Leveraging Economy of Scale across Construction Projects by Implementing Coordinated Purchasing

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Abstract

The paper presents a case study of the implementation of coordinated purchasing in a large Nordic contractor as an example of a successful but challenging radical innovation.

The paper describes the practices and tools for analysing the existing purchasing activities, categorizing the purchasing volume, and the different strategies for addressing the different categories. In particular the interface between the project and central purchasing activities is portrayed.

The paper further describes the implementation struggle, which have required a significant change of mindset in the organisation. A much greater challenge than initially imagined. The implementation of central purchasing activities has been in direct conflict with predominant project culture, as the project culture and identity formation is tightly coupled to the project based purchasing activities.

Finally the paper discusses how coordinated purchasing is an important step in the attempt to rethink the existing business model in construction. Going from competing on overhead (in a red ocean) to start to compete on company specific core competencies. The paper concludes highlighting the next milestones at the journey leveraging economy of scale even further, though the use of platforms, modularization and configuration.

Keywords: purchasing, culture, identity, industrialization

1. Introduction

The construction industry is often criticized for its inefficiency compared to other industries, its inability to innovate, to improve its practices and to provide value for its clients (Egan 1998). As a symptom of this fundamental challenge have the construction cost increased by approx. 4,6 % per year the last 20 years (Danish statistic 2010)

Despite the increasing costs are the companies in the centre of the value chain struggling with creating profit – as illustrated in figure 1.

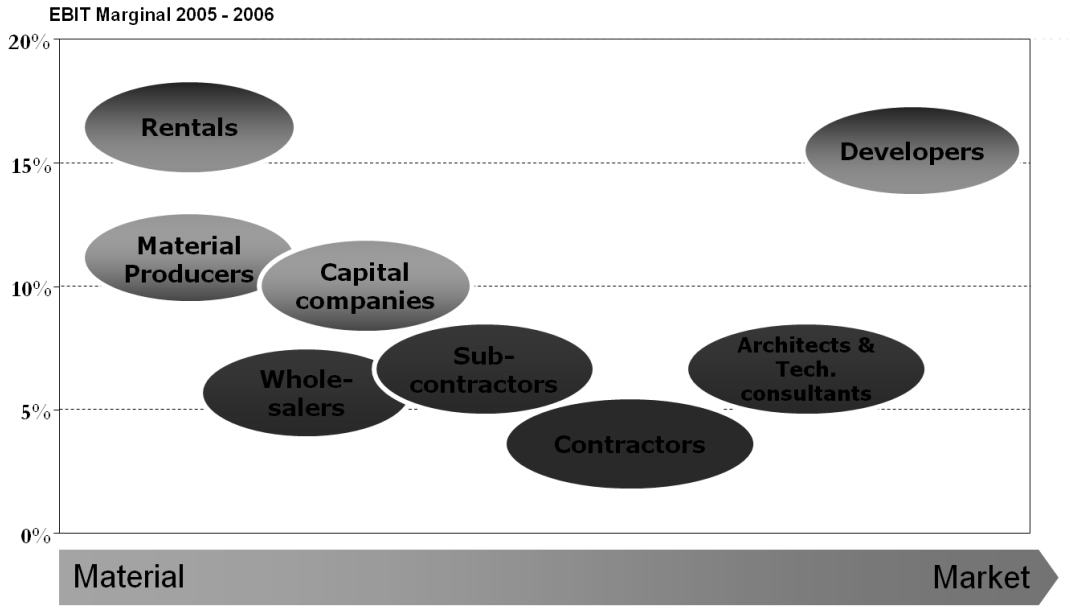

Figure 1: EBIT margin in the value-chain (Internal presentation)

As an example, are the large contractors in the Scandinavian countries having an average EBIT margin[1] between 0-3%. These very small margins compared to their cash flow make their businesses extremely vulnerable to changes in price levels and market development.

The existing production regime in construction is heavily influences by realizing one of a kind projects. Thuesen et al (2009) argues this is according to an often celebrated sectorial myth viewing buildings as uniquas. Today's predominant view of buildings – as unique – implies that:

1. the nature of the construction processes is chaotic
2. the buildings are realized through onsite project work rather than offsite production
3. project management is the fundamental management principle
4. the inter-organisational cooperation is temporary

[1] A profitability measure equal to "Earnings Before Interest and Taxes" divided by net revenue. This value is useful when comparing multiple companies, especially within a given industry.

These characteristics of the building process are also mirrored in the in the physical product. Today buildings are getting increasingly complex, manufactures of building parts are constantly pushing new technologies to the market which needs to be integrated and optimized in each physical building.

The consequence is that construction today is a mixture of new materials, processes and architectural visions - realized through a specific division of labour and institutionalized roles such as the manufacturers of the basic parts, building companies (including craftsmen), engineering companies and architects. Under this existing regime, have the value-chain got more and more fragmented. As illustrated in figure 2.

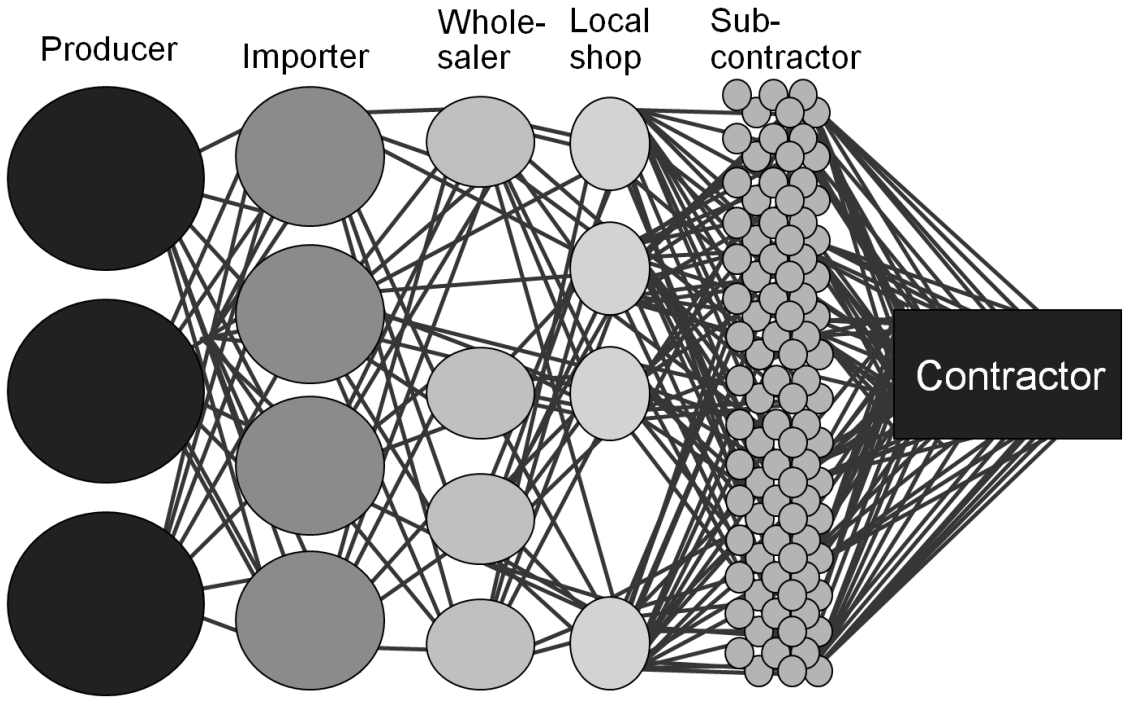

Figure 2: Structure of the value chain (Internal presentation)

A consequence of this development is that most construction businesses operate from a Cost+ model, making the companies compete on their overhead rather than their core processes (Nicolini et al 2001). In this sense are the market place characterised as a typical red ocean environment – as described by Kim and Mauborgne (2004, 81):

Red ocean strategy	***Blue ocean strategy***
Compete in existing market space.	*Create uncontested market space.*
Beat the competition.	*Make the competition irrelevant.*
Exploit existing demand.	*Create and capture new demand.*
Make the value/cost trade-off.	*Break the value/cost trade-off.*
Align the whole system of a company's activities with its strategic choice of differentiation or low cost.	*Align the whole system of a company's activities in pursuit of differentiation and low cost.*

Although the red ocean market puts pressure on margins in each company making them struggle for survival, it also represents an opportunity for creating an uncontested market space - pursuing a blue ocean strategy.

An internal analysis in one of the large Nordic contractors identified that 80% of the cash flow was spend on purchases of consultants, construction materials, rental services, subcontractors etc. In other words: If they wanted to improve their profitability (EBIT), they should focus on the 80% and not the 20%. This was the fundamental insight which was the start of a long journey implementing coordinated purchasing activities in the organisation.

The ambition of this paper is to analyse the implementation of coordinated purchasing activities in one of the large Nordic Contractor – as an example of leveraging economy of scale in project based environments and thereby rethinking the predominant business model in construction.

2. Methodology

The analysis is inspired by a Grounded theory approach (Glaser & Strauss, 1967) where the empirical material has been collected prior to the theory formulation. In this way the theoretical categories and elements is induced from the empirical material and other theories regarding purchasing processes is only referenced for situate the findings in a larger perspective. Here it is worth stating that most academic contributions for understanding and developing purchasing seems to focus on project level (e.g. Khalfanand McDermott 2006) whether as this research looks upon purchasing as company specific strategy influencing the traditional project practices.

The induced approach for developing and implementing coordinated purchasing describes the tools and practices for analysing the existing purchasing activities, categorizing the purchasing volume, and the different strategies for addressing the different categories. Furthermore is the interface between the project and central purchasing activities is portrayed.

As the paper only analyzes one single case is the ambition not to adopt a classical quantitative methodology. The ambition is on the other hand to create qualitative insights from this particular case (Yin 2002) - raising key learning points, which subsequently can be subject to more detailed quantitative and qualitative analysis.

The empirical material for the case study is collected through the author's previous employment within the contractor. Over a period of 6 year the development and implementation of coordinated purchasing has been followed both as an active part in a specific purchasing project and as an outsider. Consequently it is recognised that the author potentially is bias towards the players in construction (Loosemore & Tan 2000). In an effort to minimise this problem the interpretations and analysis have been discussed with the people within the company and academia.

The empirical material subject to the analysis encompass depth interviews with construction managers, an 18 month ethnographic study at a constructions site and an extensive amount of internal material including reports, analysis, presentation resumes etc. As a part of this material is confidential

some of the figures in this paper are modified. Furthermore has the company has chosen to remain anonymous, but has approved the analysis and the conclusion of the paper.

3. Case analysis

The process of developing a strategic approach for coordinated purchasing in the contractor follows 4 stages:

1. Identification of categories
2. Prioritization of the categories
3. Running sourcing projects for the important categories
4. Implementation of the purchasing agreement for the category

3.1.1 Identification of categories

The first process is to get an overview of the how the money is spent in the organisation. This information can be gathered in different ways... but as this organisation didn't have an existing purchasing system this was gathered from the economical system. Based on the list of creditors in the financial system, 103 different purchasing categories were identified and the purchasing volume for each category was estimated. Figure 3 below illustrates some of the different categories.

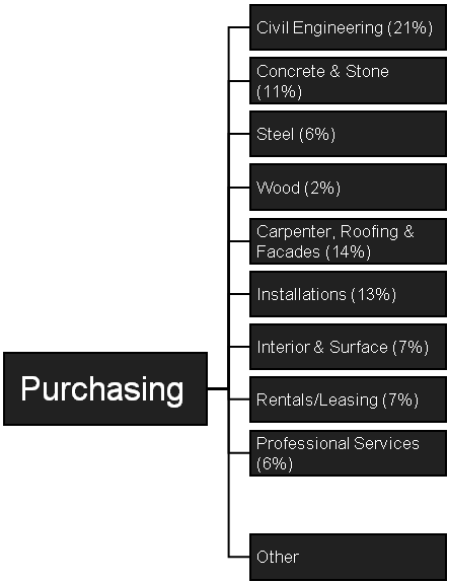

Figure 3: Different purchasing categories (Internal presentation - modified)

3.1.2 Prioritization of the categories

The next step in the process is to prioritize the identified categories. Based on interviews within the organization each category was evaluated in terms of the saving potential and how challenging the implementation would be. The result of this analysis is illustrated in figure 4.

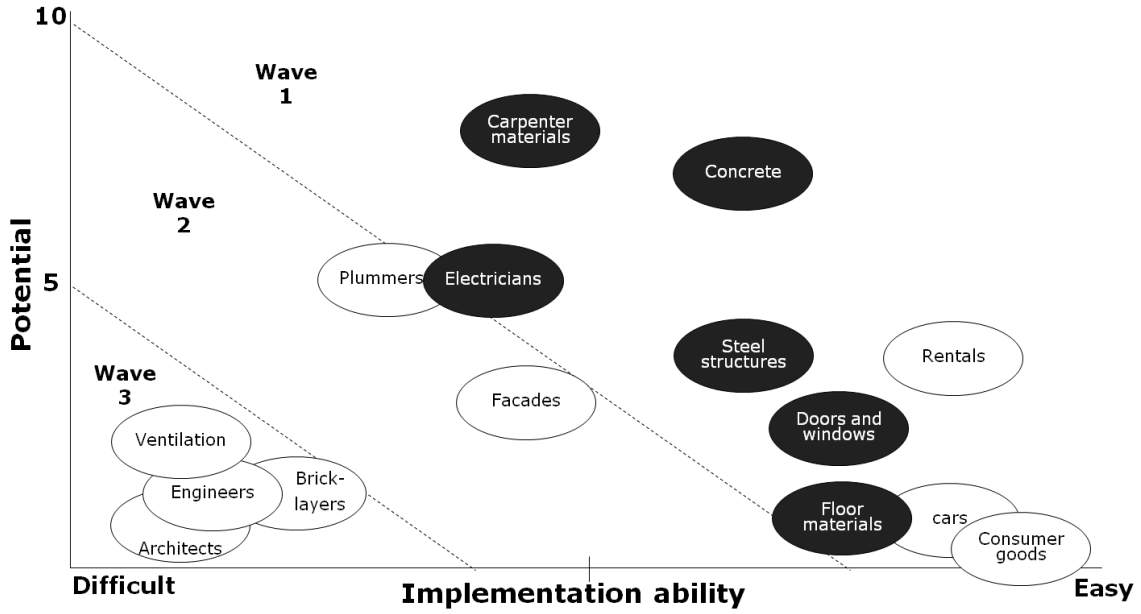

Figure 4: Prioritization of categories (Internal presentation - modified)

Based on this figure it was possible to identify the most "promising" categories like concrete elements – and thereby prioritize the subsequent sourcing processes only addressing the most important categories. Three implementation waves were identified – estimating the potential savings for the first wave to several mio EUR.

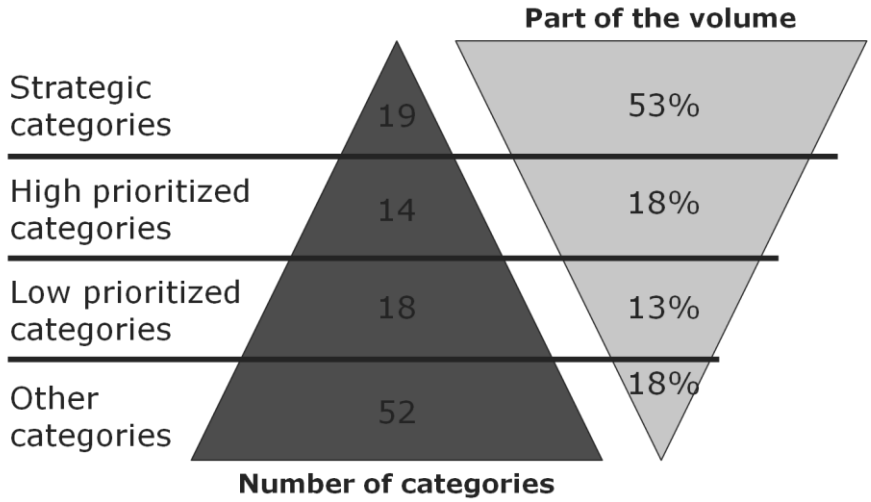

Figure 5: The prioritized categories and their percentage of the volume

Based on the different waves the categories were – as illustrated in figure 5 – categorized in strategic, high prioritized, low prioritized and other categories, each representing a decreasing percentage of the purchasing volume.

3.1.3 Running sourcing projects for the important categories

Based on the prioritization of the categories sourcing projects are initiated based on the following process.

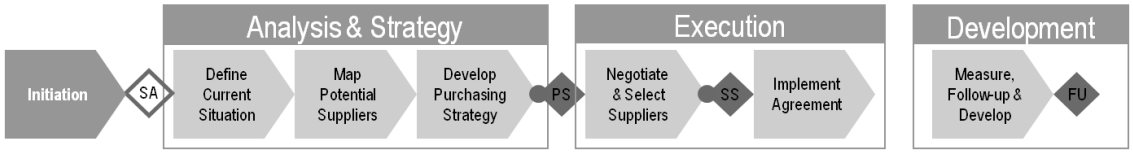

Figure 6: The sourcing process

The definition of "the current situation" consists of the following major activities: Define Assortment, Specify Purchasing volumes, Map current suppliers, Make volume prognosis, Map current purchasing pattern, Map current logistic solution, Specify current prices, terms and conditions, Identify price drivers for the assortment, Make price comparisons, Identify National Standards and Legal Requirements.

In the next phase "mapping of potential suppliers" possible suppliers nationally and internationally are identified, possible trade obstacles are analyzed, supplier evaluation criteria's are defined, financial control of potential suppliers are carried out, supplier shortlist are proposed and product test and supplier workshops are facilitated.

Based on these two phases the purchasing strategy is developed including positioning in Kraljic´s Matrix[2] and estimation of potential savings. This strategy is presented to the board of directors who has to approve the execution of the strategy.

If the strategy is accepted the process continues with evaluation of proposals from the suppliers, assessment of each supplier, negotiations, selection of supplier, calculation of potential savings and development of documentation for the final decision.

Hereafter the agreement is signed with one or several selected suppliers including definition of evaluation parameters (internal and supplier related), description of roles, responsibilities and routine for follow up activities and formal communication of the agreement to the rest of the organization.

[2] Kraljic´s Matrix (Kraljic 1983) is a tool for analyzing the purchasing portfolio of a company based on two dimensions profit impact and supply risk.

3.1.4 Implementation of the purchasing agreement for the category

After the sourcing process is ended and an agreement is established the formal implementation phase follows. Here different parameters influences the actual call-off process (project purchasing process)

- Categories of the agreement: Based on the sourcing process the agreement is labelled as being mandatory (1), optional (3) or something in between where the suppliers has to be asked in the project purchasing process (2)
- Type of product/service: Since the purchasing of subcontractors and highly complex products are very different from the purchasing of standard and bulk products, the call-of process is different. In the situation of simple products the construction manager requests the products from the contractors own whole-saler company being responsible for delivering the product to the construction site. In the case of more complex products and services "competence centres" are used.
  A competence centre is a group of specialist within a particular field like "facades and steel structures". In collaboration with the project members they assist the project in the purchasing process.

As a consequence of the different parameters 15 different call-of processes are used in the project purchasing processes.

4. Reflections

The implementation of coordinated purchasing activities however faced tough resistance from the rest of the organization. The main reason for this resistance should be found in the fact that purchasing properly is the most essential practice for construction managers – both in relation to managing risks and more broadly as a part of their personal and cultural identity. It is through purchasing activities construction managers negotiate deals for their projects and thereby enable them to control their budgets. Furthermore is this negotiation a core part of the contractor identity and culture.

As a result was the initial response from the construction managers to the new purchasing strategy - denial. They simply ignored the negotiated purchasing deals/agreements – and continued their existing local purchasing practices. Especially among experienced project managers were the resistance profound. And since they represented a strong cultural driver they were setting the agenda for upcoming construction managers.

The board of directors response to the resistance was that construction managers, that didn't followed the central negotiated agreements, were asked to find them self another contractor to buy for. The implementation was in this sense a very top-down driven process with potential dramatic personal consequences.

However, the severe resistance from the organization on the other hand initiated a revision of the purchasing strategy. After an internal workshop, central construction and design managers agreed upon that coordinated purchasing were an important strategy to pursue. However, according to them,

the potential of coordinated purchasing were not volume concentration, but the ability to buy the right "stuff". As a consequence it was not the purchasing process which was important but the design process. Their response was that it required

1. good project management skills (the ability to engage the right competences at the right time in the project)
2. that the contractor had the best competencies within the competence enters

Based on this insight they developed the division of labour illustrated in figure 7, highlighting the interplay between the competences centres and the project practices.

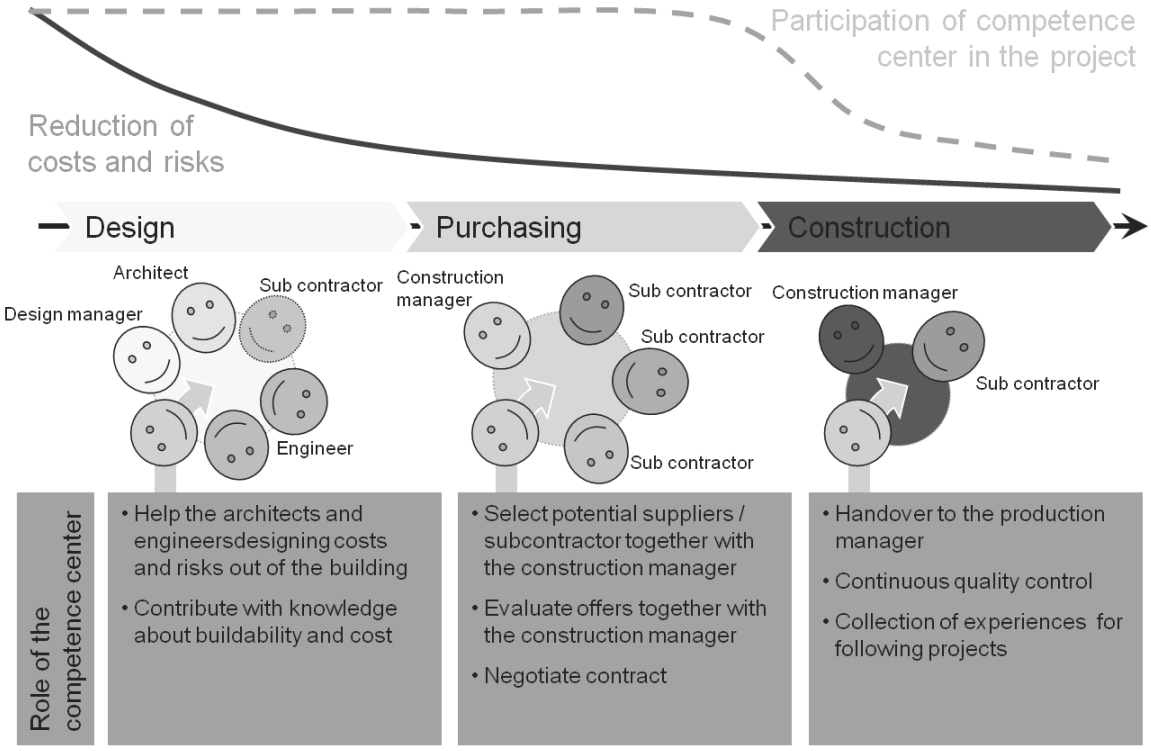

Figure 7: The competence centres part of project purchasing

Based on the critique of the system the ambition of coordinated purchasing was revised. The board acknowledge that the initial high ambition was unrealistic and a target for the coordination of purchasing was established on 45% of the volume - leaving 55% to traditional purchasing practices. This target was established, in order to ensure a continuous drive for leveraging similarity across the projects. In this way the implementation of coordinated purchasing represents an organisational learning process which through incremental improvements gradually establishes a purchasing platform.

4.1 Value chain integration

Fernie et al. (2004) argues that integrated procurement strategies create an evolving context within which alternative managerial practice emerges. The implementation of coordinated purchasing is an exemplary case on this.

The implementation of coordinated purchasing has been a part of a cultural shift tying together the project based organization into an organization which leverages size and capabilities across projects in order to reduce cost and create value. This integration of the value chain occurs both upstream and downstream.

4.1.1 Downstream value chain integration

The basic idea of the purchasing strategy is to change the fragmented nature of the downstream value chain as illustrated in figure 2. By bypassing non-value adding parts of the value-chain cost can be further reduced as building materials are bought directly from the producers (nationally and internationally). This however requires that the material and labour costs are split, also changing the business model of subcontractors of the system. Consequently is the purchasing strategy in the contractor not only changing the purchasing practices within the organisation but also changing the very organization of the value chain. This is illustrated in figure 8.

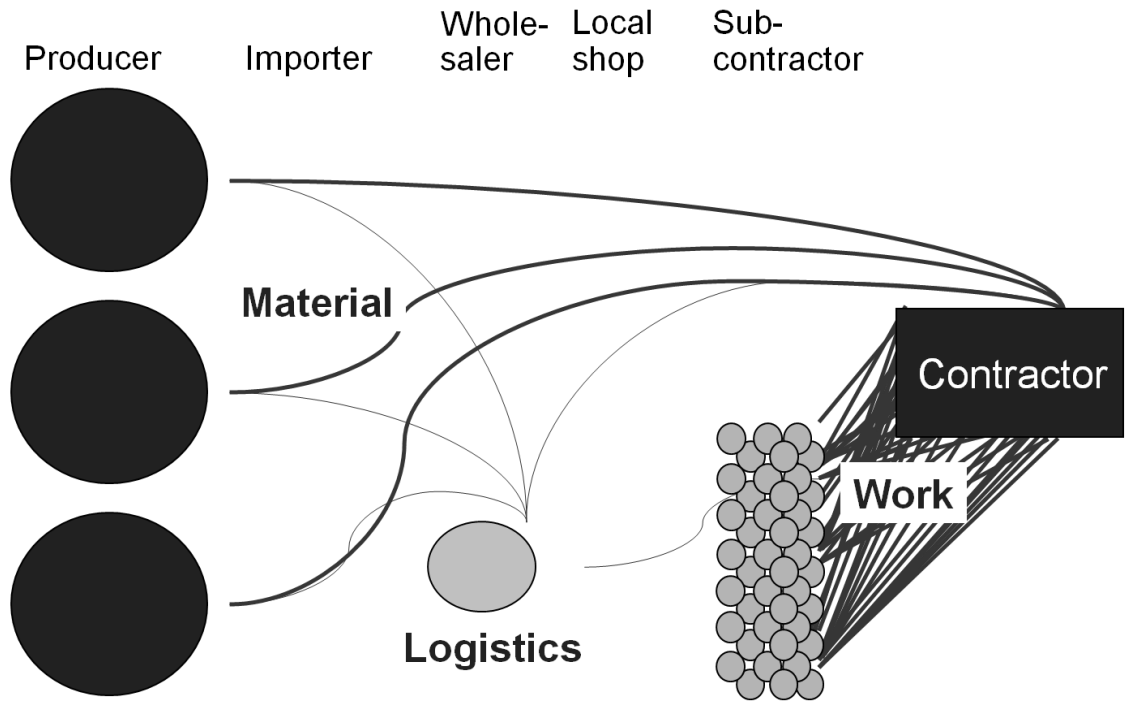

Figure 8: Reorganizing the value-chain downstream

A similar development is found in the aerospace industry (Graham and Ahmed 2000) and other major sectors of industry (Thorburn and Takashima, 1993) reducing the list of supplier in terms of the number of companies included but extended geographically, both nationally and internationally.

4.1.2 Upstream value chain integration

The coordination of purchasing also represents an offset for new development initiatives integrating the value chain upstream. The upstream integration is driven by a desire to define “what to buy”... an activity which usually has been in the hand of architects and engineers. Inspired by the car industry the basic idea is to develop technical platforms (system deliveries) which address a certain market.

Platforms are well known in classical product oriented industries as a strategy for leveraging economy of scale - across products. Meyer & Lehnerd (1997) defines a platform as "a set of subsystems and interfaces that form a common structure from which a stream of derivative products can be efficiently developed and produced." (Meyer and Lehnerd, 1997, p. 39) These platforms can be developed at building level (e.g. an office platform) or at a component level (e.g. an installation shaft). This strategy is illustrated in figure 9.

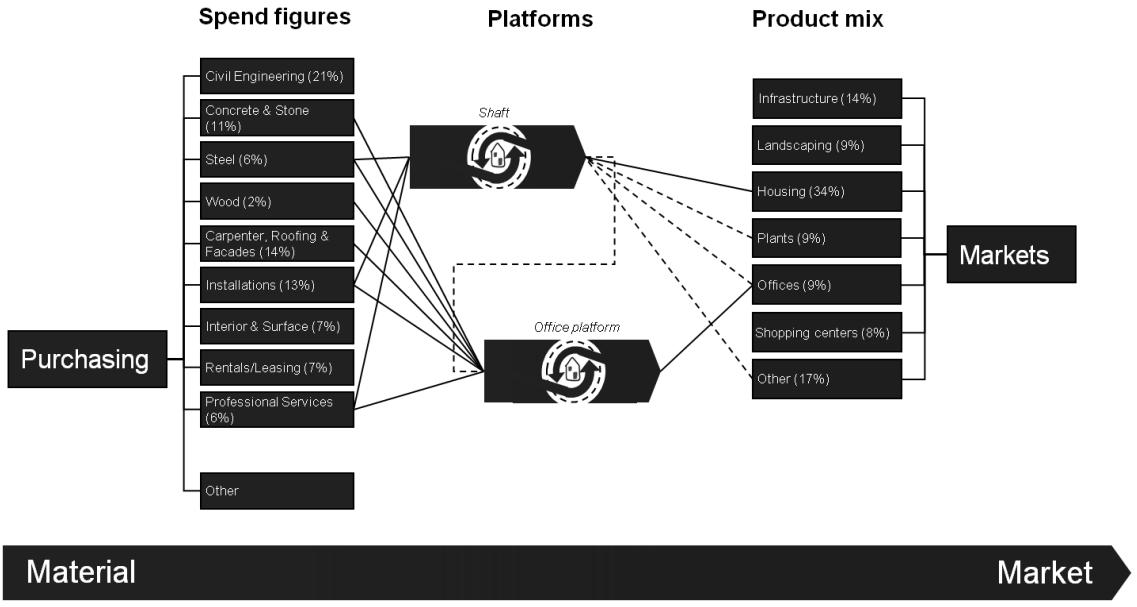

Figure 9: Reorganizing the value-chain upstream by the use of platforms

Thereby is the adoption of coordinated purchasing an attempt to escape the existing red ocean market and establish a long standing competitive advantage through the development of core competencies around company specific purchasing.

5. Conclusion

This paper has analyzed the implementation of coordinated purchasing as a strategy for rethinking the predominant business model in construction. Based on a grounded theory approach the paper presents a process for developing and implementing coordinated purchasing by describing the practices and tools for analysing the existing purchasing activities, categorizing the purchasing volume, and the different strategies for addressing the different categories. In particular the interface between the project and central purchasing activities has been portrayed. The implementation of coordinated purchasing requires a significant change of mindset in the organisation challenging the predominant

project based culture. However despite the challenges coordinated purchasing represents as promising strategy for rethinking the business model within large contractors. A strategy which can be a part of a larger journey leveraging economy of scale even further, though the use of platforms, modularization and configuration.

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