processes, as they both are relevant in project networks.

In intra-organizational projects, the overall idea of value creation could be seen as streams of activities concerning resource allocation and material procurement and use. When a certain host organization has full control over the resources and materials, then it also has the possibilities to optimize the processes of value creation for maximum efficiency. With project networks, however, the setting becomes more complex, as multiple stakeholders together join forces to create value in the project (Fuentes et al., 2019; Laursen, 2018; Lehtinen et al., 2019). Various contracts and plans govern how each stakeholder consumes its resources and materials in the project. Even in project networks it is likely that the main contractor has a dominating role as they are responsible for value creation during project implementation (Martinsuo, 2020), but they do not possess perfect information about the resources, materials and processes of all stakeholders and guarantee process efficiency.

The engineering and delivery processes in project business tend to be well known, but their logics of value creation would deserve further attention, particularly in project networks. In fact, current research tends to cover value creation indirectly, through mechanisms and activities that bring stakeholders together in the complex project, instead of the mechanisms and activities of manipulating resources and materials used directly for value creation. For example, Artto et al. (2016) concentrated on value-enhancing integration mechanisms across the stakeholders. Laursen (2018) identified four value creation activities: developing infrastructure, creating knowledge, changing minds, and managing for value capture. Lehtinen et al. (2019) covered the design principles, operating mechanisms, joint activities, and relational positions in megaprojects as organizational platforms. Where all these studies emphasize the multi-stakeholder interactions in value creation, they do not cover the material value creation processes explicitly. Lehtinen et al. (2019), however, pointed out that partial products, technologies, and solutions during the project help stakeholders in understanding each other's value creation and joint value capture.

Recent research has clearly concentrated on value creation through immaterial knowledge processes, particularly following a service-dominant logic of business. In this view, stakeholders together co-create value by interactions that enhance the project outcomes over time (Fuentes et al., 2019). Building on the sensemaking, negotiation and alignment activities at the front end and resulting in a shared value proposition, Fuentes et al. (2019) emphasize co-designing and co-developing of services that produce customer's expected value outcomes. Particularly in creative projects value is managed by controlling the distance between new knowledge (or new product/service concepts) and the dominant design, which may occur, for example, through identifying a 'common unknown', learning, imagining, and building new evaluation criteria (Gillier et al., 2015). Green & Sergeeva (2019) emphasize that project value is a social construct that is ultimately shaped by narratives, i.e., in stakeholders' spoken language, whereby value creation through such narratives effectively represents continuous identity work in the project.

Value creation through monitoring and control

Especially in the later phases of projects, value creation happens through evaluation and decision-making processes of the stakeholders, when project outcomes are compared with expectations and goals and transferred to users. In reality, monitoring and control begin already at the project front end (Volden, 2019) and continue through the project implementation, but the outcome view becomes particularly central when nearing project closure and commissioning. Different stakeholders may have their own evaluation criteria for projects, but project plans and contracts feature mechanisms for the project's own monitoring and control (Kivilä et al., 2017). Value creation then occurs through the assessment and communication of benefit realization, detection and management of risks, deviances and errors, and problem solving. In monitoring and control, immaterial and material activities and processes are in constant interaction: tangible outcomes are reviewed and evaluated, and this information is used in making decisions about the next courses of action.

Stakeholders in the project network each have their specific experiences of the different value dimensions (Eskerod & Ang, 2017), even if they are committed to the same project plan and contract with the others. Monitoring and control typically rely on measurable success criteria, but also more comprehensive value assessments are increasingly used. While it is quite typical to assess costs or sacrifices and benefits separately in the early phases of the project (Ahola et al., 2008; Volden, 2019), monitoring and controlling the resource and material consumption and assessing them in light of the actual benefits could be useful also later on. Besides the immediate outcome measures, there is a need to monitor and control other aspects of value. For example, public-private partnership projects will need to adhere to local, regional, national and potentially also international regulations and laws and carry out related monitoring and control, in addition to following the project's plan and contract (Kivilä et al., 2017). Failing to take relevant value dimensions and relevant stakeholders' views into account in monitoring and control may, again, result in later problems.

Stakeholders may differ in their power and influence, when monitoring and controlling projects. In stakeholder management research, the attention is often directed at the salience or centrality of the stakeholder with regards to the project, and stakeholders' influence strategies in the project (Aaltonen & Kujala, 2010). Directly related to stakeholders' value-oriented influence, Vuorinen & Martinsuo (2019) mapped four stakeholder influence strategies: communicating, complaining and resolving disputes, setting rules and supervising the project, using decision making authority. Some research indicates that stakeholders may need to make tradeoffs concerning their value expectations and handle risks of value slippage, when involved in project networks (Bos de Vos et al., 2016, 2019). Also risk management is considered as an aspect of value creation in projects

(Willumsen et al., 2019). Martinsuo (2020) has drawn attention to the incompleteness of the idea of project value and related tensions between stakeholders, and between goals and accumulated benefits, as key challenges in project value creation.

Monitoring and control may lead to actions and changes that can have very significant effects on the project outcomes. Fuentes et al. (2019) describe the inevitability of problems in projects and consequent need to co-solve problems, jointly transfer the project outcomes to operations, and monitor and control the emerging value outcomes also after project completion to achieve usefulness of the outcomes to stakeholders. Particularly during the project, monitoring and control are directly linked with value creation through sensemaking and shaping activities, as the identified deviances or problems may require re-negotiation of project tasks and rearrangement of resources.

Conceptual framework

The above discussion portrays value creation in the project networks of complex projects in three modes: sensemaking and negotiation; shaping and co-creation; and monitoring and control. The conceptual framework, as summarized in Table 1, illustrates how the material and immaterial aspects of value creation are intertwined in cognitive, operational and evaluative processes in the project network. The above discussion highlighted that the processes include activities of single stakeholders as well as activities carried out jointly by multiple stakeholders in the project network. The connectedness of separate value streams is central in the value creation of complex projects, while also making value creation particularly complex and challenging to observe.

Table 1. Three modes of value creation in the project networks of complex projects.

	Sensemaking and negotiation	**Shaping and co-creation**	**Monitoring and control**
Processes of value creation	Cognitive and social	Operational and behavioral	Evaluation and decision making
Nature of value creation	Dominantly immaterial	Dominantly material	Both material and immaterial
Key phase in the project lifecycle	Front end (extending to full lifecycle)	Project implementation (extending to full lifecycle)	Project control, closure and commissioning (extending to full lifecycle)
Purpose in a project network	Understanding stakeholders' priorities and adjusting them to achieve shared value goals	Designing a feasible project concept and using/modifying resources and materials to achieve the shared goal	Resolving problems and achieving maximized project value and continue value creation at the post-project operations phase
Challenges in a project network	Owner may dominate. All stakeholders' voices are not necessarily heard; peripheral stakeholders often neglected.	Contractor may dominate, but in line with owner's rules. Stakeholders may have competing priorities or fail to voice their values.	Owner may dominate. Stakeholders' interests are not necessarily monitored or controlled as part of official project governance.
Practices of value creation in a project network	• Dreaming, thinking, visioning • Speaking, listening, discussing	• Investing and using resources (people, knowledge, time) • Using, consuming and molding material	• Assessing benefit realization; communicating • Detecting and managing risks, deviances and

			errors; problem solving
Examples of previous studies	Kolltveit & Grønhaug, 2004; Martinsuo, Vuorinen & Killen, 2019; Matinheikki et al., 2016; Zerjav et al., 2021; Williams & Samset, 2010	Artto et al., 2016 ; Fuentes et al., 2019; Laursen, 2018; Lehtinen et al., 2019	Aaltonen & Kujala, 2010; Ahola et al., 2008; Fuentes et al., 2019; Kivilä et al., 2017; Volden, 2019; Vuorinen & Martinsuo, 2019

Conclusions

This chapter has expanded the concept of project value creation toward the project network level and introduced three modes of value creation in complex projects: sensemaking and negotiation, shaping and co-creation, and monitoring and control. The three modes purposely include both stakeholder-specific aspects (sensemaking, shaping, monitoring) and interactive aspects (negotiation, co-creation, control), as value creation in project networks occurs through the interplay of them both. Also, both the material and immaterial aspects of value creation have been emphasized, with the idea that also the material, tangible aspects of value creation could be considered more, besides the immaterial aspects. Particularly in complex projects also the material value creation becomes uncertain and requires attention. Future research is encouraged both concerning this overall framework and its three modes separately.

The conceptual framework as a whole offers a way to structure and categorize value-creating processes and practices in complex projects. It also enables adopting different viewpoints to value creation: that of certain stakeholders or the entire project network, that of immaterial or material value creation, or that of specific lifecycle phases or the entire project lifecycle. Selecting any of these viewpoints and combining them in creative ways in different complex projects and for specific project contexts could open up pathways for forthcoming research. The increasing interest into the connections between projects and their surrounding institutional field will create possibilities to explore value creation in complex projects in specific contexts and circumstances, including crises and other dramatic events.

Sensemaking and negotiation deal with the cognitive and social processes that are particularly active at the front end of the project. As the multi-dimensionality of value and the different value perceptions of stakeholders have been well covered in previous research, it will be relevant to investigate the events where their negotiation occurs and expected value from the project is specified. Also, it is important to understand how value conflicts and competition are resolved in project networks. Different types of project networks could be explored, for example, to reveal how dramatically single stakeholders can drive or restrain the accumulation of value, through their sensemaking and influence. Theoretically, the emerging sensemaking lens will open up relevant connections, for example, to strategy research.

Shaping and co-creation deal with the behavioral and operative processes especially during project implementation. To complement the dominant knowledge-centric view of these processes, future research could map the material and resource-related value streams, to identify how the tangible aspects of value unfold in projects. There is a need to delve deeper into the micro-level mechanisms of value creation through resource and time investments into project tasks, to understand how project work adds material and immaterial value toward the project outcome, especially under conditions of uncertainty. In particular, as the value streams of multiple stakeholders interact, it is of

interest to understand how their resource and material consumption is converted to added value and how the stakeholders transfer this value within their network. Theoretically, technology management and material aspects of actor-network theory could complement the knowledge and service-centric views in interesting ways.

Monitoring and control focus on value-oriented evaluation and decision making, which are particularly prevalent at the end of projects. Even if this phase is crucial in bridging value creation and capture, also its unique value-creating nature deserves further research attention. For example, there is a need to understand the mechanisms of value creation in the purposive deviation from goals and status quo as well as managing changes that preserve or add value in uncertain conditions. Also, the disputes and conflicts preceding decisions would deserve further attention. Theoretically, the connection of project value and organizational control will be particularly interesting, in addition to behavioral decision making.

A core interest for any stakeholder in complex projects is value capture, i.e., how the created project value can be converted to the stakeholders' own use value, especially in financial terms (Bos de Vos et al., 2016, 2019). The current research tends to emphasize the non-financial, strategic dimensions of project value, to emphasize that it is not only financial (in line with Martinsuo & Killen, 2014), and the tradeoffs that stakeholders need to make in their value priorities (Bos de Vos et al., 2016). The logic concerning project value creation and stakeholder-specific value capture is particularly challenging in complex project networks and also deserves further research attention.

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