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Organizing construction logistics outsourcing: a logistics strategy perspective

Petter Haglund and Mats Janné
Department of Science and Technology, Linköping University, Norrköping, Sweden

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Abstract

Purpose – The construction industry shows an increased interest in how to manage logistics within construction projects. Often construction logistics is outsourced to a logistics service provider (LSP). However, construction logistics is normally approached either as a strategic decision or as an operational issue and rarely as a tactical concern. The purpose of this study is to explore how to organize the logistics outsourcing decision at strategic, tactical and operational levels.

Design/methodology/approach – This study is performed as a single-case study within a construction corporation, containing (amongst others) a building contractor (BC) and a construction equipment rental company (CERC) offering logistics services.

Findings – The study shows that to procure construction logistics service successfully, BCs need logistics capabilities at strategic and tactical levels to maintain an alignment between the use of logistics services and operational characteristics. Simultaneously, CERC's need to design their service offerings to correspond to the needs of the BC.

Research limitations/implications – This study builds on a single-case study of a Swedish construction corporation. Further research is needed to better understand current logistics outsourcing and development practices and how these can be improved to foster better logistics management at the project level.

Practical implications – BCs find suggestions of different logistics organization structures and suitable outsourcing arrangements. CERCs and LSPs can use the findings to understand their customers' needs and adapt service offerings.

Originality/value – To the best of the authors' knowledge, this study is one of the first studies of how two companies within a corporation can work together to develop construction logistics service offerings.

Keywords Construction logistics, Outsourcing, Building construction, Logistics services, Supply chain management, Construction management

Paper type Research paper

1. Introduction

Construction projects are characterized by an element of temporariness as production is carried out at the final place of consumption (Ekeskär and Rudberg, 2016), with new production sites in each new project. This differs from other industry contexts where the

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place of consumption is decoupled from the place of production and the production facilities are, to a greater extent, fixed in their location. These differences indicate that logistics in construction needs to be managed in a more dynamic way as the project conditions will dictate how logistics is carried out on-site (Spillane *et al.*, 2013; Spillane and Oyedele, 2017) as well as to and from sites (Ghanem *et al.*, 2018; Ying *et al.*, 2021). At the same time, construction is material intensive and according to Scholman (1997), 60%–80% of the gross work involves purchased materials and services and approximately 40% of the project cost is made up of logistics costs (Jang *et al.*, 2003). All in all, this suggests that logistics management should be a priority in the construction industry. However, as noted by Navon and Berkovich (2005), logistics management has traditionally been approached in an *ad hoc* manner by construction projects and not as an opportunity to improve the construction projects' performance. Instead, construction projects have solved their daily logistics activities on a day-to-day basis (Ying *et al.*, 2018). Lately, however, construction logistics has received more attention from the construction industry and research alike, and BCs are starting to see the benefits of managing logistics (Dubois *et al.*, 2019). In the construction industry, outsourcing is the norm and construction projects are typically dependent on a multitude of subcontractors and suppliers being procured for each new project (Dubois and Gadde, 2002). Outsourcing logistics activities is thus not farfetched, but rather keeping in line with the temporary structure of the industry (Fredriksson *et al.*, 2021).

While logistics outsourcing in construction can bring benefits in terms of specialization (Sundquist *et al.*, 2018) and better estimates of material handling costs (Lindén and Josephson, 2013), the benefits of logistics outsourcing do not always outweigh the cost of acquiring a logistics service provider (LSP). The outsourcing norm in the construction industry typically favour short-term arrangements with LSPs, despite that LSP alliances or even in-housing logistics can generate greater benefits under certain circumstances (Selviaridis and Spring, 2007). In general, when a firm is dependent upon an LSP, it is more likely to engage in a strategic alliance or in-house logistics functions to a greater extent (Hofer *et al.*, 2009). The main rationale why contractors decide to outsource logistics is thus primarily due to institutional factors rather than for efficiency and effectiveness reasons.

Previous research indicates that the logistics outsourcing decisions, regardless of the outcome in terms of in-housing or outsourcing, need to be rooted in the buying firm's logistics strategy (Selviaridis and Spring, 2007). Autry *et al.* (2008, p. 27) define logistics strategy as "strategic directives formulated at the corporate level [. . .] used to guide more efficient and effective logistics activities at the operational level of the organization". From the perspective of the BC, the logistics strategy thus plays a key role by guiding the decision-making at the project level as to whether to perform logistics in-house or to outsource it to an LSP. Previous studies on third-party logistics in construction suggest that logistics outsourcing can be a means of developing new capabilities that would not be possible with an internal logistics function (Sundquist *et al.*, 2018). On the other hand, by internalizing the logistics function, the main contractor can set up a logistics system that is aligned with the type of product, production process and supply chain characteristics (Haglund *et al.*, 2022).

Construction logistics literature has so far mostly focused on logistics outsourcing at the project level. Meanwhile, there are few examples of contractors with a formalized logistics strategy and an internal logistics function. Instead, construction logistics is seen as an operational issue to be managed within each construction project (Ekeskär and Rudberg, 2016). BCs typically struggle to achieve sufficient economies of scale in construction logistics and thus opt for the outsourcing option (Le *et al.*, 2021). This augments the temporary structure of the construction industry (Dubois and Gadde, 2002) and limits long-

term strategic approaches to logistics management in construction. Furthermore, there is typically a missing link between strategic- and operational-level logistics among BCs (Thunberg *et al.*, 2017; Elfving, 2021). The missing tactical level of construction logistics should act as translating the operational needs of all projects into rough plans for the company's resources within the scope of the logistics strategy (Vollmann *et al.*, 2005). The missing tactical level means that there is a risk of procuring logistics services that are misaligned with the BC's operational characteristics. Therefore, the logistics outsourcing decision needs to be rooted in a company-level logistics strategy (Selviaridis and Spring, 2007), which guides decisions at the tactical and operational levels of the BC (Thunberg and Fredriksson, 2018). The purpose of this study is thus to explore how to organize the logistics outsourcing decision at strategic, tactical and operational levels.

The purpose is fulfilled through a case study of a large construction corporation's two sister companies: the BC and the construction equipment rental company (CERC). The BC has a history of different approaches to logistics development over the years, including an attempt to internalize logistics and more recently to outsource logistics. Recently, the CERC has acquired an LSP to offer third-party logistics services to its sister companies within the corporation.

2. Logistics outsourcing decision

2.1 Logistics outsourcing in construction

The decision to outsource logistics can be made for several reasons. A contractor can view an LSP as a substitute for investing in the resources and capabilities needed to manage logistics efficiently in construction projects (Ekeskär and Rudberg, 2016) or as an opportunity to learn from a specialized LSP that already possesses such resources and capabilities that facilitate economies of scale (Sundquist *et al.*, 2018). However, while lack of internal logistics capabilities can be in favour of outsourcing, another factor influencing the decision to outsource logistics is the logistical complexity of the project. Lindén and Josephson (2013) found that the lower complexity in repetitive projects (e.g. residential buildings and hotels) is in favour of logistics outsourcing. Therefore, there are two main dimensions that determine whether a contractor should outsource logistics to an LSP or keep the logistics as an internal function: the level of logistics capability of the contractor and the level of logistics complexity of the project.

Logistics complexity depends on several factors that influence the logistics outsourcing decision. The typical factors described in the literature are product, process and network characteristics (Wiengarten *et al.*, 2017). Product characteristics refer to the special considerations that need to be taken in transportation, storage and handling of materials (Rao and Young, 1994) and the product structure (Hofer and Knemeyer, 2009). Physical properties of goods mainly influence the ability of a client to control the quality of products, which can provide incentives to retain physical logistics tasks in-house. On the other hand, complex product structures demand high service levels to ensure timely replenishment of components and materials, which is in favour of logistics outsourcing (Bolumole, 2003).

Process characteristics comprise how critical timely deliveries are to the point of consumption (e.g. a production task) and the predictability of demand for materials and components (Rao and Young, 1994). The unsteady demand of materials and components in site production is in favour of small lot sizes and frequent replenishment (Schonsleben, 2000). As such, this requires a higher degree of coordination in the supply chain, which is in favour of outsourcing logistics for the client (Bolumole, 2003).

Supply network characteristics are defined as the geographical dispersion of suppliers and the type of business relationship (Hofer and Knemeyer, 2009). The geographical

dispersion of suppliers determines the number and distance to nodes in the supply network. An LSP can be used in situations where network complexity is high, and the client does not possess the sufficient capital, capability and/or facilities to manage the wide dispersion of material flows (Rao and Young, 1994). For instance, a contractor can use a construction logistics company that channel deliveries through a terminal, thus reducing the number of deliveries to the site (Janné and Fredriksson, 2022). Besides the potential operations-related reasons for logistics outsourcing, experiences from previous business relationships with LSPs can determine whether a client favour outsourcing logistics or relying on in-house capabilities (Rao and Young, 1994). Construction projects are a typical example where contractors and sub-contractors have been unfamiliar with logistics service arrangements, which has led to scepticism in relying on LSPs (Ekeskär and Rudberg, 2016).

2.2 Logistics organizations designs

BCs are project-based organizations where functional areas typically do not exist or have a limited role. In general, the more variety there is between projects, the more project-oriented the organizational structure will be to handle this complexity and unpredictability generated from variety at the project level (Galbraith, 1971). Logistics organizations can be designed in several different ways that accommodate different contextual conditions in terms of logistics complexity and predictability (Persson, 1978). Kim (2007) identifies five generic logistics organization types: the non-supply chain management oriented, the functional, the matrix channel, the process staff and the integrated line:

- The non-supply chain management oriented is characterized by its absence of a logistics or supply chain department. Logistics activities are performed in the line organization within each functional area without the use of specialized logistics personnel.
- In the functional type, logistics is separated into its own functional area, i.e. it has the same status as production, marketing and sales.
- The matrix channel type is similar to the functional type, but rather than having the role as a functional area, it focuses on cross-functional coordination and takes a boundary-spanning role.
- In the process staff organization, the logistics department is a form of internal consultant, where logistics activities are executed by unspecialized line staff of each functional area, but with the support of logistics specialists.
- In the integrated line organization, the logistics department is positioned close to the strategic apex in the organizational hierarchy. In this type of logistics organization, the logistics manager possesses a senior management role and is typically part of the top management team, whereas day-to-day logistics tasks are performed in the line organization.

Because building construction is a project-based, engineer-to-order type of production, it is uncommon to find logistics departments at the central company-level or as a functional area within BC organizations (Haglund *et al.*, 2022). Many BCs' logistics organizations are therefore project-based versions of the non-supply chain management-oriented organizational type (Kim, 2007) where logistics is managed decentralized at the project level (Dubois *et al.*, 2019). This type of logistics organization design favours logistics outsourcing due to the lack of adequate internal logistics resources needed to achieve economies of scale (Daugherty and Dröge, 1997). Projects need to bear their own costs, and when the cost of logistics resources are allocated to the projects rather than to the logistics department at the

central level, outsourcing becomes a means of increasing specialization and achieving economies of scale in the absence of internal logistics resources (Sundquist *et al.*, 2018).

2.3 Organizing construction logistics outsourcing

In the design of the logistics organization and the decision whether to outsource logistics or not, the latter is typically described as preceding to the former (Daugherty and Dröge, 1997). The outsourcing decision thereby precedes structure. Non-supply chain management-oriented and/or staff-oriented logistics organization structures are the result of a decision to outsource logistics. When logistics is outsourced, there is no need for the buying company to set up corresponding logistics capabilities in-house. Functional logistics organization types will however outsource logistics to a lower degree.

However, it is not possible to rule out the possibility that the structure does not follow the outsourcing decision because a change in structure may incur the need to change the decision. As such, rather than being unidirectional, the relationship between logistics organization design and logistics outsourcing is bidirectional, where an existing logistics organization structure may influence the decision to outsource logistics. The structure of the logistics organization in BCs is in turn influenced by other factors than logistics outsourcing decisions, for instance, the degree of logistics complexity and predictability generated by the number and variety of products, the production strategy (make-to-order/make-to-stock), interdependence between the logistics function and other functional areas (Persson, 1978; Haglund *et al.*, 2022). Such contextual conditions can therefore influence the logistics outsourcing decision via the logistics organization design and vice versa.

3. Research design and method

This study was based on a single-case study design (Yin, 2018), where the interaction between the BC's and the CERC's strategic, tactical and operational levels was the unit of analysis (see Figure 1). The focus of the empirical investigation was how the BC and CERC organized logistics outsourcing at the three levels. In line with the recommendation by Van de Ven (1992), the research is a combination of a retrospective perspective and real-time observation of the BC's approach to logistics outsourcing, which led to the CERC becoming

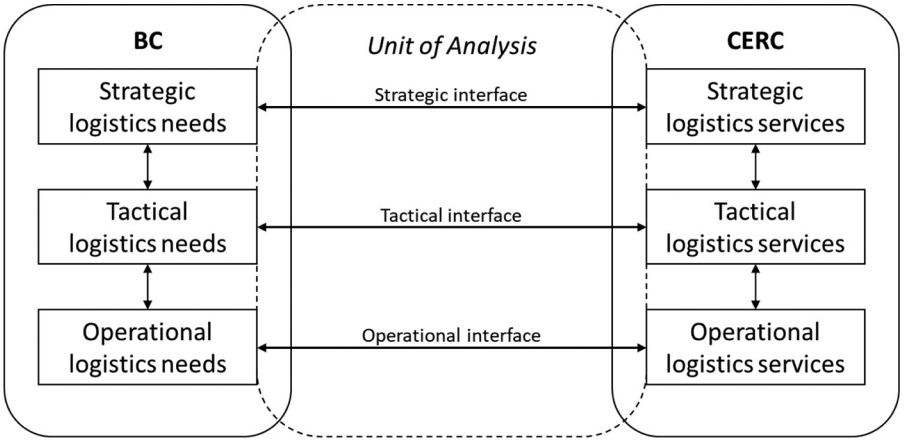

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Figure 1.
Unit of analysis in the single-case study

an LSP. The longitudinal data was collected several years prior to the field studies that constitute the empirical foundation of this study. The longitudinal data was used to contextualize the current organization of logistics outsourcing between the BC and CERC by following the events that had led up to the present situation. Therefore, even though the study was not designed as a longitudinal study in a strict sense, it carried elements of longitudinal data while studying the organization of logistics outsourcing at different organizational levels in real time.

3.1 Data collection

Different methods were used to collect data, although in-depth interviews were the primary source of data. Table 1 summarizes the data collection methods used in the study and which organizational level the data was used for. For the interviews, they ranged from being unstructured interviews with key informants at an early stage of the research process to explore the case to semi-structured interviews in a later stage as the research problem became clearer. More importantly, the data collection strategy aimed to capture the perspective of the BC and the CERC, and the strategic, tactical and operational decision levels. As such, the researchers used a contact person at the BC (referred to as the logistics developer in Table 1) who referred the researchers to suitable persons to talk to in the BC or CERC. The logistics developer thereby assisted in finding suitable candidates to interview that met the researchers' sampling criteria (King *et al.*, 2018).

Other data sources used were documents and direct observations. The documentation was retrieved from the BC and the CERC and included information about the BC's past, current and planned (future) logistics organization, standard operating procedures and routines at the BC and descriptions of the CERC's logistics services. One site visit at an ongoing construction project recommended by the BC's logistics developer was conducted. In the project, the BC had one of their project logistics specialists working with site, production and delivery planning, while they also used the CERC's logistics services, e.g. the CERC's planning system and logistics specialists. The site visit provided valuable input on how the BC could use the CERC's logistics services.

3.2 Data analysis

The analysis procedures were partly deductive and partly inductive. Initially, the researchers formed tentative propositions regarding how construction equipment rental

Data collection method	#	Time	Perspective		
			Strategic	Tactical	Operational
Interviews with logistics developer at BC	4	30 min to 2 h	X	X	
Interview with business developer at CERC	1	1.5 h	X		
Interview with operations manager at CERC	1	1 h	X	X	
Interview with project logistics specialist at BC	1	1 h			X
Interview with regional manager at CERC	1	2 h		X	X
Site visit at BC project	1	2 h			X
Documentation BC: strategy documentation, organizational charts, organizational procedures and routines	n.a.	n.a.	X		
Documentation CERC: logistics service descriptions	n.a.	n.a.	X		

Source: Authors' own creation

Table 1. Data collection methods

companies could become LSPs. During the process of collecting and analyzing the data, these propositions were revised. This iterative process is referred to as "explanation building" (Yin, 2018). For instance, in the case study, the study initially focused on the CERC's new service development. However, the initial interviews with key informants at the CERC suggested that the BC played a large role in what services they developed. As such, the researchers partly abandoned the notion of new service development and instead shifted the focus towards the BC's logistics organization and the CERC's service offerings.

Furthermore, the initial screening of documentation suggested that the logistics outsourcing arrangement required attention on different organizational levels. Hence, the data analysis proceeded as thematic coding (Flick, 2018), in which short case descriptions were created for each interview. This description included a summary of what the interview dealt with and how it was related to the overall purpose of the study (i.e. whether the respondent worked at the BC or the CERC, and at which organizational level the respondent was involved). The result of this is outlined in the right part of Table 1 with the perspective of each data source. Finally, the case descriptions were compiled into the findings that covered the strategic, tactical and operational levels at the BC and the CERC.

4. Findings

The following sections present the case study based on the findings from the interviews, site visits and documentation. Furthermore, the relationship between the BC and the CERC is presented using information about two main components within the outsourcing relationship: the BC's internal logistics organization and the CERC's service offerings. Finally, the findings are synthesized by presenting the BC–CERC dyad.

4.1 Logistics development in the construction corporation

The BC and the CERC are part of a larger construction corporation. The BC is a general-purpose contractor that designs and builds multi-family residencies, industrial buildings, commercial buildings and public buildings (e.g. hospitals, schools and elderly homes). They have been working sporadically with logistics development projects since 2008, but it has never fully gained traction within the organization. They put in considerable effort between 2008 and 2015, but this lost ground when the logistics manager at the time retired. Instead, the purchasing manager at the time started up a central logistics function to drive the company's logistics development. In 2018, a logistics developer was hired to pick up where the former logistics manager had left off. The logistics developer made a thorough analysis of the company's previous undertakings and their current situation. In particular, the logistics developer investigated what types of material and resource flows the BC typically had in their projects, what supplier base they had, the existing internal logistics capabilities within the construction company's subsidiaries and started working towards an understanding for what logistics services were needed in their typical projects to be able to find a supplier of said services. The logistics developer identified and categorized five vital flows, i.e. *site establishment resources*, *machine resources*, *project-specific materials*, *consumable materials* and *waste* (1 in Figure 2). In 2020, this resulted in a vision; all projects should at least consider how the five identified flows were to be managed as part of planning the construction projects. However, this could not be integrated into the contracting business area with its focus on traditional contracting services. Instead, the CERC was approached because they already offered all these services, except for logistics (2 in Figure 2).

The CERC is one of Scandinavia's largest companies in construction equipment rental, crane rental and other construction-related services. They already had the ability to manage

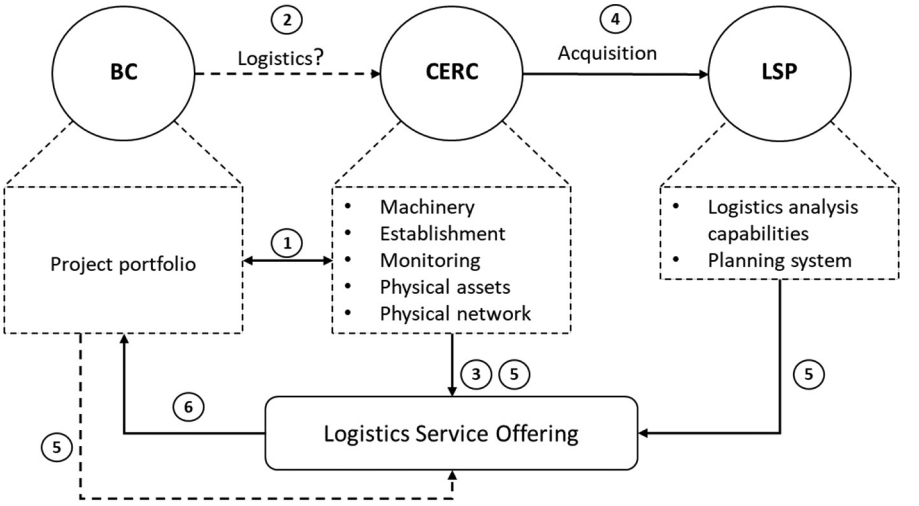

Figure 2.
CERC's development of "new" logistics service offerings

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the machinery and establishment resource flows, and they also provided a solution for monitoring energy efficiency, etc. on site and added this as part of their logistics service offerings (3 in Figure 2). In addition, the CERC partnered with a supplier of a smart delivery container where consumable materials could be delivered using an app that unlocked the container from the outside, enabling the suppliers to deliver consumables contactless. The focus from the CERC was thus primarily on physical assets and providing these types of services once the projects were up and running.

However, even though logistics is a large part of the CERC's daily operations, they lacked more analytical and planning-based capabilities. As such, the CERC (in collaboration with the contractor's logistics developer) started investigating if there were any logistics planning systems that could be licensed and supplied to the construction projects through the CERC. They entered discussions with an LSP who had a well-developed planning system and found that the owner of the LSP company was planning to sell the company and retire. A decision was made, and the CERC acquired the LSP in 2021 (4 in Figure 2), thus gaining the planning system and logistics analysis capabilities needed. The logistics analysis capabilities alongside the planning system and the physical assets the CERC already possessed were presented as an initial logistics service offering to the contractor's logistics developer who gave input on what was needed in terms of logistics services in the projects (5 in Figure 2). These logistics services are now packaged as the logistics service offerings that the construction projects can choose to use (6 in Figure 2).

4.2 The building contractor's logistics organization

The BC's previous attempts with logistics development had set out to set up a logistics organization within the company, but this was never realized due to the failed implementation of the strategy and the previous logistics manager's retirement in 2015. As such, the BC had no one in the organization that owned and maintained logistics set-ups at a company level. Yet, the BC had a need for basic logistics services, such as delivery planning, site disposition planning and intermediate storage. In response to these requirements, the

logistics developer at the company initiated the development of a logistics setups configurator. The configurator, which is inspired by product configurators in terms of handling constraints and combinations of modules, aims to maintain a certain degree of flexibility in designing project-unique logistics set-ups based on a set of predetermined services. For instance, in projects where the BC already has a project logistics specialist, this option is greyed out in the configurator. This flexibility in designing logistics setups is deemed important to the BC because their projects vary in size, complexity and availability of logistics resources.

Currently, the BC does not have a formal logistics department, but the organization constitutes the logistics developer working at the corporate level, and several logistics specialists working at the regional and the project levels. The logistics developer mainly works with the long-term, strategic, logistics development. The project logistics specialists work in projects from start to end as expert support for site management and as a hub for site management and the CERC's logistics specialists when these are used. In general, the BC lacks presence at strategic, tactical and operational levels due to the small number of logisticians relative to the company size. As such, the logisticians in the company's current logistics organization has limited influence on the overall organization. However, the absence of logisticians is most profound at the tactical level, which corresponds to the BC's regional divisions. Although there are routines and standard operating procedures across the company, the regional divisions operate autonomously to a great extent. A key point is that the BC's core business (i.e. contracting services) takes place at this level where traditional roles dominate, such as regional managers, project managers and site managers. The tactical level can be described briefly as a regional manager who is responsible for tendering procedures and decides whether to place a bid or not, a regional operations manager who is responsible for business development and sales and operations planning of the projects in their regional area and a project is assigned to a project manager who is responsible for master planning of the project in terms of costing, purchasing, scheduling and client relationships. The absence of logistics at a regional level has not gone unnoticed. The logistics developer is planning on strengthening the regional divisions across Sweden with regional logistics managers and project logisticians in the upcoming five years.

4.3 The construction equipment rental company's service offerings

The CERC has been offering logistics services since 2021 when they acquired an LSP. As the CERC is part of the construction company corporation, they had access to business area managers to get their input on what type of services are needed for the contractor's different project portfolios. During the service development, the CERC worked closely with the contractor's logistics developer, housing developers, business area managers and project managers to develop service packages. An issue that the CERC identified was that even though they are part of the same corporation, the construction industry's local character meant it was difficult to reach all the regions of the contractor to pitch their service offerings. This in turn meant that the CERC started to focus more locally from their different subsidiaries, using them as sales organizations.

The CERC took its departure from what they already knew and offered to their customers. The philosophy from the CERC's point of view was that "by paying a little more initially, we can reduce the total cost of operations for the construction projects". This philosophy has in the past led the CERC to develop solution-based service offerings related to site establishment and machinery resources, taking total ownership of the site establishment process. Example of this is that the CERC has equipped all their heaters with sensors and remote controlling to be able to keep temperatures constant during concrete

drying processes or to lower the indoor temperature of buildings when craftsmen are not on site in evenings and weekends to reduce projects' total energy consumption. This not only creates value for the construction projects but also gives the CERC an overall control of their resources and assets. In addition, by taking the overall responsibility for delivering and retrieving machinery from sites based on the progression plan of the projects, the CERC has been able to reduce their tied-up capital and increase the occupancy rate of assets.

The CERC's preferred trajectory is to become a solutions supplier, providing logistics services that can manage the five flows defined by the contractors' logistics developer (*site establishment resources*, *machine resources*, *project-specific materials*, *consumable materials* and *waste*). As such, the CERC targets municipalities and large housing developers in their marketing efforts and prefers not to bid for procurement proposals unless they can be a solutions supplier. If, for instance, they are approached with a procurement proposal regarding on-site materials handlers, they prefer not to invest time in making an offer. However, the CERC is aware that not all construction projects have the need for all logistics services they offer. They thus work to develop service packages that can be of value in different project settings. An example of this is the logistics planning system that was acquired with the acquisition of the LSP company: the aim is to develop this system and to provide it in small, medium and enterprise versions to cater to different project sizes' needs.

With the acquisition of the LSP came some more hands-on construction logistics know-how in the form of LSP employees joining the CERC. This means that the CERC can offer logistics analysis as part of their service offerings. As mentioned previously, the CERC wants to be included early in the project planning process and by offering the analytical work, they can ensure that they can affect the construction projects positively from a logistics perspective. The analysis also includes offering recommendations on services and service providers that the CERC themselves cannot offer. As the construction projects progress, the CERC provides continued analytics to show the value that the construction logistics services has given the project. The goal of these analytics is twofold: to show the value created for the project, but more importantly, to increase the logistics awareness in the construction project managers and to drive home the point that well-functioning logistics is a necessity for a well-functioning construction project.

4.4 Building contractor–construction equipment rental company dyad

Figure 3 illustrates the BC–CERC dyad, including key persons in the BC and the CERC and their position in the organizational hierarchy. The CERC has a similar structure to the BC in terms of geographical divisions. At the strategic level, there is a business developer that focuses on developing the logistics service offerings. The business developer is supported by an operations manager, whose main responsibility is the delivery of logistics services for the CERC's logistics business unit. At the operational level, there are regional managers who work more closely with delivering services within a geographical region.

There are clear interfaces between the companies' strategic and operational levels. There is close collaboration at the strategic level, where the logistics developer and the business developer have put in joint efforts into designing the CERC's service offering in parallel with the BC's logistics configurator. At the operational level, the BC's project logistics specialists collaborate with an operations manager at the CERC. At the tactical level, the CERC's operations manager does not have a counterpart because this level does not really exist in the BC. The logistics specialist (positioned to the left in the figure in the dashed box) works in multiple projects in one regional division in Sweden, which could be regarded as the tactical level, but there is no communication between them and the CERC's tactical level.

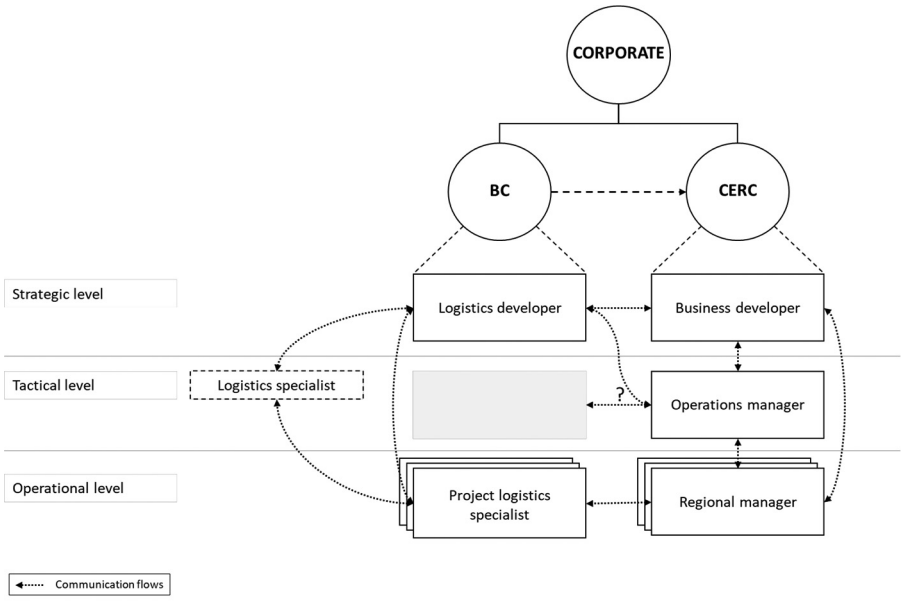

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Figure 3. Logistics organizations and communication flows in the BC and CERC

Furthermore, most regional divisions in the BC do not have a corresponding role. Hence, the tactical level in the BC's logistics organization hierarchy is greyed out.

5. Discussion

The purpose of this study was to explore how to organize the logistics outsourcing decision at strategic, tactical and operational levels. The BC's use of the CERC as an LSP differs from transactional, arms-length relationships in that it is a systematic use of an LSP. As such, this use of an LSP goes beyond merely buying themselves free from managing logistics, where logistics is not considered as a cost only, but that it adds value to their operations (Tetik *et al.*, 2022). However, at a strategic level, there is still a mismatch between the BC's need for logistics and the logistics services offered by the CERC. The BC's logistics configurator is a means of developing customized logistics set-ups for each project, where some services can be excluded if they already possess corresponding capabilities in-house. On the other hand, even though the CERC recognizes that not all their services are required in every project, they clearly favour larger contracts with a wide variety of services that are bundled together. From a corporate perspective, this raises questions of what to prioritize because the two companies are part of the same corporation: profitability of the BC's projects or profitability of the CERC? Typically, standardized "package" solutions are preferred when they serve the main contractors' project portfolios while customized solutions are intended for unique, one-off projects (Fredriksson *et al.*, 2021). As such, the CERC should be able to offer package solutions of logistics services to the BC. The problem with this set-up is that the BC lacks organizational procedures and routines for logistics which, in the absence of logistics expertise at the BC's tactical level, results in that the BC only procures the CERC's logistics services on a project-to-project basis. In other words, there is no dialogue between

the BC and CERC at a tactical level, which limits the sales volumes for the CERC's logistics services.

Tactical level planning in engineer-to-order contexts, such as construction, is characterized by a high degree of uncertainty (Shurrab *et al.*, 2020). However, preliminary production plans and rough capacity requirements estimates can be derived from previous projects with similar characteristics (Bhalla *et al.*, 2022). The BC thus needs to build up logistics organizations at tactical levels, corresponding to the BC's regional divisions, to increase the scale of logistics services purchased from the CERC. This enables the CERC to increase sales volumes of their logistics services and the use of standard logistics service package set-ups. There is a tendency among BCs to focus on either the strategic corporate level or the operational project level (Elfving, 2021). The tactical level is an important means of linking strategic plans of available resources within the company with project-level plans of required resources to carry out the projects (Thunberg and Fredriksson, 2018).

At the operational level, the question is whether the CERC should take a more comprehensive role in coordinating production with transportation, delivery and materials planning, whereas the BC's logistics specialists should work at higher planning levels. Currently, the BC's project logistics specialist coordinates project-level production plans with material deliveries. The CERC's logistics specialists are not involved in the site production but are involved in activities upstream of the construction site, such as planning of transports from suppliers to an intermediary storage or directly from suppliers to the construction site. Previous research indicates that logistics specialists that pursue multiple tasks that are interdependent (e.g. coordinating deliveries with production activities) can improve efficiency in the supply chain and at the construction site by reducing the number of transports while retaining service levels to the site production (Dubois *et al.*, 2019). Although this is a feasible option for projects where the BC does not have a project logistics specialist, the CERC's logistics specialist can be used as buffer resources during temporary periods of capacity constraints among the BC's project logistics specialists. As such, the CERC needs to ensure that they have sufficient capacity to provide buffer resources for BC's projects, whereas BC needs to carefully consider which projects they should allocate internal logistics resources to.

The findings from the case study suggest that both the BC and the CERC need to ensure that they have adequate logistics and service delivery capabilities, respectively, at all three organizational levels. At a minimum, the BC needs logistics capabilities at the strategic and tactical levels due to the company's geographical dispersion. There are several different organizational configurations that are possible when the BC uses the CERC's logistics services. Daugherty and Dröge (1997) identified two generic types that influence the degree to which logistics services should be outsourced: the "staff only" configuration and the "staff/line" configuration. These two configurations correspond to the functional type and the process staff type as defined by Kim (2007). In the process staff type, the BC would perform strategic and tactical logistics planning activities, whereas the CERC handles logistics activities at the operational project level. In the functional type, the BC would primarily use internal logistics personnel to perform logistics activities at the operational level or a combination of the BC's and CERC's logistics resources. In general, the process staff type typically corresponds to a higher degree of logistics outsourcing, whereas the functional type corresponds to a lower degree of logistics outsourcing (Daugherty and Dröge, 1997).

Even though the BC has a long history of trying to organize its construction logistics, the case study shows that there is still more work to do. Current efforts show the need for this work to be carried out in a structured way on the strategic, tactic as well as on the

operational levels. However, as discussed by Sundquist *et al.* (2018), managing logistics in-house can be difficult if the in-house logistics capabilities do not cover all three levels. This can lead to a situation where one person tries to tackle all issues at once, which we can see in the case of the BC. One logistics developer tries to develop logistics management routines for an entire corporation. Traditionally, not possessing the "right" logistics capabilities has been a contributing factor to outsourcing logistics to a third-party logistics (TPL) provider (Selviaridis and Spring, 2007). Simultaneously, being overconfident in the in-house logistics capabilities can lead to a situation where a company does not know what to ask an LSP or TPL provider for (Janné and Fredriksson, 2022), and this is where it becomes important that the BC and (in this case) the CERC work together to develop both the BC's in-house logistics capabilities and the CERC's logistics offerings. However, once again, the case study shows the importance of addressing logistics capabilities on all three organizational levels also in the BC–CERC dyad. Logistics outsourcing should be a strategic decision that is not delegated entirely to the project level. However, on the strategic level, there is a mismatch between what the BC requests and what the CERC wants to achieve from their standpoint. The BC wants modularized service offerings, whereas the CERC wants to be a solutions supplier. On the tactical level, there is no real dialogue due to the BC's logistics developer focusing primarily on the strategic and tactical levels, i.e. the CERC does not have a counterpart within the BC's organization. This is in line with what Elfving (2021) found; the tactical level is often forgotten in strategy development. Yet, this is the translation from strategy to operational level and should not be forgotten. Thus, the minimum level of logistics capabilities needed in-house is at the strategic and tactical levels. This allows the BC a chance to maintain an alignment between the use of logistics services and the operational characteristics. Mid-term planning is needed here to ensure that logistics resources are available at certain times of a construction project and not left idle at other times of the project (Thunberg and Fredriksson, 2018).

The BC and CERC are both part of the same corporation, but from an organizational point of view, the respective logistics organizations are two small organizations within two large organizations within a large corporation. As such, the BC and the CERC must carry their own costs and deliver profits. Yet, there is an argument to be made for the BC and CERC collaborating to develop logistics capabilities within the two firms, as this can generate income for the CERC (Fredriksson *et al.*, 2021) and lower costs for the BC (Thunberg and Fredriksson, 2022). However, the corporation must be open to allow this collaboration in an area not seen as the respective firms' core competence areas. If the BC and CERC are allowed to invest in developing collaborative construction logistics capabilities, the whole corporation can benefit from the collaboration.

6. Conclusions

The purpose of this study was to explore how to organize the logistics outsourcing decision at strategic, tactical and operational levels.

This study has shown that when organizing construction logistics services or set-ups, it is important to understand the connection between the strategic, tactical and operational levels within the organization, what logistics capabilities you possess within these levels and how these levels relate to one another. A suggestion is that the minimum level of logistics capabilities needed in-house is at the strategic and tactical levels to maintain alignment between the operational logistics characteristics of projects and the logistics services procured from an LSP. Understanding the in-house logistics capabilities will aid BCs in their outsourcing decision as it will help them realize what logistics capabilities they are lacking. Similarly, rental companies or LSPs need to understand what their customers

(BCs) are requesting and adapt their service offerings to cater to the missing logistics capabilities of BCs. Even if the drive is there to develop and offer full logistics service solutions, this may not be what BCs or developers are looking to procure. It is thus important that CERCs or LSPs consider their customers' in-house logistics capabilities as well and develop their service offerings in collaboration with BCs. To gain economies-of-scale in the construction logistics services offered, one suggestion is to develop modularized logistics services to allow BCs the chance to pick-and-choose the "correct" services from the project perspective.

Another important part of the outsourcing decision connected to the in-house logistics capabilities is to know what type of logistics organization aligns with the overall company logistics strategy. In this study, we suggest that BCs should aim for either a strategic/tactical process staff organization where operational construction logistics is outsourced to an external LSP or a functional type where BCs primarily use internal logistics personnel or a combination of internal and external personnel to perform logistics activities at the operational level.

There are inherent limitations to the single-case study approach in that a single case can only show the findings from that case. However, findings from this single-case study constitute a valuable starting point for further studies. To the best of the authors' knowledge, there are no similar cases where a rental company that has become an LSP and a BC are part of the same corporation. The CERC is thus semi-internalized in the BC. Future studies should use multi-case designs that pursue theoretical replication by comparing the findings from this study with cases where logistics is fully integrated within the contractor's organization and fully outsourced. Furthermore, this study has exemplified how the tactical level is overlooked amongst BCs. More research is needed to better understand the BC's current practices on the tactical level and how these practices can be improved to foster better logistics management at the project level. Finally, rental companies face challenges in becoming LSPs. Their traditional equipment and machinery rental businesses differ from that of an LSP. Future research should investigate potential synergies and/or contradictions between the rental and LSP trades.

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Corresponding author
Petter Haglund can be contacted at: petter.haglund@liu.se

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