

Integrated Logistics and Value Chain Management (A new model approach to value chains)

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Abstract

In an ongoing research project between researchers from SINTEF and participants from a builder's merchants value chain in Norway, we try to come up with a method and a management model for development and implementation of integrated logistics value chains. Our hope is that this method and model can be used to handle generic cases of logistics integration. During the project work we have identified the need for a new consideration approach to value chains. With basis in Porter's enterprise model, other relevant theory and from discussions and reflections with the representatives from the involved companies, we have moved towards a process oriented model for such value chains and have in that work uncovered some, in our minds, interesting findings about the model. This paper presents the process-oriented model, some characteristics of the model, how we came to that result and our arguments for this kind of approach to the value chain.

Keywords:

Logistics, value chain, strategic level, management, model, builders' merchants, extended enterprise

Introduction

Based on preliminary results, we are confident that rather high logistics integration of companies in a value chain from producers to retailer creates competitive advantages. In order to realise such competitive advantage, co-operation, co-ordination and the process for closer relationship among the participants in the value chain is a criterion for success. Questions like; what is the best-suited integration level, and how to integrate, are the main challenges in order to ensure an efficient value chain.

In an ongoing Norwegian research project, which started in the spring of 1998, the research team¹, in co-operation with companies in a builder's merchants value chain, is dealing with such issues in order to build an integrated logistics management model². The research project is at the phase of finalising a pilot study, which shall contribute to establish a close co-operation between the participant companies at three different logistics levels; strategic, tactical and operational.

This paper is concentrated around the strategic level of the co-operation. According to our experiences so far, decisions tied to different ways of co-operating, clarify roles and process designs are important key elements of the strategic level in building an integrated logistics management model for value chains. At the strategic level, and from a logistics value chain's perspective, we think that the major research questions are:

- Who should do what of the companies in a value chain?
- How should the relationship between the companies be?
- What implications do this have for the design of processes in the value chain?

¹ The study is accomplished by the authors of this paper which are all researchers from the Foundation of Industrial and Scientific Research at the Norwegian University of Science and Technology in Trondheim (SINTEF).

² The integrated logistics management model will take into consideration core business, contracts and forms of co-operation at a strategic level; control areas, product categories, principals of controls, communication systems and organisational structures at a tactical level; training and implementation of systems and routines at an operational level.

As a consequence of trying to answer the above-mentioned questions, we have found a need for a new consideration approach to logistics value chains. With basis in Porter's model of the value chain and the research work we have done so far, we suggest a new integrated value chain model with a logistics perspective.

The main topic of this paper is to present this new approach to value chains, how we became aware of that need and the work towards this new approach. In addition we focus on some uncovered interesting characteristics of the model and discuss this kind of approach to the value chain.

Method

An essential aspect with the project is the case study of the previous mentioned builder's merchant industry. The case consists of four companies; a manufacturer, a wholesaler, a retailer and a transportation company all with different roles in the value chain. One of the objectives with this case study, is to come up with contributions to the integrated logistics value chain management model which we are going to create.

Both qualitative and quantitative data are obtained in an interactive process between the case companies and the researchers. Quantitative and qualitative data are defined, collected and analysed by representatives from the case companies in co-operation with the researchers. The researcher through empirical and theoretical discussions and reflections guides this process [4] [11]. The following figure 1 illustrates the interactive process:

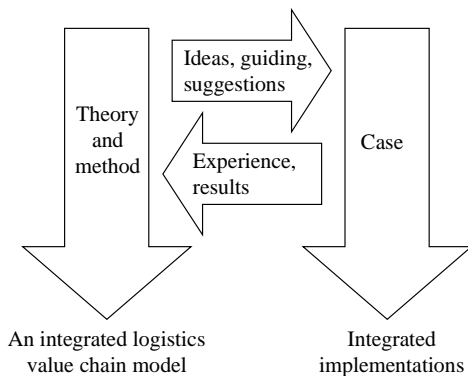


Figure 1 – The interactive research process

In that process, we have step by step tried to identify the different elements of the value chain as building blocks of an integrated value chain model. Through this analysing process, we identified the need for the new approach to model *integrated* logistics value chains.

Searching the literature, we have not found any models or theory that fulfils the needs and requirements we have to represent this. Through discussions and reflections in the group of researchers we have come up with a suggestion to that approach which is presented as follows.

Towards a new theory for integrated logistics value chains

The project's objective is to create an integrated logistics system to minimise the production costs and transaction costs within a value chain, and thereby obtain a lower price and better service for the customer.

The first research question we tried to answer was who should do what. To be able to answer that, all activities in the companies were identified and categorised. With the value chain model of Porter [9] as a basis, we have in co-operation with the companies, divided each company's operations into primary and support activities. For this purpose, we used the company oriented Porter's model to each of the participating companies. The model of Porter is illustrated in figure 2.

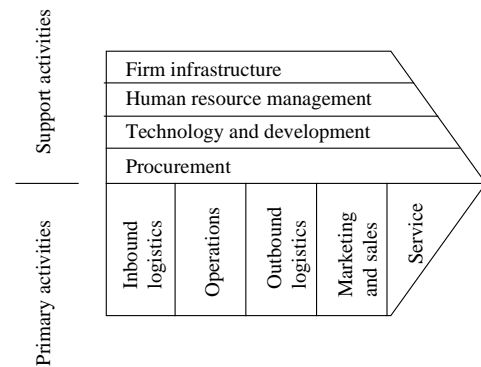


Figure 2 – Porter's model

The next step was to analyse which of these primaries and support activities are core business of the company. That was done together with the companies in the project, by use of their own strategic documents combined with a study of which activities are value added for the customer [6] [8]. Core business of the company could be both primary and support activities [9].

One assumption is that core business of a company is more efficient than other activities in the company, A second assumption is that a core activity of a company is more efficient than the corresponding (but not defined as a core) activity in another company. It is in the core business the knowledge, the experience, and the skills are. In other words, it is the competitive advantage and the identity of the company.

Improved efficiency within a value chain could therefore be obtained by transferring a non-core activity from one company to another company, which have the same activity as their core business. In this process we found it more suitable for each participating company to redefine non-core activities as support activities. We then end up with a classification of activities as either core activities or support activities as illustrated in the following figure 3, but still we have a company oriented perspective on the activities.

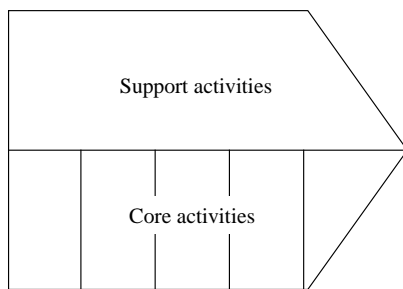


Figure 3 – Identifying and classifying the core and support activities for each company

Some of the companies in the project defined similar activities as their core activities, and due to that they could be competitors instead of being complementarily of each other. Co-operation within a value chain is then less relevant.

After discussions with the companies combined with further analyses, the core business was divided into new and more limited core activities. The similarities were then far less. However, this was quite a long discussion because it influenced on the different companies' strategies in what they should actually do and what they should outsource to other members of the value chain.

It should, according to that, be mentioned that the companies, in some cases, decided to perform core activity which was placed to another participant. The reason for this is that those companies in settings with other customers, decided to keep their old ways of doing business with those customers. From our point of view, is this outside the context of the integrated value chain we tries to study.

This approach to concentrate on core business and outsource other activities to companies, which have that particular activity as their core business, would most probably increase the efficiency of production within the value chain [2]. On the other hand such a strategy would increase transactions between the companies as well, and they would be more dependent on each other. It is therefore important to be aware of that the transaction costs could increase more than the production costs were reduced within the value chain were reduced [10].

It is crucial to analyse the costs of transfers before the model of concentration on core business is implemented. On tactical and operational level of business management these costs are logistics costs, and including transaction costs as well. On strategic level it is a matter of market conditions and type of co-operation between the companies, in other words pure Transaction Costs.

The second research question, is as mentioned, how the relationship between the companies should be. According to Transaction Costs Theory [10]; frequency, opportunism, specificity, and risk are essential elements when transaction

costs are going to be studied. The more there are of these factors, the closer the relationship should be between the companies. A formal contract, for instance, could reduce the transaction costs by getting less opportunism and risk [5].

Agency theory and methods for analysing processes are used to discuss the factors of Transaction Costs further.

Agency theory is among other things a method used for a deeper analysis of the two first factors of Transaction Cost Theory opportunism and risk. The expressions hidden information and hidden actions in Agency Theory are essential in that respect. The risk is higher, and the possibilities for opportunism is bigger if there are participants in the value chain that hide information or their actions in order to sub-optimize in the benefit on others costs [3].

The level of hidden actions and hidden information depends on the market situation. The more imperfect the market is, the more it could be of hidden information and hidden actions [3]. Under such circumstances the transaction costs could be reduced by a closer relationship between the participants in the value chain.

The factors' frequency and specificity of the Transaction Cost Theory could be discussed by identifying and analysing processes in the value chain. The two main processes found are the process of Orders and the Distribution process. The logistic processes within these two are in almost all cases product oriented. Products should therefore be categorised for both the Order process and the process of Distribution. Conditions, standards, and what kind of product decides in most of the cases the most suitable type of transaction. Level of technology for different parts of the transaction is also important in that respect. These analysis of processes are as mentioned inputs to estimate the frequency of the transactions and the specificity, the two factors of Transaction Cost Theory.

The methods of Transaction Cost Theory, with contributions from Agency Theory and processes analyses, could guide us. Whether relationships in a value chain should just be a gentleman agreement, or an agreement by use of formal contracts, or a partner agreement, or a joint venture, or maybe integration by doing it in house is the best solution [5].

As a tentative conclusion the integrated logistics system on strategic level is a method to minimise:

- The logistics costs by concentration on core business
- The transaction costs by getting the best relationship and co-operation.

The third and last research question is what implications do this have for the design of processes in the value chain. Porter put his focus on the Production Company.

Schoolbooks concerning value chain models [1] [7], seems to also put focus on the central (often production) company and do not emphasize so much the other participants in the value chain. If we, for a moment, suppress this central company oriented perspective, and only takes into consideration *the processes of the value chain* – we may construct a Porter-like model of the value chain based on a process perspective. This is illustrated by the following figure:

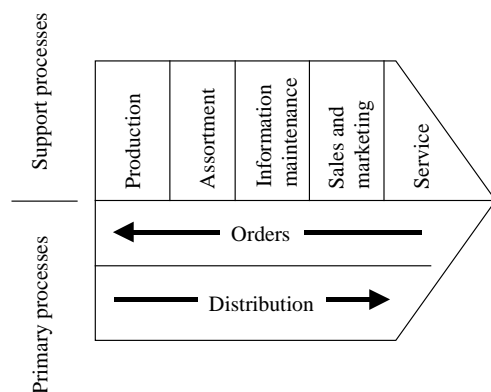


Figure 4 – A process oriented value chain model

In construction and identification of this model, we identified the primary processes as logistics processes concerning all the participants of the integrated value chain. It is reasonable to consider transfers and transaction of products and information as primary processes, when logistics functions are in focus. The support processes are identified as other relevant processes among the participants.

The primary process Orders can be considered as flow of information. It is information from the customer to the producer about the demands, and to the Transport Company and to the distributor regarding deliveries.

The information does not necessarily follow the same route as the physical products do. In a value chain the information process should be co-ordinated by a logistic function by getting different information input from suppliers, producers, transport companies, and customers.

This information input from the different participants could be looked upon as parts of the primary activity of getting order information correct to the right participant. The primary activity Orders or flow of information is then constructed with contribution from all participants in the value chain, while each support activity is limited to one particular participant. That is the reason behind limited boxes for support activities, and an arrow going beyond all the sectors or activities for the primary activity (Figure 4). Quite the opposite of Porters model for a value chain (Figure 2).

It is the same situation for the primary activity Distribution or flow of goods in the opposite direction. The distribution of products goes through different activities like transport and inventory handling by the different participants in the value chain. In this way the Distribution it self can be regarded as an overall process involving all participants and not related to one particular participant.

When detailing the primary processes, by using techniques from i.e. SADT³, we can structure the activities of a primary process without in the first hand take into consideration where the control of the different sub activities shall be placed. First on a detailed activity level we may assign control of activities to the different participants as a part of the logistics strategic discussion.

Conclusions

Based on discussions that lead to this new approach for value chains, some interesting findings according to this model emerged, and what we think of as important aspect with this approach:

- It seems that all processes (or activities) in this model is a core activity for one of the companies according to the value chain perspective.
- Outsourcing is probably not a relevant topic in a traditional way for one of the processes, because if that happens, the new participants per definition will be a part of the value chain, and supplies a product from its core activity.
- In construction and identification of this model, we identified the primary processes as logistics processes concerning all the participants of the integrated value chain. The support processes are identified as other relevant processes among the participants.
- The strategic choices for each participant may conflict with the best overall strategy for the complete value chain. Our experience is that it is important to put great focus on this area.
- In implementation we must put great emphasis to the transaction costs connected to this construction because it can be higher than the savings from this approach. High specialising can give high transaction costs.

From our point of view, the suggested approach to a value chain model does not contradict Porter's model of a value chain. The difference lies in the fact that Porter looks at the value chain as a set of separate autonomy companies, while we in this perspective present an integration focus on the

³ A semi-graphic method to describe systems of different kind. For more information see: Marca and McGowan (1988) SADT, Structured Analysis and Design Technique, McGraw-Hill Inc, ISBN 0-07-040235-3

value chain and therefore need to see the companies in a kind of extended enterprise perspective. We think that this holistic approach is necessary if effective and competitive integrated value chain systems shall be realised.

In the future we mean that the suggested process oriented value chain model will serve as a basis and guideline for us in analysing other generic cases. Or, said in other words, this approach to value chains will be a part of the method and management model for merchants value chains we are working towards.

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References

- [1] Christopher M. Logistics and Supply Chain Management. Strategies for Reducing Cost and Improving Service, Financial Times Professional Limited, 1998
- [2] Coase R. The Nature of Firm, *Economica N.S.*, 4, , 1937
- [3] Eisenhardt K. Agency Theory: An Assessment and Review. *Academy of Management Review*, Vol. 14. , 1989
- [4] Eisenhardt K. Building Theories from Case Study Research. *Academy of Management Review*, 1989: 16 (3) pp. 532-50.
- [5] Hart O. Firms Contracts and Financial Structure. Clarendon Press, 1995
- [6] Kaplan R S and Norton D. Balanced Scorecard. Harward Business School Press. 1996
- [7] Lambert M L, Stock J R, Ellram L M, Fundamentals og Logistics Management, Irwin/ McGraw-Hill, 1998
- [8] Mcmillan J. Games, Strategies, & Managers. Oxford University Press, 1992
- [9] Porter M E. Competitive Advantage. The Free Press, 1985
- [10] Williamson O. The Economic Institutions of Capitalism. The Free Press, 1985
- [11] Yin RK. Case study research: Design and methods. Thousand Oaks, CA: Sage Publications, inc., 1994.

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