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Exploring logistics strategy in construction

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Abstract. The purpose of this research is to explore logistics strategies in construction. There are very few studies on logistics and SCM practices in construction, especially when it comes to the long-term strategic work of construction companies. Therefore, this research takes a contractor's perspective and addresses logistics strategy based on the empirical examination of two case companies in the construction industry. The main focus is the contents of the strategy and possible components of the logistics strategy are identified through a literature review. Also the process of the strategy is treated through exploring logistics strategy in two case companies exemplifying two strategic approaches to construction logistics. However, the approaches differ, implying a spectrum that at one end responds in a standardized manner to a pre-determined design solution and at the other reveals a re-configurable modular approach. The main contributions of this study lie in exploring logistics strategy in construction and providing examples of how construction companies work with logistics strategies, adding empirical knowledge to the field of construction logistics.

Keywords: Logistics strategy, Construction management, Case study.

1 Introduction

Construction is essentially a complex industry due to the large number of participants and interactions (Winch 2010). Where traditional manufacturing industries can work long-term and strategically in a stable and process-oriented environment, the construction industry is typically characterized by one-off projects, tendering and procuring subcontractors and suppliers on a short term-basis each time a project is launched (Dubois and Gadde, 2000, Kristiansen, et al., 2005). This leads to a situation where projects are managed locally, in a tactical manner, becoming disconnected from the strategic company level (cf. Dubois and Gadde, 2002, Kristiansen, et al., 2005). This in turn affects how logistics and supply chains are managed within construction companies, where it is uncommon to find logistics strategies defined at the company level that are implemented as logistics plans at the project level. Recent research has demonstrated that the principles of supply chain management, particularly when focused on logistics, offer a potential means of overcoming this complexity and improving productivity (Vrijhoef & Koskela 2000), yet achieving this in practice is far from straightforward. While some progress has been made, the nature of the industry and the scale of relationships

involved cause barriers to progress (Meng, 2013). This indicates the need for a ‘big picture’ view of construction logistics and supply chain management, one that is more strategic than operational in nature.

The purpose of this research is therefore to explore how logistics strategies can be developed in construction companies, and how they can be a platform for developing effective logistics plans for individual projects. There are very few studies on logistics and SCM practices in construction (Bankvall et al, 2010), especially when it comes to the long-term strategic work of construction companies. This research takes the perspective of the contractor and focuses on the empirical examination of the contents of logistics strategy in the construction industry. In so doing, the following research questions are addressed:

1. What are the typical components of a logistics strategy?
2. What constitutes logistics strategy in construction?

Building on these research questions the following section describes the research design. Thereafter the literature review is introduced, with a focus on investigating research question 1. Research question 2 is then addressed through case studies followed by case analysis and discussion. The paper is then concluded, and possible further research is identified.

2 Research design

There is a lack of studies on logistics strategies in construction, therefore this study is explorative, using a case-based research method. The research design is divided into two phases. The first phase is a literature review taking a stance in the traditional logistics and operations management literature, searching for suitable factors for describing and defining the contents of a logistics strategy.

The second phase of the research is based on an empirical study focusing on two case studies representing construction companies that have developed logistics strategies for their operations. One of the case companies has a logistics strategy that is standardized and deployed for all of the company’s construction projects, whereas the other case represents a construction company employing a modularized logistics strategy that forms the basis of configurable specific logistics plans for individual projects. As such, we use two contrasting cases to identify and describe critical variables (Stuart et al., 2002). Contextual variables and project specific characteristics are identified and coded to facilitate the use of pattern matching and logical models (Yin, 2014) for a cross-case analysis, and for contrasting the case studies with the results from the literature review. The main sources of data are: archival records (logistics strategy statements, internal reports, project documents, master’s thesis reports) and semi-structured interviews (strategists, logistics managers, project managers).

3 Literature review

3.1 The construction industry setting

The productivity in the construction industry is considered relatively low (Abdel-Wahab and Vogl, 2011; Fulford and Standing, 2014; Josephson and Chao, 2014), but the construction industry also faces unique settings that to some extent can explain the low level of productivity and the high costs. This uniqueness is characterized by the construction site that creates a temporary factory around the product (Bygballe and Ingemansson, 2014), since these products are typically large and immobile, meaning they must be built on the site of use. Therefore, construction work is carried out in temporary organizations with temporary supply chains (Behera et al., 2015). Typically, a construction project is dependent on many, often small, firms acting as subcontractors (Dubois and Gadde, 2002; Miller et al., 2002). As a result of the construction industry setting, many studies report on poor performance that originates from poor logistics management (Meng, 2012), e.g. high costs (Hwang et al., 2009), waste (Josephson and Saukkoriipi, 2005), and waiting time (Thunberg and Persson, 2013). This is one of the reasons why some authors (e.g. Bankvall et al., 2010; Department for Business Innovation and Skills, 2013; Thunberg and Persson, 2013; Vrijhoef and Koskela, 2000) argue that many of the problems in construction could be mitigated through better managed supply chains and better logistics management.

3.2 Logistics strategy

There are surprisingly few clear definitions of what a logistics ‘strategy’ is, even outside of construction in its more traditional domain of manufacturing. According to the Financial Times Lexicon, a logistics strategy is “the set of guiding principles, driving forces and ingrained attitudes that help to coordinate goals, plans and policies between partners across a given supply chain.” (Financial Times Lexicon, n.d.). Seeking their categorization, Autry et al. (2008) defined logistics strategies as “...directives formulated at the corporate level ... used to guide more efficient and effective logistics activities at the operational level of the organization”. This establishes the important separation of logistics as a strategic activity at the company-level, compared to its implementation at an operational, or in construction’s case, project-level (see Fig. 1). Fig. 1 also shows that logistics strategy is divided between the strategy contents and the strategy process. The main focus of this study is the strategy content, including how the contents are transferred into detailed descriptions of logistics components in logistic plans for each individual project. However, the empirical part of the study also includes the strategy process, including parts of the formulation and implementation of the strategy when the strategy is realized into logistics plans at the project level. As such, the unit of analysis is the logistics strategy content and process, taking a contractor’s perspective.

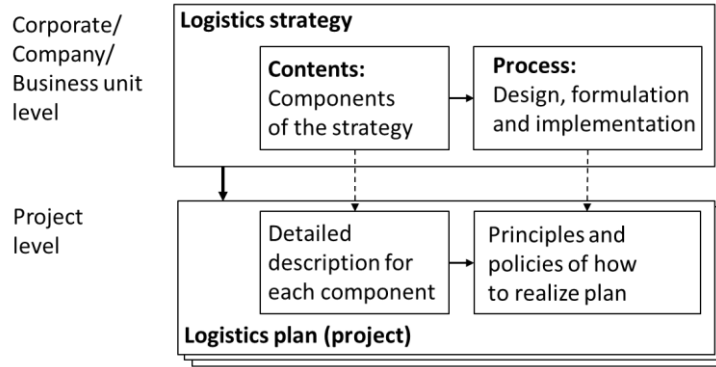


Fig. 1. Logistics strategy and plans divided into content and process aspects of strategy.

3.3 Components of logistics strategy

Bowersox and Daugherty (1987) established the first logistics strategy classification, identifying three distinct bases for logistics development: process-based/functional, focusing on cost-reduction; market-based, focusing on customer service; and information/external-based, focusing on coordination and collaboration. McGinnis and Kohn (1990) similarly investigated forms of logistics strategies. Throughout this strand of research into logistics strategy has been a continual questioning of the detail of what such a proposition contains (Clinton & Closs, 1997). Relying on the division between the contents and the process of a strategy, it is possible to identify a set of logistics components that make up the strategy content and some examples of this from the literature review is presented in Table 1.

The identified components reveal a list of areas where strategic logistics decisions must be made and executed as logistics plans and decisions, these components help companies to work actively to define logistics strategies. McGinnis et al. (2010) identify that companies working intensively with their logistics strategy show significantly better performance than more passive companies, especially when it comes to logistics coordination effectiveness and customer service commitment. These performance indicators, in turn, are argued to positively affect overall company competitiveness (McGinnis et al., 2010).

4 Case studies

The two case companies, referred to as company A and B, operate mainly in the Swedish market. Company A, a commercial construction company, shows a construction logistics 'strategy' that is focused upon a narrow 'product-type' — commercial office buildings in dense, urban areas of Sweden. Their projects are mostly new-builds, with some renovations, and typically have budgets up to 500m SEK (US\$53.8m at March 2019). Utilizing traditional construction methods, the company only undertakes a

handful of projects at one time. Company A's logistics strategy is highly standardized in order to meet the pre-defined demands of these projects.

Table 1. Examples of components of the logistics strategy contents identified in the literature.

<i>Traditional logistics textbooks¹</i>	<i>Autry et al (2008)</i>	<i>Sing (2016)</i>	<i>Oakden (2016)</i>
Customer service policy	Customer Service	Customer Services	Customer service policy
Supply network design (nodes)	Procurement (incl. supplier selection)	Channel Design	Inventory location policy (Supply Network Nodes)
Transport and distribution (links)	Coordination & Collaboration activities	Network Strategy	Transport and distribution policy (Supply Network links)
	Transport Management	Transport Management	
Inventory policy	Inventory & Order Management	Warehouse Operations	Inventory Policy
	Operational Controls	Materials management	Cost plan
IT, information sharing and communications	Technology/Information System	Information Technology	IT and Communications capability
	Storage	Policies & Procedures	
Logistics organization structure	Strategic Distribution Planning	Facilities & Equipment	Logistics organization structure
Logistics targets and metrics (KPI)	Order Processing	Organization & Change Management	Logistics targets and metrics
	Logistics Social Responsibility		

Company B, a larger construction company than A, undertakes projects all over Sweden in urban and sub-urban locations. The projects that they have developed a logistics strategy for are residential in nature and almost exclusively new-builds. The structures are built using a mix of traditional and prefabricated methods, with a typical cost between 50m-300m SEK (US\$5.4m-\$32.3m at March 2019). Being a large company, they have many projects running concurrently around the country.

As for the contents of the logistics strategies, both company A and B have clearly defined the components of their strategies. Company A demonstrates that a clearly defined logistics strategy can be put in place that responds to a fixed 'product' through a pre-defined, standardized logistics approach at the project-level. Company B's logistics strategy has created a reconfigurable 'modular' approach, meaning that components of the strategy are defined and then a range of solutions within these components are defined for selection based upon the nature of the specific project's context when logistic

¹ This is a summary of the components mentioned in the most common textbooks on logistics and supply chain management. Due to the page limit it was not possible to include them all.

plans are developed. A summary of the logistics strategy components for the case companies is provided in Table 2.

Table 2. Summary of components making up the logistics strategy content for the two cases.

<i>Company A</i>	<i>Company B</i>
Long-term strategic suppliers and sub-contractors — development of relationships for continual improvement	Long-term relationships with suppliers and development of these relationships
Use of a Construction Consolidation Centre (CCC) — a centralized distribution center to help manage material flows	The use of Construction Consolidation Centre (CCC) or Distribution Terminals
Integrated Planning Process — clear and related production and delivery planning	Planning of transport and distribution activities
Planning Roles — dedicated organizational management roles for: transport co-ordination, in-bound co-ordination, and IT co-ordination	Delivery planning and scheduling
Dedicated IT System (Cloud-based) — All project participants must use this system (contractors, suppliers, transport companies etc.)	Understanding the detailed design requirements of a project from a logistics perspective
On-site Materials Handling Team — Dedicated and specialized team for efficient materials movement and task planning	Site logistics planning solutions
	Marking and labelling of goods

Overlaps between company A and B appear in the content of these strategies. However, rather than focusing on the content (that is specific to each company's business model), instead the two approaches reveal distinct ways of approaching a logistics strategy and its implementation at the project-level. Company A has a standardized logistics strategy, where the logistic plans are strictly based on what is defined in the components of the strategy contents. Basically, all logistics plans look the same, since the strategy is adjusted to the narrow focus of the projects that company A is bidding for, with the only variable being the site conditions. Company B uses the components of the strategy contents as decision-making areas that must be dealt with when developing their logistics plans for their different projects. Since the projects vary so much in location, design, structure, size, etc., company B's strategy must be more flexible and can be seen as a modularized strategy, where the modules (components) are adjusted to the contextual factors as logistics plans are developed.

5 Discussion

Case studies A and B demonstrate that construction logistics strategies emerge in response to specific contextual factors. This context extends beyond the physical construction site and includes factors that are related to the specific business models of the companies themselves, responding to their technical platform (construction method), product offering (type of building), and target market (customer profile or budget), in

line with Brege et al.'s (2014) definition of construction business models. Case Studies A and B reveal the possibilities of a strategic approach to construction logistics. These approaches establish a spectrum that at one end responds in a standardized manner to a pre-determined design solution (as in A) and at the other uses a reconfigurable modular approach (as B shows).

The main contribution of this study lies in establishing an exploration of logistics strategy in construction, drawing attention to logistics as a strategic activity for contracting companies. Furthermore, this study provides examples of how construction companies work with logistics strategies, identifies that a spectrum of approaches exists, adding empirical knowledge to the field of construction logistics. Relating to the two research questions, a possible set of components of the logistics strategy contents have been listed in Table 1 (RQ1) and examples of what constitutes logistics strategies in construction (RQ2) have been provided through the case studies, especially through Table 2.

The research presented here is exploratory and a starting point to research logistics strategy in construction. There are a number of ways to continue this research, of which some are: to extend the literature review to further define the logistics strategy components; to increase the number of cases and also the number of projects within each case organization where logistics plans, anchored in logistics strategies at corporate level, have been implemented; and to extend the cases to countries outside of Sweden.

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