

Working Paper Proceedings

15th Engineering Project Organization Conference
with
5th International Megaprojects Workshop
Stanford Sierra Camp, California
June 5-7, 2017

Governance of Business Ecosystem Projects

Kent Eriksson, Abo Akademi, Finland

Kim Wikstrom, Abo Akademi, Finland

Magnus Hellstrom, Abo Akademi, Finland

Raymond Levitt, Stanford University, USA

Proceedings Editors

Ashwin Mahalingam, IIT Madras, Tripp Shealy, Virginia Tech, and Nuno Gil, University of Manchester



© Copyright belongs to the authors. All rights reserved. Please contact authors for citation details.

GOVERNANCE OF BUSINESS ECOSYSTEM PROJECTS

ABSTRACT

Business is increasingly done in ecosystems that do not fit with as traditional industry, corporate or business segment boundaries. We present a framework that can be used for the analysis of business ecosystem projects, which we define as projects within a business ecosystem. The framework shows how business ecosystem projects can be governed by the analysis of workflow interdependencies, and how governance mechanisms can be selected so that workflows in the business ecosystem projects becomes efficient.

We illustrate our framework in an analysis of a case, where the development of a cargo vessel for short sea shipping is the business ecosystem projects, and sea cargo transportation is the wider business ecosystem. We identify several contentious lock-ins, and show how they can be resolved by governance that can add value, and increase profits and competitiveness of the business ecosystem project. The analysis suggests that governance of workflows in a business ecosystem project can be achieved by a limited set of tools, and that the positive outcomes can be substantial.

INTRODUCTION

Project research has made great strides in defining ‘project’, its antecedents, and consequences. In defining a project, there are numerous ways to define the context of a project, such as an industry, a company, an alliance, a value chain, to name a few. In this paper, we propose to define the project context as a business ecosystem. The business ecosystem is a new kind of conceptualization of business boundaries, which is based on ecological and lifecycle perspectives, where workflows are interconnected with each other and perform a function in the business ecosystem (Moore, 1993, 1996). The business ecosystem boundary setting is guided by the pursuit of business goals over the lifecycle of the system.

The purpose of this paper is to develop a governance framework for business ecosystem projects. We define a business ecosystem project (BEP) as a project within a business ecosystem, where the project boundaries are determined by how the project's workflows ties in with the workflows of the business ecosystem. Similar conception has been presented in the case of learning and innovation in ‘project ecologies’ (Boland Richard J., Lyytinen, & Yoo, 2007; Grabher, 2004), however, few studies have dealt with the governance issue. A business ecosystem may have multiple BEPs at any point in time, and they may last for varying lengths within the lifecycle of the business ecosystem. The business ecosystem constitutes a context for the BEP in the sense that the BEP workflows tie in with those of the business ecosystem, often characterized by its institutionalized structure of production, industry architecture, or vertical scope (Cacciatori & Jacobides, 2005; Jacobides & Winter, 2005) . The BEPs in the business ecosystem do relate to each other, because they are in the same business ecosystem. The boundary setting of a BEP *vis a vis* the business ecosystem is based on the business of the project. Using business as a boundary setting condition is also used for business units, business segments, business processes, and many other business units of analysis.

Business ecosystems research has not developed a clear conceptualization of governance of business ecosystems (cf. Gulati, Puranam, & Tushman, 2012). As we define business ecosystems to be workflows that are interconnected over the lifecycle in pursuit of commercial ends, it follows that business ecosystem governance focuses on the workflows. We define workflows as interdependent activities, performed by actors that use interdependent resources (Crowston, 1997). The governance problem is that workflows may not necessarily be easily aligned within a business ecosystem. The reasons for this is that resources may be scarce, actors may have conflicting subgoals, and certain activities may be uneconomical.

Governance of workflows was discussed already by Thompson (1967), and subsequent research has identified different governance mechanisms for different kinds of interdependence in workflows (Levitt 2015, Tsvetkova et al. 2016). The pooled interdependence is when workflow parts are independent of each other, and the governance required for that is that workflow parts should be specified and coordinated for desired delivery and quality standards. The Sequential workflow interdependence is when one workflow element depends on input from another workflow element, and the governance mechanism used for that is hierarchical scheduling. Reciprocal workflow interdependence exists when multiple workflows need to be coordinated concurrently, and here the governance differs depending on whether the subgoals of the organizations executing the workflows are compatible or contentious. Compatible reciprocal workflows are governed by self-organized networks or relationships. Contentious reciprocal workflows are governed by set rules for decision making among the parties involved.

Business ecosystems contain many workflows, and any BEP contains a subset of all the workflows in the business ecosystem. The governance of a BEP is essentially accomplished by governance of workflows in the BEP. A BEP usually contains multiple workflows of different kinds. So, while there are different kinds of governance structures for different kinds of workflows, the overall governance of the BEP needs to address how to govern combinations of different kinds of workflows. To the best of our knowledge, this has not been investigated before, and this paper closes this gap.

The paper is structured so that it starts with a discussion and definition of BEPs. This is followed by a discussion of governance of BEPs, and after that we analyze the array of governance tools that can be used in BEP governance. Finally, we illustrate our framework on a case from the seaborne transportation industry.

BUSINESS ECOSYSTEM PROJECTS

WHAT IS A BUSINESS ECOSYSTEM?

Collaboration and cooperation across industries and-between companies is increasingly seen as a way to achieve enhanced capabilities around novel innovations and increased value creation. Thus, the performance and competitiveness of a company is not solely dependent on its own capabilities and activities, but on the capabilities it can access through its business ecosystem and how well it is able to align the interests and the workflows in the ecosystem towards a common business goal.

Two major characteristics of business ecosystems withstand. Firstly, there is the presence of a system-level business goal (Adner, 2006; Gulati et al., 2012), or, rather, an overall service that the system provides. Secondly, achieving the system level goal hinges upon the idea of a system of interdependent firms whose performance depends on the actions of their collaborators (Adner &

Kapoor, 2010; Moore, 1993). This means that firms are parts in a system of interdependent workflows, often spanning conventional industrial boundaries (Tsvetkova et al. 2016). Hence, ecosystems provide a cross-sectoral view to value creation (cf. Dalziel, 2007).

Like in its biological analogy, an ecosystem is dynamic and undergoes constant evolution and change. Hence, the notion of system leverage becomes central to business ecosystems, which refers to a situation when firms by organizing and doing things differently in a system can create more value based on the same input (Thomas, Autio, & Gann, 2014). The notion that competition is moving from the firm level to the ecosystem level builds on this insight, and it has profound impact on workflow coordination in the business ecosystem. By coordinating workflows differently, for example by lowering barriers that exist because firms have their own business goals, and do not focus on system level business goals, the business ecosystem can become more competitive.

The change in business ecosystems implies a lifecycle perspective, where business ecosystems emerge, and remain viable as long as they are not outcompeted by other business ecosystems. Changes in technology, regulation, innovation, and end user behavior are among the factors that can influence the business ecosystem lifecycle.

Based on the above discussion, we define a business ecosystem as a system of workflows that contribute towards a common system-level business goal. The definition implies a bottom-up perspective, where the workflows are at a micro-level, and the business ecosystem boundary is determined by the way in which these workflows contribute towards a macro-level business ecosystem goal.

WORKFLOWS IN THE BUSINESS ECOSYSTEM PROJECT

Since business ecosystems are systems of workflows, it seems logical that governance of workflows would be key to governance of business ecosystems. However, the multitude of workflows in a business ecosystem can lead to a daunting complexity, and overarching, system-level governance is often too complex. Governance of business ecosystems is therefore best done by governance of workflows at the micro-level (Tsvetkova et al. 2016).

Research shows that workflows can be effectively governed in projects, where the design and structure of the project is organized in such a way that it suits the characteristics of the workflow in the project (Crowston 1997, Malone and Crowston 1994, Eppinger, 1991; Sosa, Eppinger, & Rowles, 2004). In further support for using projects as the primary level of governance in business ecosystems, we note that projects are often carried out in a network mode (Brusoni, 2005; Sydow & Staber, 2002; Windeler & Sydow, 2001), and we argue that this shows how projects contain workflows that transcend company boundaries. Business ecosystems can contain many projects, and they may vary in length of time over the lifecycle of the business ecosystem. We call these projects Business Ecosystem Projects (BEP).

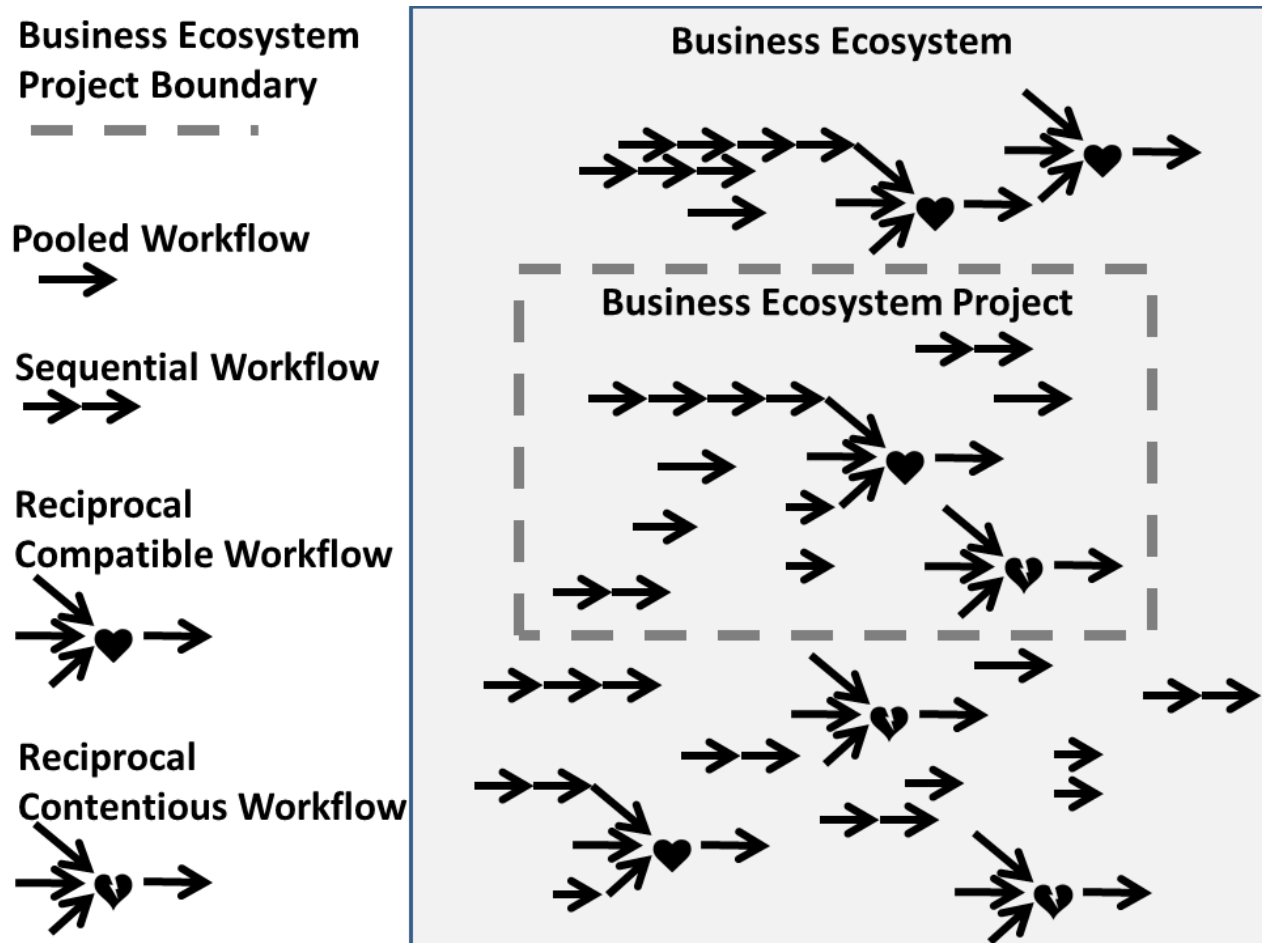
Following Thompson (1967), and Levitt (1995), we identify four kinds of workflows in a Business ecosystem:

- Pooled workflows where the work task can be done independent of other work tasks.
- Sequential workflows, where one work task has to be completed for the next to be able to start.
- Reciprocal-compatible workflow, where several work tasks need to be done concurrently and integrated, and where goals of the actors involved are compatible.

- Reciprocal-contentious workflow, where several work tasks need to be done concurrently and integrated, and where one or more subgoals of the actors involved are contentious.

In a Business ecosystem, there may be multiple workflows of these four kinds at any point in time. They are bound together in that they contribute to the system-level business goal, which means that they can, but need not, be linked together at a specific point in time. The relationship between a Business ecosystem, a BEP, and workflow kinds is schematically depicted in Figure 1.

Figure 1. A Business Ecosystem Project (BEP) in a Business Ecosystem,



PROJECT CHARACTERISTICS AND THE DYNAMISM OF BEPS

The challenge for governance of BEPs are similar to those of other projects, with the addition that BEPs are embedded in a business ecosystem. The challenge for project organizing in general is its temporary and discontinuous character (Hadjikhani, 1996; Lundin & Söderholm, 1995). A project is a temporary organization that is set up intentionally, initiated by a project owner or a main supplier. In such settings projects can act as “temporary administrative frameworks” where

authoritative communication in an otherwise vertically disintegrated industry can unfold (Brusoni, 2005). For a BEP, such authority serves to select workflows in a business ecosystem, and integrate the workflows temporarily. BEPs can be seen as tests of the collaborative capabilities of a part of the business ecosystem.

In this respect, it is important for actors to maintain relationships that are not momentarily engaged in active business, but that can potentially be activated later (Hadjikhani, 1996), and it is also important for actors to be able to utilize product systems' evolutionary dynamics (Prencipe, 1997). The driving companies must retain knowledge of the entire product system; and a set of systems integration capabilities becomes essential (Brusoni et al. 2001). The temporary nature of projects and the, therefore, potentially immature or "unvalidated" industry architectures also have an immense impact on the management of the projects. For instance, they considerably restrict the available options for such key issues as contracting strategy (Cox & Thompson, 1997; I. Thompson, Cox, & Anderson, 1998) and procurement strategy (Ahola, Laitinen, Kujala, & Wikström, 2008).

We do acknowledge the fact that the difference between a temporary and a permanent organization may not be as clear cut as has been pointed out in recent research (Müller-Seitz & Sydow, 2011). Especially in large infrastructure projects that last for several years the project organizations can be more permanent than many "permanent organizations". Still, the conception of temporary organization is useful for us as we set out to explore how BEPs (as a temporary endeavour) can be governed within a business ecosystem. For the purposes of this paper, we see a BEP as a phase stretching from the point in time when the project owners start to involve other parts of the business ecosystem with the purpose of investing attention, time and/or resources in producing an output for the business ecosystem. Such a point in time is when the main suppliers are invited to tender. We take the end of commercial operation as the end of the project phase.

Earlier studies on major project acknowledge the fact that projects are tied to and influenced by (i.e., embedded in) their context and history (Engwall, 2003; Grabher, 2004; Miller & Hobbs, 2005). However, to our knowledge very few studies examine how projects are connected to their underlying business ecosystems in terms of their constituent workflows, or how these processes are governed from a system point-of-view. We earlier defined a BEP as 'a project within a business ecosystem, where the project boundaries are determined by how the project's workflows ties in with the workflows of the business ecosystem.' The context of the BEP is determined largely by how it ties in with other workflows in the business ecosystem. Workflows develop and are terminated as they are needed, both in the BEP and the surrounding business ecosystem. The context for the BEP, and the BEP itself therefore changes over its lifecycle, meaning that the BEP boundary in the business ecosystem changes dynamically over time.

For the present purposes, workflow attributes are functional with respect to the production in the business ecosystem. However, our framework could also be expanded to include additional workflow attributes, such as workflow institutionalization, and these attributes would also require additional governance considerations.


GOVERNANCE OF BUSINESS ECOSYSTEM PROJECTS

The above mentioned four different kinds of workflows are each coordinated in different ways (Table 1). Pooled workflows are coordinated primarily by standardization, either through specifying the required outputs and competence needed, or the detailed work process. Sequential

work tasks are coordinated primarily by hierarchical planning and scheduling of work tasks. Compatible-reciprocal workflows are coordinated primarily by mutual adjustment where the involved actors organize themselves, because their goals are compatible. Contentious-reciprocal interdependence is negotiated by mutual adjustment, and escalated in case of deadlocks to be resolved by the BEP management, because one or more subgoals of the actors involved are contentious.

Because of the varying amount of effort needed in coordination of the four workflow types, the cost of coordination differs. The cost ranges from lowest for pooled workflow interdependence, to highest for contentious-reciprocal interdependence.

Table 1 Business ecosystem project governance framework

Type of workflow interdependence	Primary workflow coordination mechanism	Cost of coordination	Primary mode of BEP governance	Practical governance tools	
Pooled	Standardization	Lowest	Decentralization	Contracts, Incentive, pricing, standard operating procedures	
Sequential	Planning and Scheduling		Hierarchy	Contracts, pricing, Incentive, authority, standard operating procedures	
Compatible-reciprocal	Self-organized relationships and networks, information sharing facilitate mutual adjustment		Relationship and network governance	Network management, incentive, pricing	
Contentious-reciprocal	Organized BEP to facilitate mutual adjustment based on BEP-level outcomes		Highest	Real or virtual hierarchy	Contracts, conflict resolution, authority, network management

There are also primary modes of governance associated with each of the four workflow types. Pooled workflows can be governed by decentralization, as long as delivery is made to specified standards. Sequential workflows need a hierarchy that sets, monitors and adjusts, the schedule. Compatible reciprocal workflows can be governed by self-governed relationships and networks. Contentious reciprocal workflows need to be governed by a real or virtual hierarchy that specifies the relationships between the actors involved in mutual adjustment.

There is an array of practical governance tools for management of business ecosystem projects. We describe these tools, and their application to BEPs in the following sections and we also evaluate the need to develop further governance tools to ensure the integration between the ecosystem and the BEP.

PRACTICAL GOVERNANCE TOOLS FOR MANAGEMENT OF BUSINESS ECOSYSTEM PROJECTS

Governance structures have traditionally been addressed from the point of view of formal safeguards, that is, contracts (Eccles, 1981; Stinchcombe, 1959; Williamson, 1979). The purpose of a contract is to define the obligations and responsibilities between the parties making an agreement. Formal contracts thus represent promises or obligations to perform particular actions in the future (Macneil, 1978). A contract is often seen as the opposite to hierarchical control (cf. market vs. hierarchy). In the specific case of (construction) projects, Cox and Thompson (1997), suggest that the contractual terms within a contractual relationship comprise typical market mechanisms: the relationship, the risk allocation, the division of responsibilities and the reimbursement mechanism. Stinchcombe (1990), however, noted early on that a contract also fulfills five governance functions predominantly associated with hierarchies: authority system, incentive system, pricing system, conflict resolution, and standard operating procedures. In the next, we will discuss various practical operationalizations of these governance functions. In addition to such formal safeguards, we will also add a number of informal (non-contractual) safeguards to the discussion, such as trust.

Moreover, governance is not only about safeguarding, but indeed also about efficient transactions (Dyer, 1997) and, coordination costs and appropriation concerns (Gulati & Singh, 1998), and value creation (Amit & Zott, 2001). In fact, new types of collaborative governance arrangements such as project alliances increasingly build on both leveraging social capital, increased transaction efficiency and value creation, which will be reflected in the discussion below.

Authority system

With authority system, Stinchcombe (1990) referred to communication practices, especially in change situations. Communication is also essential for distributing information to the various parties in a large project and coordinating their work efforts. Communication can be understood in many ways, but the key argument here is that extensive interfirm information sharing may lower transaction costs (Dyer, 1997) and that sources of inter-organizational competitive advantage consequently can be found, among others, in effective and efficient knowledge-sharing routines (Dyer & Singh, 1998). And vice versa, ineffective communication has been linked to poor performance (Maznevski, 1994). In this spirit, for example, Pietroforte (1997) call for tools that facilitate both formal and informal communication and interaction among project participants, rather than IT tools that merely focus on the controlling function.

Monitoring of an agent's adherence to the principal's objectives is a typical authoritative tool and is a critical component of any governance system (Evaristo, Scudder, Desouza, & Sato, 2004; Jensen & Meckling, 1976; Ouchi, 1979). We understand work monitoring as the practical, hands-on operationalization of governance. Brady and Davies (2014) found that context is an important determinant in the choice of an appropriate governance (in their cases, reporting) of a mega project.

In collaborative governance arrangements these can be interpreted as administrative consistency and planning emphasis (Lahdenperä, 2012). Ever since Macneil's (1978) seminal work on relation contract theory it has, in fact, become widely accepted that basically all contracts contain a relational element. Indeed, today relationships and contracts are considered as each other's complements in both the general management literature (Poppo & Zenger, 2002). This is also why various kinds of collaborative governance arrangements also put emphasis on a cooperative culture and team formation activities (for an overview, see Lahdenperä, 2012). When knowledge or trust increases, the level of monitoring can be decreased (Adler, 2001). In this regard, the procurement process itself is crucial as it often sets the direction of the relationships. The form these will take in the initial stages of cooperation is difficult to change later on (Doz, 1996; Olsen, Haugland, Karlsen, & Johan Husøy, 2005).

Incentive system

Down this vein a contract or project organization is ideally to provide a cooperative system between parties based on mutually consistent objectives (Levitt & March, 1995; Turner & Simister, 2001). Incentives are one way to achieve commercial unity and mutually consistent objectives that is prerequisite for collaborative governance arrangements, for example through shared financial risks and rewards (Lahdenperä, 2012). Incentives are associated with rewards for good performance (Stinchcombe, 1990). At a general level, risks are expected, directly or indirectly, to be assigned through the contractual terms (Cox and Thompson, 1997). A couple of studies report on the successful management principles of Heathrow Terminal 5 project, where the owner accepted not assigning all risks to contractors, but decided to bear most of them itself (Brady, Davies, Gann, & Rush, 2008; Davies, Gann, & Douglas, 2009), using an incentive profit pool to reward all key participants for a successful project outcome. In a recent study, Brady and Davies (2014) illustrate how incentives were used in two successful mega projects (Heathrow Terminal 5 and the London Olympics).

Pricing system

Stinchcombe (1990) argued that "administered" rather than market-driven pricing systems could be another way reach commercial unity. A concrete operationalization of such pricing systems are different forms of payment terms. For example, Turner and Simister (2001) used three standard forms of payment terms in their analysis: cost plus, remeasurement and fixed price. They indeed argue that the different terms motivate contractors in different ways and that the choice of payment terms should be made according to the type of uncertainty in the project. More generally, the entire purchasing strategy may also have a significant impact on the buyer's value creation potential, and should, to maximize value, be aligned with the project marketing process of the seller (Ahola et al., 2008). In this regard, the pre-contractual phase of the procurement process is interesting because it involves decisions about project decomposition, project delivery method and supplier (or contractor) selection.

Conflict resolution

Costly market-based conflict resolution procedures are a major source of transaction inefficiencies. Stinchcombe (1990) proposed that contracts could provide mechanisms for avoiding costly disputes in courtrooms. Likewise, one important element of collaborative governance arrangements is the specification of conflict resolution procedures to improve the teamwork premises.

Standard operating procedures

Standard operational procedures aiming at process efficiency of all sorts can also be found in large projects, for example, master schedules and standard documents (Stinchcombe, 1990). In an extensive comparison of various multi-party arrangements, Lahdenperä (2012) explicitly found that operational procedures are on cornerstone of collaborative governance arrangements.

A specific type of “standard operating procedures” which has implications for communication is found in the theory of modular designs that through its standardized interfaces enable product development tasks to be carried out concurrently and autonomously (Sanchez & Mahoney, 1996). Sanchez and Mahoney (1996) describe how standardized product interfaces create a well-defined “information structure” that specifies how the components of a product function together and consequently how the corresponding development processes and groups connect. This idea lies in the heart of the market-hierarchy contradiction. Sanchez and Mahoney (1996) explain this as the case when a well-defined information structure enables a kind of “embedded coordination without the need to continually exercise authority”. Langlois (2003) called this phenomenon “the vanishing hand” of modularity. That is, as interfaces become fully standardized and specified, neither market nor hierarchy is needed to coordinate the transactions within an industry.

Network governance

Hardly any single firm possesses all the capabilities needed to undertake a large project. For this reason, some level of collaboration is needed. Collaboration (Dyer, 1997; Powell, Koput, & Smith-Doerr, 1996) has been researched under a variety of labels such as cooperation (Dyer & Singh, 1998; Gulati & Singh, 1998) and network governance (Jones, Hesterly, & Borgatti, 1997). At the core of effective interfirm collaboration lies effective governance through informal, self-enforcing safeguards (Dyer, 1997; Jones, Hesterly and Borgatti, 1997; Dyer and Singh, 1998).

As already noted, one issue in establishing collaboration in temporary settings is the interplay between the formal agreements and their interpretation and implementation. For instance, complex projects tend to demand a culture of trust and mutual respect and that this must be reflected in the contract structure (Turner and Simister, 2001). The importance of both the relational and the governance (contractual) aspect is also underlined by Smyth and Edkins (2007) and Henisz *et al.*(2012). Trust builds social capital, which in a project environment translates into financial capital (Smyth, Gustafsson, & Ganskau, 2010). Long-term collaboration with a relatively stable set of suppliers may also reduce transaction costs and affords interactive learning processes that benefit involved partners (Grabher, 2004). Trust is also the basis for closer integration and information exchange between parties (Kirsilä, Hellström, & Wikström, 2007). However, building trust would often require more joint experiences than the project schedules allow and complementary means of facilitating collaboration are needed.

Non-business actors and public organizations play an important role in large projects (Grün, 2004) and, hence, need to be involved in governing the BEP. The overall purpose of their intervention is to monitor the society's interest over the project. Governments as project participants may play diverse roles, although often hiding behind the role of "the independent guardian of the public good" (Miller & Hobbs, 2005). Governments often set up their own governance frameworks public projects (Williams, Klakegg, Magnussen, & Glasspool, 2010).

CASE ANALYSIS OF A BEP IN SHORT-SEA TRANSPORTATION SYSTEM

We present an example of a Business Ecosystem Project in the form of an investment in new construction of a cargo vessel for short sea shipping in the Baltic. Our analysis of the illustrative case of a vessel investment in the Baltic short sea shipping ecosystem offers an example of how the success and functionality of an investment is highly dependent on how well it is embedded into the surrounding business ecosystem (Tsvetkova, 2016). The current short sea logistics ecosystem in the Baltic Sea is characterized by a number of inefficiencies that make shipping—and consequently operation of vessels—economically and environmentally infeasible. Several lock-ins and even monopolies have been detected in the existing ecosystem. The utilization rate of the ships is below 40%, because of inefficient cargo space utilization and the amount of idle time in ports. The number of organizations involved has increased gradually and now numbers from 16–19, causing higher cost and fragmented information flow. At the same time, the shipbuilding process exhibits broken agency: it is heavily biased toward a "low-cost-oriented" logic, creating impediments for designing and delivering vessels that would be somewhat costlier to build, but would produce much greater benefits during operations over their lifecycle. The transportation system forming the core of the business ecosystem includes the cargo owner, land transportation, ports, the ship owner, and the end customer receiving the cargo. Included in the ecosystem are also ship brokers, technology providers, ship designers, ship yards, and authorities.

The specific BEP - new cargo ships - is integrated into the ecosystem as illustrated in figure 2. The vertical axis shows the lifecycle of a vessel, going from planning, to design, construction and finally operations. The horizontal axis shows parts of the business ecosystem that have interconnected workflows. The vessel investment and development is the BEP. The workflows of a more permanent character in the ecosystem impacting on the BEP are cargo owners material flows, and existing port infrastructure. Important for the relationships between actors in Figure 2 are existing technologies, legislation, and regulations, of which the most important ones are environmental regulations. The various governance tools for connecting the BEP workflows with the ecosystem and to govern the actual BEP is discussed more in detail below.

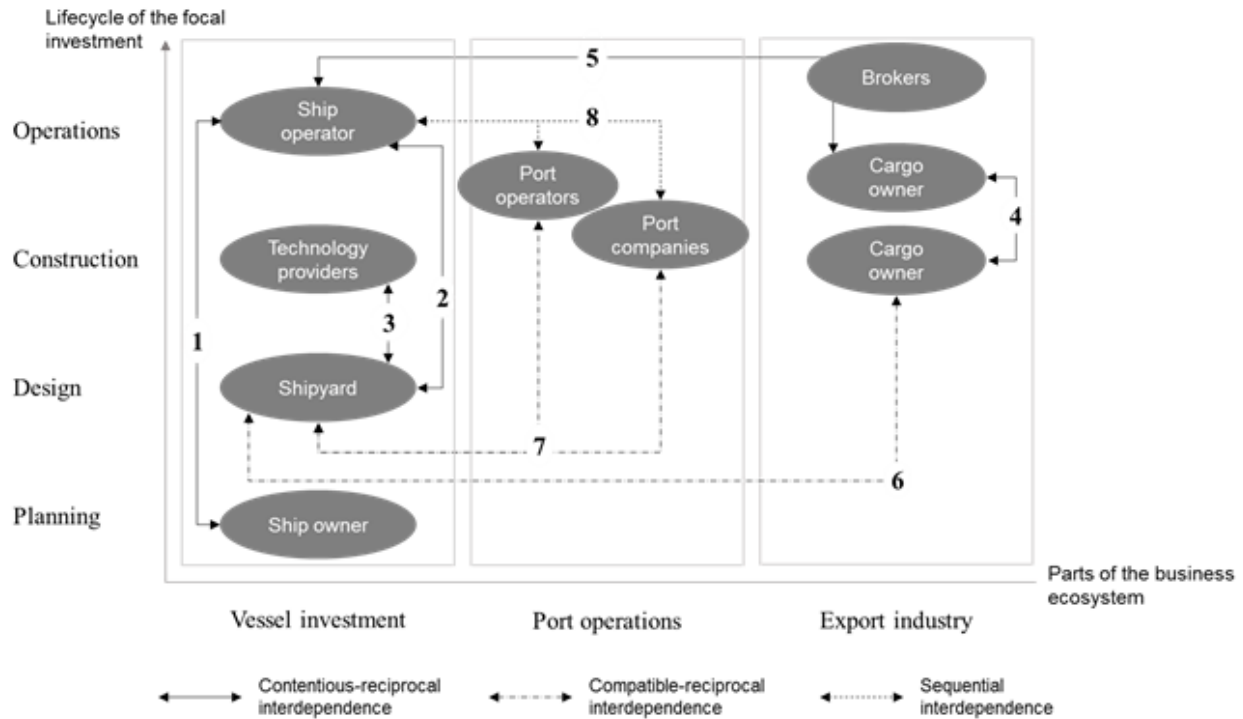


Figure 2. An investment in a vessel as an example of a BEP.

The most demanding workflows are within the BEP as shown in figure 2, the workflows between the BEP and the ecosystems are generally compatible-reciprocal flows. Also the intensity of interaction between the BEP and the ecosystem is concentrated to the early phases and late phases of the BEP even if the ambition is to interact and adapt during all phases of the investment. In the following part a more detailed presentation of the most critical workflows within the ship investment BEP and the integrated flow between the BEP and the ecosystem is discussed based on previous work from (Tsvetkova, 2016).

Tsvetkova et al. (2016) identified eight critical workflow interdependencies in analyzing the complexity of required governance for a ship investment– from the costliest contentious-reciprocal ones to sequential one (see Figure 2). The most challenging workflow interdependencies proved to be the costliest, contentious-reciprocal ones. There were five such interdependencies identified, and they were characterized by a misalignment of interests and goals of various actors in the business ecosystem. Three of them concerned the disintegration of activities during the lifecycle of vessel delivery, while two of them were related to the lack of alignment of vessel delivery and operation with the activities of the export industry, i.e. the cargo owners.

Contentious-reciprocal interdependencies

The vessel investment is controlled and affected by different actors at various stages of its lifecycle. The ship owner is the actor that makes the decision about key characteristics of the vessel during the design and planning phase, such as its size, tonnage and suitability for certain cargos, while the ship operator is the one that operates the vessel during its operations phase (workflow interdependence 1 in Figure 2). Often the two actors are connected by a rather transactional time-charter party agreement, which allows a ship operator to charter and use the vessel of the ship

owner for a certain price, and during a fixed period of time. In this situation, the information about actual operations is not communicated back to the ship owner, no “feedback for design” is generated either, and thus the activity of defining future ship specifications is not connected to the activity of operating vessels. Since the ship owner is not involved in, nor directly benefits from, the operations of the vessel, there is no motivation for the ship owner to invest in more advanced and potentially more expensive technology that could lead to greater lifecycle benefits, such as reduced fuel consumption, decreased costs of cargo, lower cleaning costs during operations, and timely vessel maintenance to reduce operating time lost due to downtime. The ship owner, instead, focuses on minimizing the capital expenditure related to the vessel investment.

Currently, the dependency is governed as sequential by excluding the ship operator from the planning phase. Moreover, the transactional time charter contract between ship owner and ship operator does not facilitate resolving conflicting subgoals of actors in the value chain.

Further vertical fragmentation along the vessel lifecycle is caused by the highly low cost-oriented business model of a shipyard, which is a technical integrator and the major actor in designing the vessel. The shipyard strives to reuse existing designs and take bids for the lowest construction cost among a multitude of technology providers; the ship operator is not involved in the design process (workflow interdependence 2 in Figure 2). A related problem is the lack of a link between the technological knowledge of various technology providers to the design and planning process (workflow interdependence 3 in Figure 2). Due to the lowest-cost-oriented bidding, there is no forum for proposing more advanced designs by technology providers, even if they have the requisite knowledge.

In all these cases, the contentious-reciprocal interdependencies are currently governed as sequential through excluding the technology providers and ship operator from the decision-making during the vessel planning phase and exercising a highly structured and formalized bidding process. Thus, the need for mutual adjustment is ignored, and the potential for achieving lifecycle benefits of vessel delivery and operation is overlooked. In order to unleash the potential for increased lifecycle performance of the vessel, there is a need to address, rather than avoid, the contentious nature of dependency between the activities of the named actors and move them into a concurrent co-design mode.

One solution designed to integrate as outlined for the Business Ecosystem Projects is to create an alliance that virtually integrates the actors that are critical for lifecycle performance of a vessel—, virtually integrate the firms through alliance contracting, rather than integrating them legally through mergers and acquisitions. This could take place using forms of contracting that align the actors’ interests and incentivize them to invest their best knowledge and resources in: (1) creating a vessel that would have the potential to achieve greater lifecycle performance, and (2) ensuring that the vessel would operate in the intended manner. Such actors would include the ship operator, the yard, and key technology providers. The alliance would be responsible for the design and construction of the vessel, on one hand, and for the operation and maintenance of the vessel, on the other hand.

By sharing the profit generated during lifecycle vessel operation, the participants should be motivated in a number of new and more optimal ways considering also the influence from the surrounding context (ecosystem). Technology providers are incentivized to adjust the capital expenditure for a vessel based on a value-driven rather than cost-driven logic, and to use their best

knowledge to design and maintain the vessel in such a way that operations are not disrupted. Ship operators are incentivized to utilize their knowledge to provide input for the design of the vessel based on lifecycle operating costs given current prices, rather than being driven purely by minimizing first cost. With this combined input, designers can simulate vessel construction and operations to help align the planning activities of a number of crucial actors within the alliance, as well as with potential consumers of logistics services.

The other set of contentious-reciprocal interdependencies concerns vessel operation and the operations of cargo owners. Currently, cargo owners are reluctant to combine their bulk cargo shipments with others, due to the assumed and real quality risks and prospective schedule delays (workflow interdependence 4 in Figure 1). Our research identified the potential of introducing new cargo handling technology on the vessel, which would address the conflicting interests of various cargo owners. The opportunity to safely separate different types of cargo and efficiently combine different cargos on different routes would resolve the contentious character of this interdependence and allow for increased vessel utilization while still delivering greater value to the end customers.

Coordination can be further facilitated by a new technology – an electronic marketplace for cargo transport. This solution would also address the existing lack of efficient governance of the contentious-reciprocal interdependence between cargo owners and ship operators, which is currently bridged by cargo brokers in a somewhat opaque and non-optimal manner (workflow interdependence 5 in Figure 1). Cargo owners are interested in lower freight rates and suitable delivery schedules, while ship operator is interested in higher freight rates and high vessel utilization. Brokers, who act as intermediaries, exploit the opacity of information flow between cargo owners and ship operators and do not facilitate efficient utilization of vessels or efficient transportation of cargo. Framework suggests that this dependency could be governed as contentious-reciprocal, resolving the conflict between parties through the introduction and use of an electronic market place for cargo that enables more transparent information exchange and sets optimum freight rates. Also, more long-term contracts between cargo owners and ship operators can facilitate advanced logistics planning. By turning the interdependency into a compatible-reciprocal one, system-level optimization of cargo flows and efficient value chain can be achieved.

Compatible-reciprocal interdependencies

The next type of critical interdependencies analyzed are compatible-reciprocal ones. These include the interdependence between the vessel design and cargo transportation at the export industry end as well as between vessel design and design of port facilities and equipment in shipping operations. In both cases, there is a natural need for compatibility between the vessel and the cargo it is intended to transport, as well as for efficient vessel-port systems.

Cargo owners are the ultimate users of logistics services. Thus, vessel operations need to be compatible with industrial operations, including type of cargo transported, transportation costs, frequency, and routes. Already during the design phase, it is crucial to identify operating profiles in order to design a vessel that would show good performance during its lifecycle (workflow interdependence 6 in Figure 1). In order to do so, vessel designers need information on cargo flows during the planning stage. Although there are occasional informal discussions between shipowners and prospective end users – the cargo owners— there is no persistent dialogue between them, nor any one-time communication when the vessel is designed. Based on the findings, the dependency needs to be governed through early and extensive information exchange to enable the best fit of

the vessel for the kinds of cargo to be transported. To achieve this, cargo owners can be incentivized to provide their input to vessel design in exchange for improved quality of transportation. As a result, the compatibility between cargo and vessels can be ensured, and potential for system innovation is realized.

The other compatible-reciprocal interdependence is the dependence of vessel operations on the activities in ports and on port facilities and equipment (workflow interdependence 7 in Figure 1). There is a direct technological link between the vessel and port facilities and equipment in terms of, for example, the size of vessels that are allowed to load or unload at a given port's quay, the capacity of cargo handling facilities in the port, the compatibility of cargo handling systems on the vessel with those at the port for different kinds of cargo, etc.

Currently, the interdependence is governed as sequential. That is, port facilities and equipment are seen as a given and as a constraint for vessel design. Since, in fact, such interdependence is compatible-reciprocal, there is a need for more proactive governance, which would enable coordination between the design of the vessel and the properties of equipment and facilities in relevant ports. This can be achieved by adjusting vessel design to fit the relevant characteristics of ports at which it is likely to pick up or deliver cargo (the current, sequential governance approach), or by jointly designing vessel-port solutions. One of the solutions proposed within the present research project is to develop a specific technology for separating, storing, and transporting cargo on vessels, which would potentially require a different cargo handling process in ports. This would ultimately create benefits for the port owners and operators through higher throughput in ports and improved quality of their service. Although this requires a system-wide shift and naturally brings uncertainty, the attempt to achieve better technological alignment between vessels and ports can spur more intensive information exchange and workflow alignment as well.

The interdependencies spanning the boundaries of other subsystems in the business ecosystem usually require compatibility of those systems and open avenues for system innovation and network externalities. Proper governance mechanisms for such compatible-reciprocal interdependencies should support extensive, transparent information sharing and thereby facilitate mutual adjustment for optimal outcomes at the ecosystem level. A remaining key challenge is to identify mechanisms like governance tools that would incentivize the actors that are currently outside the boundaries of the BEP to engage in transparent communication and information sharing.

Sequential interdependencies

The last workflow interdependence is a sequential interdependence between vessel operation and port operations (workflow interdependence 8 in Figure 1). Currently, the system for managing vessel arrivals at ports significantly undermines the value creation potential of a vessel. For example, the complicated reporting and notification procedures combined with the highly inflexible working times of port operators such as stevedoring companies, force vessels to spend significant time idling in ports, while not generating any profit. In addition to that, the current "first come first served" principle creates the incentive to increase sailing speed when approaching ports, which increases fuel consumption and therefore the economic and environmental costs of operating a vessel. The relationship between ship operators and ports is transactional, and the processes at ports are highly institutionalized, making it extremely challenging to alter the current ways of working.

The dependency needs to be governed through real-time, collaborative decentralized scheduling, which includes transparent and extensive information flow in order to enable planning and just-in-time operations, parallelization of activities, such as notification of arrival, enabled by ICT technology, and negotiations among multiple ships and port about timing and sequencing of loading and unloading. Negotiations between vessels contending for port slots to purchase each other's port slots can be introduced, as described in Kim and Paulson (2003). As a result, a more efficient value chain and 'just-in-time' operations can be achieved for the benefit of the involved parties.

Dynamic benefits of BEP governance

Short sea shipping vessel development can create dynamic benefits through workflow integration. Developments are currently underway. An example is provided by governance of the BEP by joint innovative activities between the cargo owner, ship owner, shipyard, technology providers and third party actors (government, consultants, NGO:s). The governance effort involves the creation of "innovation alliances" between all these actors before the actual specific investment decision has been made. The innovation alliance creates a compatible reciprocal interdependence between workflows that were previously less interdependent, or even not connected at all, because of lock-ins. The innovation alliance fosters a collaborative environment where all the actors share proprietary information for joint development of innovative vessels. One of the most important practical governance tools is contracts, because they are used to govern the relationship between the actors involved in the 'innovation alliance'. This is a difficult task because one actor may share information that can be used for value creation by another. Contracts are used to define the ownership of input and output of the innovation alliance, as well as the processes for collaboration in the alliance.

Contracts effectively govern the network within the BEP, and the relationships in between the BEP and the business ecosystem.

Another example of a workflow integration is to connect the BEP with some of the major ports that it will utilize, and further also connect it with land transportation that utilizes the ports. There are opportunities for efficiency improvements in the sequential interdependencies across vessel, port and land transportation, for instance by standardization, and by consideration of regulatory compliance across the different modes of transportation. Examples of opportunities are planned new investments in the port and land transportation spaces that can improve the performance of the new ships. New digital solutions based on real-time information of the flow of cargo at the different spaces can improve the overall performance of the ecosystem.

A third example of workflow integration is to make new types of financing structures where the ownership of parts of the infrastructure could be integrated so that one investor owns a larger part of the business ecosystem. Creation of a financial entity usually leads that return on investment for the entity is considered, and so financing can be used as a governance tool in the BEP. There are currently financing initiatives for actors to own ships over construction and operation and maintenance, meaning that workflows of those two lifecycle phases would be better integrated. These financing structures can be included into shipbuilding and ship operation alliances to find efficient forms of governance.

These new types of integration mechanisms create more demanding workflows in the BEP and its interaction with the ecosystem. With more costly workflows the expectation is that the value

created through these are higher and also increases efficiency. Still, these demands new tools of integration where the contractual forms, incentive schemes and collaboration “rules of the game” play an essential role. One example is a series of modular contracts that gradually bind the actors together and create more acceptable risk profiles.

CONCLUSIONS

This paper has developed a framework for the analysis of BEP governance in business ecosystems. It also outlines the concept of a BEP. Four types of workflow interdependence are used for the analysis of primary coordination and governance mechanisms. We identify that pooled interdependence is coordinated primarily by standardization, and governed by decentralization. We further identify that it is the least costly coordination mechanism, and that value is generated by increased capacity and expertise for each firm’s performance of its own tasks in the business ecosystem. Sequential workflow interdependence is coordinated by planning and scheduling, and governed by hierarchy. Sequential workflow interdependence is the second least costly to coordinate, and generates value primarily through workflow sequence optimization by prioritizing high-value tasks and eliminating idle time.

Compatible-reciprocal workflow interdependence is coordinated primarily by mutual adjustment through information sharing, self-organized relationships and networks. The governance is relationship and network governance. This is the second costliest workflow interdependence to coordinate. It generates value primarily through system level optimization of the value chain, avoiding inter-component misfits and through network externalities, and/or economies of scale.

Contentious-reciprocal workflow interdependence is coordinated by negotiation between the interdependent parties, with escalation in case of deadlocks, for delivering optimal ecosystem level outcomes. Creation, reinforcement and communication of high level project goals makes negotiation in contentious sub goals far more likely to be resolved without escalation. The cost of coordination for this type of interdependence is the highest. It is governed by real or virtual integration of the fragmented supply chain. Value creation is achieved by system level optimization through the value chain, network externalities, and/or economies of scale. Put differently, contentious-reciprocal interdependence governance creates value primarily by restructuring business ecosystems into virtually integrated organizations using alliance forms of contracts that combine the fragmented network into a single “macrofirm” (Dioguardi, 1983).

The workflow interdependencies affect the value created by the vessel investment and analyzed how the governance of interdependencies between respective workflows needs to be adjusted. One of our major findings is that value creation is being hindered by ignoring the contentious-reciprocal character of some interdependencies. This reduces ecosystem efficiency and functionality of a given investment. With the proposed governance of a BEP a shared interest for, and information exchange among, the crucial actors in the value chain enhance the lifecycle performance of the overall business ecosystem investment and each of its components.

MANAGERIAL IMPLICATIONS

The framework that we have developed can be used for analysis of which governance mechanism to use for the management of BEPs in business ecosystems. The greatest potential cost reductions lie in effective governance of the most costly coordination mechanisms, and those are associated primarily with contentious reciprocally interdependent workflows. Using the appropriate

governance mechanisms can unlock hold-ups that can reduce costs in the business ecosystem. But it is not only that cost reduction can be achieved. Governance of BEPs can increase value creation, innovation, and the overall competitiveness of the business ecosystem.

REFERENCES

- Adler, P. S. (2001). Market, Hierarchy, and Trust: The Knowledge Economy and the Future of Capitalism. *Organization Science*, 12(2), 215–234.
- Adner, R. (2006). Match Your Innovation Strategy to Your Innovation Ecosystem. *Harvard Business Review*, 84(4), 98–107.
- Adner, R., & Kapoor, R. (2010). Value creation in innovation ecosystems: how the structure of technological interdependence affects firm performance in new technology generations. *Strategic Management Journal*, 31(3), 306–333.
- Ahola, T., Laitinen, E., Kujala, J., & Wikström, K. (2008). Purchasing strategies and value creation in industrial turnkey projects. *International Journal of Project Management*, 26(1), 87–94. <https://doi.org/10.1016/j.ijproman.2007.08.008>
- Amit, R., & Zott, C. (2001). Value creation in e-business. *Strategic Management Journal*, 22(6–7), 493–520.
- Boland Richard J., J., Lyytinen, K., & Yoo, Y. (2007). Wakes of Innovation in Project Networks: The Case of Digital 3-D Representations in Architecture, Engineering, and Construction. *Organization Science*, 18(4), 631–647.
- Brady, T., & Davies, A. (2014). Managing Structural and Dynamic Complexity: A Tale of Two Projects. *Project Management Journal*, 45(4), 21–38. <https://doi.org/10.1002/pmj.21434>
- Brady, T., Davies, A., Gann, D. M., & Rush, H. (2008). Learning to manage mega projects: the case of BAA and Heathrow Terminal 5. *Project Perspectives*, 29(1), 32–39.
- Brusoni, S. (2005). The Limits to Specialization: Problem Solving and Coordination in “Modular Networks.” *Organization Studies*, 26(12), 1885–1907. <https://doi.org/10.1177/0170840605059161>
- Cacciatori, E., & Jacobides, M. G. (2005). The Dynamic Limits of Specialization: Vertical Integration Reconsidered. *Organization Studies*, 26(12), 1851–1883. <https://doi.org/10.1177/0170840605059160>
- Cox, A., & Thompson, I. (1997). “Fit for purpose” contractual relations: determining a theoretical framework for construction projects. *European Journal of Purchasing & Supply Management*, 3(3), 127–135. [https://doi.org/10.1016/S0969-7012\(97\)00005-1](https://doi.org/10.1016/S0969-7012(97)00005-1)
- Crowston, K., *A Coordination Theory Approach to Organizational Process Design*. *Organization Science*, 1997. 8(2): p. 157-175.

- Dalziel, M. (2007). A systems-based approach to industry classification. *Research Policy*, 36(10), 1559–1574. <https://doi.org/10.1016/j.respol.2007.06.008>
- Davies, A., Gann, D., & Douglas, T. (2009). Innovation in Megaprojects: Systems integration at London Heathrow Terminal 5. *California Management Review*, 51(2), 101–125.
- Doz, Y. L. (1996). The Evolution of Cooperation in Strategic Alliances: Initial Conditions Or Learning Processes? *Strategic Management Journal*, 17, 55–83.
- Dyer, J. H. (1997). Effective Interfirm Collaboration: how Firms Minimize Transaction Costs and Maximize Transaction Value. *Strategic Management Journal*, 18(7), 535–556.
- Dyer, J. H., & Singh, H. (1998). The Relational View: Cooperative Strategy and Sources of Interorganizational Competitive Advantage. *Academy of Management Review*, 23(4), 660–679. <https://doi.org/10.5465/AMR.1998.1255632>
- Eccles, R. G. (1981). Bureaucratic versus Craft Administration: The Relationship of Market Structure to the Construction Firm. *Administrative Science Quarterly*, 26(3), 449–469.
- Engwall, M. (2003). No project is an island: linking projects to history and context. *Research Policy*, 32(5), 789–808. [https://doi.org/10.1016/S0048-7333\(02\)00088-4](https://doi.org/10.1016/S0048-7333(02)00088-4)
- Eppinger, S. D. (1991). Eppinger_Model based approaches.pdf. *Journal of Engineering Design*, 2(4), 283–290.
- Evaristo, J. R., Scudder, R., Desouza, K. C., & Sato, O. (2004). A dimensional analysis of geographically distributed project teams: a case study. *Journal of Engineering & Technology Management*, 21(3), 175–189. <https://doi.org/10.1016/j.jengtecman.2003.05.001>
- Grabher, G. (2004). Temporary Architectures of Learning: Knowledge Governance in Project Ecologies. *Organization Studies*, 25(9), 1491–1514. <https://doi.org/10.1177/0170840604047996>
- Grün, O. (2004). *Taming giant projects: Management of multi-organization enterprises*. BOOK, Berlin: Springer.
- Gulati, R., Puranam, P., & Tushman, M. (2012). Meta-organization design: Rethinking design in interorganizational and community contexts. *Strategic Management Journal*, 33(6), 571–586. <https://doi.org/10.1002/smj.1975>
- Gulati, R., & Singh, H. (1998). The Architecture of Cooperation: Managing Coordination Costs and Appropriation Concerns in Strategic Alliances. *Administrative Science Quarterly*, 43(4), 781–814.
- Hadjikhani, A. (1996). Project Marketing and the Management of Discontinuity. *International Business Review*, 5(3), 319–336.

- Henisz, W. J., Levitt, R. E., & Scott, W. R. (2012). Toward a unified theory of project governance: economic, sociological and psychological supports for relational contracting. *Engineering Project Organization Journal*, 2(1–2), 37–55. <https://doi.org/10.1080/21573727.2011.637552>
- Jacobides, M. G. (2006). The architecture and design of organizational capabilities. *Industrial & Corporate Change*, 15(1), 151–171.
- Jacobides, M. G., & Winter, S. G. (2005). The Co-Evolution of Capabilities and Transaction Costs: Explaining the Institutional Structure of Production. *Strategic Management Journal*, 26(5), 395–413. <https://doi.org/10.1002/smj.460>
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics*, 3(4), 305–360.
- Jones, C., Hesterly, W. S., & Borgatti, S. P. (1997). A General Theory of Network Governance: Exchange Conditions and Social Mechanisms. *Academy of Management Review*, 22(4), 911–945. <https://doi.org/10.5465/AMR.1997.9711022109>
- Kirsilä, J., Hellström, M., & Wikström, K. (2007). Integration as a project management concept: A study of the commissioning process in industrial deliveries. *International Journal of Project Management*, 25(7), 714–721. <https://doi.org/10.1016/j.ijproman.2007.02.005>
- Lahdenperä, P. (2012). Making sense of the multi-party contractual arrangements of project partnering, project alliancing and integrated project delivery. *Construction Management and Economics*, 30(1), 57–79. <https://doi.org/10.1080/01446193.2011.648947>
- Langlois, R. N. (2003). The vanishing hand: the changing dynamics of industrial capitalism. *Industrial & Corporate Change*, 12(2), 351–385.
- Levitt, B., & March, J. G. (1995). Chester I. Barnard and the intelligence of learning. In O. E. Williamson (Ed.), *Organization theory: from Chester Barnard to the Present and Beyond* (pp. 11–37). CHAP, New York: Oxford University Press.
- Levitt, R. (2015). *An Extended Coordination Theory for Governance of Tasks, Projects, Firms and Business Ecosystems*, GPC Working Paper, Stanford university, Stanford, CA, USA
- Lundin, R. A., & Söderholm, A. (1995). A theory of the temporary organization. *Project Management and Temporary Organizations*, 11(4), 437–455. [https://doi.org/10.1016/0956-5221\(95\)00036-U](https://doi.org/10.1016/0956-5221(95)00036-U)
- Malone, T.W. and K. Crowston (1994). *The interdisciplinary study of coordination*. *ACM Comput. Surv.*, 26(1), p. 87-119.
- Macneil, I. R. (1978). Contracts: Adjustment of long term economic relations under neo-classical and relational contract laws. *Northwestern University Law Review*, 72(6), 854–965.
- Maznevski, M. L. (1994). Understanding our differences: Performance in decision-making groups with diverse members. *Human Relations*, 47(5), 531–552.

- Miller, R., & Hobbs, B. (2005). Governance Regimes for Large Complex Projects. *Project Management Journal*, 36(3), 42–50.
- Moore, J. F. (1993). Predators and Prey: A New Ecology of Competition. *Harvard Business Review*, 71(3), 75–86.
- Moore, J. F. (1996). *The death of competition : leadership and strategy in the age of business ecosystems*. BOOK, Chichester : Wiley, cop. 1996.
- Müller-Seitz, G., & Sydow, J. (2011). Terminating Institutionalized Termination: Why SEMATECH became More than a Temporary System. *Project-Based Organizing and Strategic Management*, 28, 147–186. Retrieved from [http://dx.doi.org/10.1108/S0742-3322\(2011\)0000028010](http://dx.doi.org/10.1108/S0742-3322(2011)0000028010)
- Olsen, B. E., Haugland, S. A., Karlsen, E., & Johan Husøy, G. (2005). Governance of complex procurements in the oil and gas industry. *Journal of Purchasing & Supply Management*, 11(1), 1–13. <https://doi.org/10.1016/j.pursup.2005.03.003>
- Ouchi, W. G. (1979). A Conceptual Framework for the Design of Organizational Control Mechanisms. *Management Science*, 25(9), 833–848.
- Pietroforte, R. (1997). Communication and governance in the building process. *Construction Management & Economics*, 15(1), 71–82. <https://doi.org/10.1080/014461997373123>
- Poppo, L., & Zenger, T. (2002). Do Formal Contracts and Relational Governance Function as Substitutes or Complements? *Strategic Management Journal*, 23(8), 707. <https://doi.org/10.1002/smj.249>
- Powell, W. W., Koput, K. W., & Smith-Doerr, L. (1996). Interorganizational Collaboration and the Locus of Innovation: Networks of Learning in Biotechnology. *Administrative Science Quarterly*, 41(1), 116–145.
- Prencipe, A. (1997). Technological competencies and product's evolutionary dynamics a case study from the aero-engine industry. *Research Policy*, 25(8), 1261–1276. [https://doi.org/10.1016/S0048-7333\(96\)00900-6](https://doi.org/10.1016/S0048-7333(96)00900-6)
- Sanchez, R., & Mahoney, J. T. (1996). Modularity, Flexibility, and Knowledge Management in Product and Organization Design. *Strategic Management Journal*, 17(Winter Special Issue), 63–76.
- Smyth, H., & Edkins, A. (2007). Relationship management in the management of PFI/PPP projects in the UK. *International Journal of Project Management*, 25(3), 232–240. <https://doi.org/10.1016/j.ijproman.2006.08.003>
- Smyth, H., Gustafsson, M., & Ganskau, E. (2010). The value of trust in project business. *International Journal of Project Management*, 28(2), 117–129. <https://doi.org/10.1016/j.ijproman.2009.11.007>

- Sosa, M. E., Eppinger, S. D., & Rowles, C. M. (2004). The Misalignment of Product Architecture and Organizational Structure in Complex Product Development. *Management Science*, 50(12), 1674–1689. <https://doi.org/10.1287/mnsc.1040.0289>
- Stinchcombe, A. L. (1959). Bureaucratic and Craft Administration of Production: A Comparative Study. *Administrative Science Quarterly*, 4(2), 168–187.
- Stinchcombe, A. L. (1990). *Information and Organizations*. Berkeley: University of California Press.
- Sydow, J., & Staber, U. (2002). The Institutional Embeddedness of Project Networks: The Case of Content Production in German Television. *Regional Studies*, 36(3), 215–227. <https://doi.org/10.1080/00343400220122034>
- Thomas, L. D. W., Autio, E., & Gann, D. M. (2014). Architectural Leverage: Putting Platforms in Context. *Academy of Management Perspectives*, 28(2), 198–219. <https://doi.org/10.5465/amp.2011.0105>
- Thompson, I., Cox, A., & Anderson, L. (1998). Contracting strategies for the project environment. *European Journal of Purchasing & Supply Management*, 4(1), 31–41. [https://doi.org/10.1016/S0969-7012\(98\)00005-7](https://doi.org/10.1016/S0969-7012(98)00005-7)
- Thompson, J. D. (1967). *Organizations in action social science bases of administrative theory*. BOOK, New York: Mc Graw-Hill.
- Tsvetkova, A., Eriksson, K., Wikström K, Levitt, R. (2016) Governing Workflows in Business Ecosystems: The Case of Baltic Short Sea Shipping, Working paper proceedings Cle Elum, Washington, USA, June 28-30, 2016
- Tsvetkova, A., Nokelainen, T., Hellström, M., Eriksson, K. (2017). A Framework for Ecosystemic Strategizing and Change. *Practices for Network Management : In Search of Collaborative Advantage*. J. Vesalainen, K. Valkokari and M. Hellström. Cham, Springer International Publishing: 275-301.
- Turner, J. R., & Simister, S. J. (2001). Project contract management and a theory of organization. *International Journal of Project Management*, 19(8), 457–464. [https://doi.org/10.1016/S0263-7863\(01\)00051-5](https://doi.org/10.1016/S0263-7863(01)00051-5)
- Williams, T., Klakegg, O. J., Magnussen, O. M., & Glasspool, H. (2010). An investigation of governance frameworks for public projects in Norway and the UK. *International Journal of Project Management*, 28(1), 40–50. <https://doi.org/10.1016/j.ijproman.2009.04.001>
- Williamson, O. E. (1979). Transaction-Cost Economics: the Governance of Contractual Relations. *Journal of Law & Economics*, 22(2), 233–261.
- Windeler, A., & Sydow, J. (2001). Project Networks and Changing Industry Practices — Collaborative Content Production in the German Television Industry. *Organization Studies*, 22(6), 1035–1060.

