The Impact of Deep-Financing on Supply Chain Competitiveness

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Abstract. The purpose of this paper is to discuss how the competitiveness of a supply chain is impacted by the usage of the deep-financing instrument. Both, the concept of "supply chain competitiveness" as well as "deep-financing" are to be explained. The main results of this paper are two hypothesis with respect to the supply chain competitiveness. It is increased by (a) the ability to reduce the cost-of-capital and (b) the ability to ensure liquidity in the SC (financial chain efficiency variables). The subsequent discussion develops hypotheses on how deep-financing increases the financial stability through the usage of the blockchain technology.

1 Impact of the Financial Chain Efficiency on Supply Chain Competitiveness

Within the modern supply chain management (SCM) literature, it is commonly accepted that instead of single organizations, rather whole supply chains are competing with each other [1]. In the automotive industry for example, where the manufacturing of a single product is outsourced to a large extent to the supplier base [2], the competitiveness of an original equipment manufacturers (OEM) supply chain is dependent on the global *availability of supplier goods* [3]. At the same time, an OEM aims to *reduce material and operational costs in the SC* to keep its profit margins high [4]. Both dimensions to measure the SC competitiveness are visualized in figure 1.

However, SCM instruments which would address the optimization of the material flow in a SC, are mostly applied by organizations with the highest bargaining power [5]. For example, an OEM is able to use "Just-in-Sequence"-contracts (JIS) to reduce capital tied-up in inventory, optimize lead times and reduce operational costs while ensuring a high availability of supplier goods [6]. To make JIS-deliveries possible, suppliers (which are acting in a highly competitive environment) are willing to store inventory in warehouses all around the world and/or invest in a global transportation network [7].
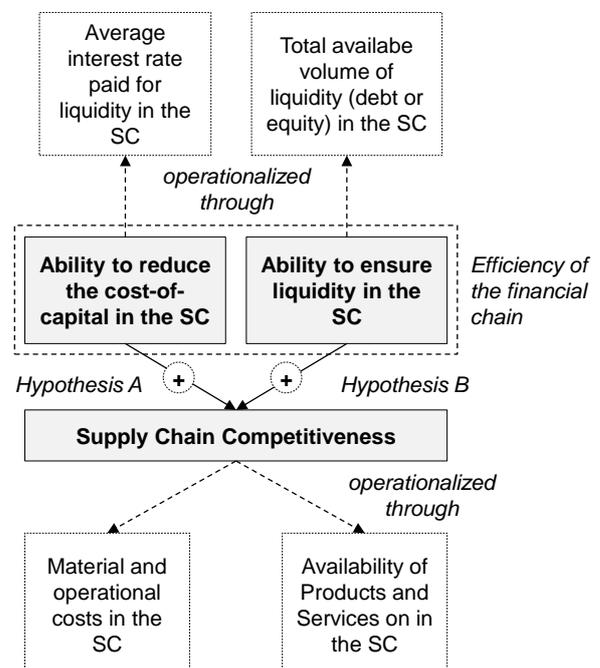
Figure 1: Hypotheses on the impact of the financial chain efficiency on supply chain competitiveness

This in turn is increasing the capital tied-up in the SC from tier 1 to tier n. From a financial chain perspective (please refer to [8] and [9]), higher capital costs are on the one hand reducing the net income (by the payment of debt interest) and on the other hand the economic value generated by organizations (assuming that the return on equity is not increasing) [10]. Therefore, small and medium-sized enterprises (SME) (1) need to *reduce their cost-of-capital* and (b) *ensure a necessary level of liquidity in the organization*. Both are variables to model and measure the efficiency of financial flows in the supply chain [11].

In this paper it is assumed, that liquidity issues in the supplier base can lead to disruptions, thus decrease the availability of goods and increase the operational and capital costs in the SC [12]. Therefore addressing these two efficiency goals in the financial chain ultimately leads to a higher supply chain competitiveness (*hypothesis A and B*).

However, due to the financial crisis in 2008, SMEs in the SC are facing an increasingly challenging environment to acquire liquidity at low costs. They either do not get further debt-financing from banks or have to bear a high interest burden [13]. The ability to reduce the cost-of-capital is therefore measured by the *average interest rate paid for liquidity at organizations in the SC,* whilst the ability to ensure liquidity in the SC is measured by *the total volume of available liquidity in the SC*.

2 Deep-Financing: Concept and Impact

This chapter briefly describes the concept of "*Deep-Financing*" (DF) from a processual and technological perspective. Furthermore, hypotheses on the impact of the DF concept on the two levers of the financial chain efficiency are discussed (Figure 2).

From a *processual perspective*, DF is similar to trade-financing (TF) solutions. These are commonly used for global export and import activities between two organizations in a supply chain. In these TF-transactions, so called letter of credits (LCs) are reducing the financial risk on both ends (on the other hand, their usage is increasing administration costs for all parties). Based on these LCs, the bank of the buying organization is assuring to pay the supplier (on behalf of the buyer) with the agreed amount in the case that the respective goods are delivered (in time and in the right quality) [14].

The supplier is able to use the issued LC from the bank to acquire liquidity based on the credit rating of the buying company with the higher creditworthiness (this is called interest-rate-arbitrage) [15]. This way, the supplier would reduce its cost-of-capital, since short-term financing interest rates are minimized.

Now, the basic idea of DF is that all suppliers in the SC (from tier 1 to tier n) should be able to finance goods and services for their manufacturing and delivery processes at the (often much lower) interest rate of the OEM at the end of the supply chain (and with the highest creditworthiness). If all members of the SC gain cheaper access to liquidity, the risk of SC disruptions is reduced and ultimately, the SC competitiveness increases [16].

Therefore, from a processual perspective, DF is applied in a supply chain when organizations are financed on multiple tiers based on the same interest rate - the rate of the OEM with the highest creditworthiness (hypothesis C).
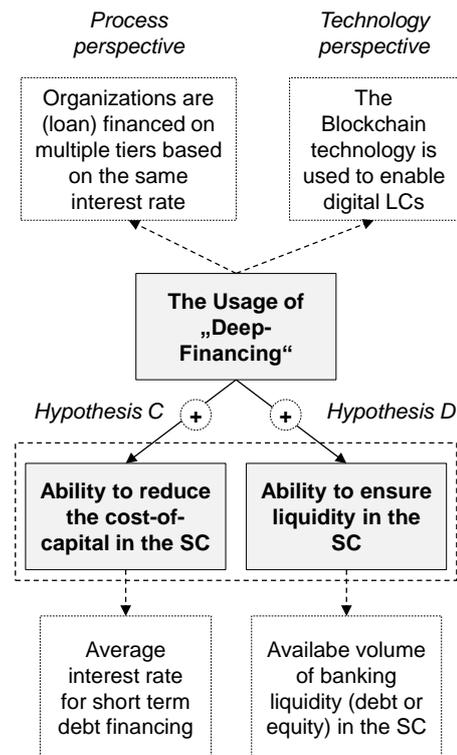
Figure 2: Hypotheses of "Deep-Financing" on the financial chain efficiency

Currently, technology start-ups (such as "*skuchain*" or "*TradeIX*") are offering this DF-solution in cooperation with banks and other institutional investors [17]. They are using a distributed hyper ledger technology, called the blockchain, to enable an efficient process in DF transactions (please find a *detailed description of the Blockchain technology* in [11]). Without explaining the concept of the Blockchain itself, this paper highlights the value provided by the technology to the DF-process. The main benefits using the Blockchain are:

- The data stored on the Blockchain is irreversible. This enables to create trustworthy digital LCs which may be used by any bank or investor to finance the supplier based on the digital document.

- The Blockchain is working as a fully decentralized infrastructure, which only finishes transactions when all needed parties triggered the process. This ensures (1) that all needed parties are involved and (2) all needed information and data have been provided. This highly reduces administration costs at the involved banks and industrial companies.
- The Blockchain is a highly secure system (when it is ensuring high frequency mining activities) where fraud is (almost completely) prevented. This ensures banks and investors that the information provided on the buyer can be used for their credit risk management processes.
- The Blockchain works with a consensus mechanism, which means that not only one single organization is approving the completeness and accuracy of the data stored on the Blockchain, but the whole network. This is further increasing the trustworthiness of digital letter of credits [17].

Any other technological infrastructure would not enable a trustworthy base to create and use digital LCs for trade financing transactions in the SC. *Therefore, from a technological perspective, DF is applied, when all parties included in the specific transaction are interacting on the Blockchain technology. This enables all interacting organizations on all tiers to acquire TF capital which furthermore increase the total volume of liquidity in the SC (hypothesis D).*

3 Summary and Outlook

The results of this paper may be summarized as follows. Supply chains are competing with each other and their competitiveness is highly dependent from their financial chain efficiency. The financial chain efficiency is measured (a) by the ability to reduce the cost-of-capital in the whole SC and (b) by the ability to acquire liquidity in the whole SC.

This paper theoretically discussed how and why the concept of DF is addressing both levers of supply chain competitiveness. First, DF enables all organizations in the SC to acquire liquidity based on the interest rates of the OEM or the most creditworthy organization in the SC. Second, using the Blockchain to provide DF-solutions enables (a) all organizations to acquire more liquidity based on the digital LCs and (b) reduces administration costs in the SC.

Further research may perform confirmatory research and test the stated hypothesis above. This paper provides the necessary operationalization of the stated structural variables. A further empirical analysis may show the state of the art of DF comparing the solutions by technology start-ups and the created financial networks.

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