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A literature review of supply chain finance in a digital and sustainable environment: A conceptual framework

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Abstract

In this article, a literature review is completed to investigate the role of an IT platform connecting companies in the supply chain and to define Supply Chain Finance metrics in terms of the improvement of liquidity, efficiency, and (multiple) value creation. The significance of IT platforms is that they facilitate information, communication and new technologies and allow companies to improve their financial and non-financial performance and optimise their supply chain processes from different perspectives.

Keywords: Supply chain finance; Supply chain; Lean manufacturing; Working capital; Enterprise Resource Planning; IT platform; New business models; Multiple value model.

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1. Introduction

In this paper a literature review is conducted to discuss published information about supply chain finance in a digital and circular or sustainable environment. There are several major terms and concepts relevant to this topic.

The well-known Supply Chain Management (SCM) term was proposed by Van Hoek et al. (2011) and Council of Supply Chain Management Professionals (2020). SCM implies the relationship between the flows of goods & services, the information flows, and the financial flows (Fig. 1).

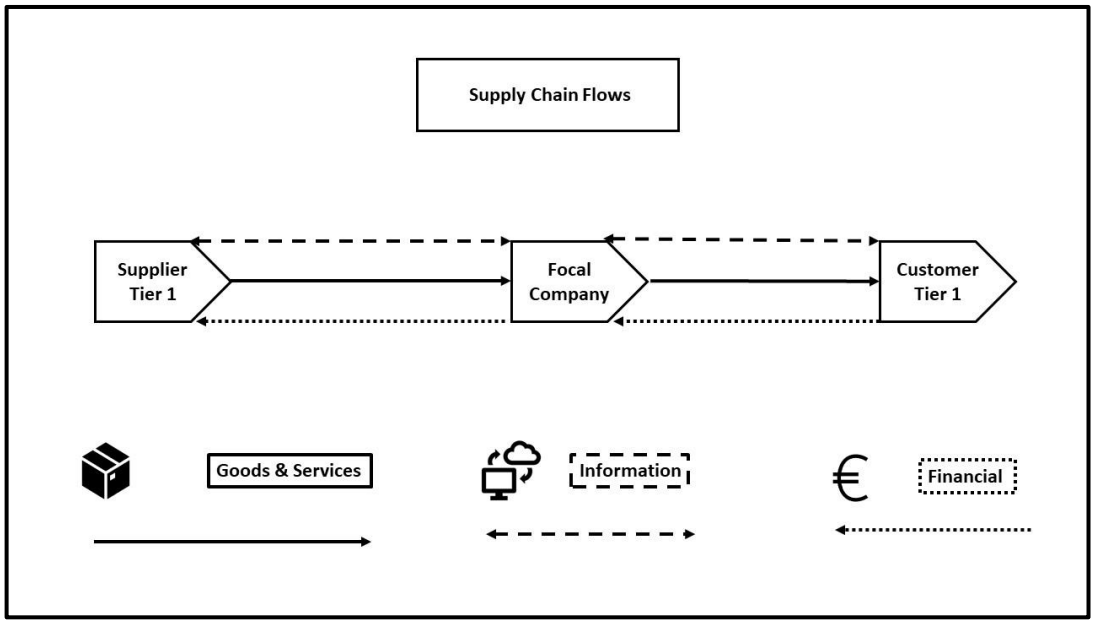

Fig. 1. Supply Chain of the focal company (developed by the authors).

The second term is Supply Chain Finance (SCF). Steeman (2014) outlines SCF from a more general point of view with no link to such SCF instruments {e.g. reverse factoring and dynamic discounting as defined by European Banking Association (2014)]:

> *'Financial arrangements in the form of debt, equity or financial contracts used in collaboration by at least two supply chain partners and facilitated by the focal company with the aim to improve the overall financial performance and mitigate the overall risks of the supply chain.'*

Integrated Business Planning (IBP) is one of the new concepts used in SCM. IBP is an integrated plan of Logistics, Finance and Marketing in which three elements come together as defined by Weenk (2019):

- Order to Cash (O2C)
- Purchase to Pay (P2P)

- Demand to Supply (D2S)

The IBP concept (Fig. 2) is visualized by Börner and Kaiser (2016) in three main activities Supply plan, Demand plan and Financial Plan which are linked to Production & Logistics, Inventory Management, Sales & Marketing Management, Product Life Cycle Management and Financial Management.

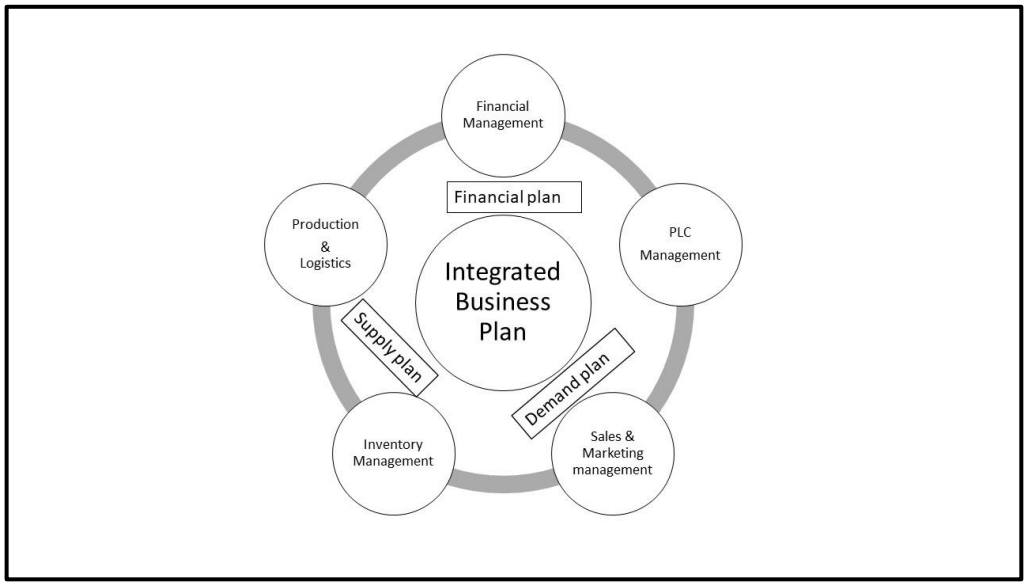

Fig. 2. Visualisation of the IBP concept based on Börner and Kaiser (2016).

The other core concepts used in the literature review are Enterprise Resource Planning (ERP) by Caiola and O'Sullivan (2016), Digital Platforms by Ruggieri et al. (2018), Operations management by Slack et al. (2016), and Corporate Finance by Brealy et al. (2020) and Hillier et al. (2011).

Our literature research question is: "What is the conceptual model of the financial flows in a supply chain in terms of sustainable supply chain finance metrics?"

2. Literature review

In this literature review the authors discuss such terms as Supply Chain Management (SCM), Supply Chain Finance (SCF), Finance, Logistics, Operations Management, ERP, Cloud technology and IT platforms.

Supply chain finance (SCF) is based on four pillars as described by Jansen (n.d.):

I. Supply Chain Management (SCM): Purchase, Sales, and Inventories.
II. Finance & Control: Working Capital (e.g., Net Operational Working Capital = NOWC), Processes (O2C and P2P), and Risk Mitigation.

III. IT: Enterprise Resource Planning system (ERP), and Electronic Data Interchange (EDI) / IT Platform / Blockchain.

IV. Bankers / Financiers (SCF Instruments): Reverse factoring, Dynamic discounting, Factoring, Crop financing, Inventory financing, and Equipment financing.

The authors neglected in this research pillar IV which is about the role of supply chain finance instruments from the financial sector (Banks, SPVs, and FinTechs, etc.). This literature review focuses on the discussion of how production companies or original equipment manufacturers (OEMs) adopt digitalisation in their supply chains.

For this literature review, an adjusted conceptual model by Jansen (2018) is used to understand how business activities (Purchase, Production and Sales) and their link with internal processes (using an ERP system and an IT platform) influence sustainable supply chain finance metrics and the outcome for the company (liquidity, added value and risk mitigation).

The value aspect by Jansen (n.d.) is more in alignment with the so-called multiple value model by Gleeson-White (2014). So, value is no longer only financial value or Economic Value Added (EVA), but also includes social & relationship value (Customer Supplier Relationship) and environmental value (less waste of paper and the cost reduction of handling of document flows). In the original work of Gleeson-White (2014) the following six forms of capital for creating value are introduced:

- Financial capital
- Manufactured capital
- Intellectual capital
- Human capital
- Social and relationship capital
- Natural capital

The concept of integrated reporting by the International <IR> Framework (2021) is based on the six capitals model, which is why more and more companies are accepting this new reporting standard to provide a fair value for the short, medium and long-term of a company. In several annual reports of companies, this or a similar integrated reporting format as well as the underlying sustainable/circular business model by Jonker et al. (2017) are applied in Philips Annual Report (2022), Unilever Annual Report (2022) and Maersk Annual Report (2022).

An ERP system has the following functionalities described by Caiola and O'Sullivan (2016): Marketing & Sales, Purchases, Inventory, Engineering & Manufacturing (including Bill of Materials), Shop Floor, Scheduling, Administration, Financials, Executive Information System (including Business Intelligence), and Communication.

An ERP system is defined by Romney and Steinbart (2015) as follows: ‘A system that integrates all aspects of an organization’s activities – such as accounting, finance, marketing, human resources, manufacturing, inventory management – into one system’. ERP systems

became popular in the 90's. It is a well-known fact that production companies using ERP systems significantly benefit from the digitalisation of business processes and the use of information stored in databases of ERP systems that is available at any moment for the fulfilment of daily operations, generating demand forecasts, production planning, data analysis, analysis of financial results, problem-solving and decision making.

The current technological development is forcing many companies to use ERP systems and IT platforms connecting companies' ERP systems and enabling collaboration in the "cloud" environment through the Internet. Specifically, this literature review is about the application of ERP systems, IT platforms and new technologies that can provide an innovative way for companies in a supply chain to optimise their business processes and working capital and increase their competitive advantages in the market.

The use of IT platforms is the next step in the process of digitalisation. Ruggieri et al. (2018) define these platforms as follows: 'Digital platforms is a collective term associated with technologies such as mobile devices and applications, cloud computing, in-memory technologies and social media'. There are several types of IT platforms, some of which are referred to as multi-sided platforms. Ruggieri et al. (2018) described a multi-sided platform as an aggregation platform acting as an intermediary and bringing together producers and consumers.

3. Conceptual model

The literature review of the previous section is now summarized in the Sustainable Supply Chain Finance conceptual model for SMEs (Fig. 3) based on a well-known input-throughput-output flow diagram by Blackstone (2010).

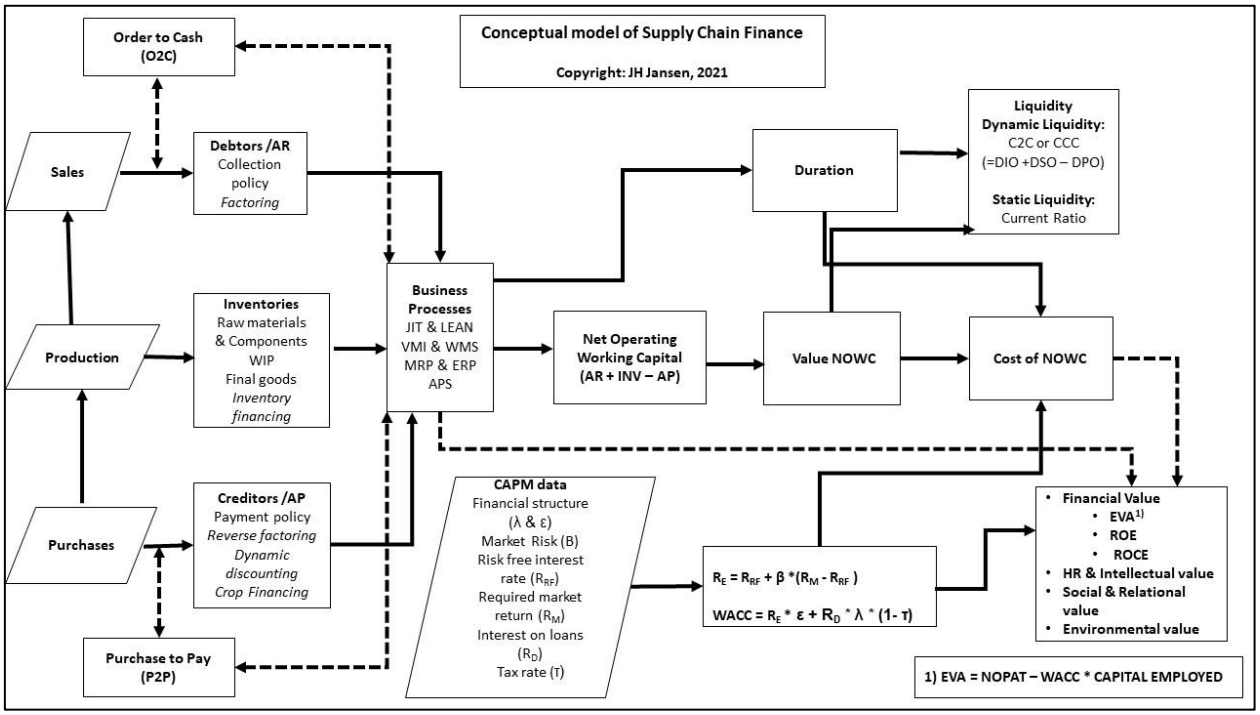

Fig. 3. Sustainable Supply Chain Finance conceptual model for SMEs by Jansen (2018) and Jansen (n.d.).

The event-driven aspects of supply chain finance start with the input of purchases, production and sales. The three events continue in the P2P and O2C processes showing the impact on the financial ledgers: Debtors/AR, Inventories, and Creditors/AP.

They are represented finally in the middle of the model in the box called Net Operating Working Capital (NOWC), using the Business Processes box in the model to process the incoming and outgoing financial data of the 3 main business processes: purchases, production and sales.

The NWOC is defined like: $NWOC = Inventories + Debtors\ (AR) - Creditors\ (AP)$ (Brealy, Myers, & Allen, 2020).

Using basic finance theory by Brealey et al. (2020) the dynamic liquidity C2C) or CCC and static liquidity (current ratio) can be calculated as one of the supply chain finance outputs in this conceptual model. The dynamic liquidity (C2C or CCC) consists of the following components:

$$Days\ Inventory\ Outstanding\ (DIO) = Inventories/(Cost\ of\ Sales) * 365\ days.$$

$$Days\ Sales\ Outstanding\ (DSO) = \ Debtors/(\ Revenues) * 365\ days.$$

$$Days\ Purchases\ Outstanding\ (DPO) = \ Creditors/(\ Cost\ of\ Sales) * 365\ days.$$

$$Cash\ to\ Cash\ cycle\ (C2CC\ or\ Cash\ Convesrion\ Cycle\ (CCC) = \ DIO + DSO - DPO$$

Another output is the cost of the NOWC using the well-known cube model by Pfohl and Gomm (2009) in which the following formula is developed:

$$Cost\ of\ capital\ (NOWC) = Value\ NOWC * Capital\ rate\ (WACC) * Duration\ (Time).$$

Finally, the third output is the (multiple) value output which is traditionally measured (as defined by Brealey et al. (2020)) by Economic Value Added which is calculated by deducting the costs (WACC[1]) of capital employed from the Net Operating Profit After Taxes (NOPAT) (see formula on the bottom of Fig. 3). Besides the financial value (EVA) other values according to the model of Gleeson-White (2014) have been considered: the long-term value that is created for the suppliers, the value for the environment and intellectual value. A similar approach is the sustainable development model, where three circles fit together: Economy, Society and Environment (Schoenmaker & Schramade, 2019). The last types of value are more in alignment with the so-called long-term orientation of firms in the supply chain. This long-term orientation is also known as the Rhineland business model by Van Aken et al. (2018).

4. Conclusion and Discussion

The literature review shows us what a conceptual model for supply chain finance might look like for a focal company in a supply chain using the state of IT applications (like ERPs and IT platforms). The main results are in terms of the Anglo-Saxon business model by Van Aken et al. (2018):

- Better liquidity in the supply chain
- Lower costs of Net Operating Working Capital
- Higher Economic Added Value

Additional values in terms of the Rhineland business model by Van Aken et al. (2018) are:

- Better social & human value
- Fair distribution of benefits in the supply chain (relationship value)
- Higher environmental value

Nowadays, in supply chain finance the statement ‘cash is no longer king anymore’ might be true and the overall outcome should not be judged only in terms of financial results. Further research using case studies is a way of testing the relationships in the conceptual model (Fig. 3) as well as the results in terms of multiple values.

[1] WACC = return on equity * equity ratio + {cost of debt * debt ratio * (1 - corporate tax rate)}, see also formulas in Fig. 3.

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References

Blackstone, J. H. (2010). *APICS Dictionary.* Chicago (USA): APICS The Association for Operations Management.

Börner, D., & Kaiser, U. (2016). *Integrated Business Planning (IBP) - Lifting Sales & Operations Planning to the next level.* NA: Capgemini Consulting. Retrieved from Capgemini: https://www.capgemini.com/consulting-de/wp-content/uploads/sites/32/2017/08/integrated_business_planning_ibp_0.pdf

Brealy, R., Myers, S., & Allen, F. (2020). *Principles of Corporate Finance.* New York (USA): McGrawHill Education.

Caiola, G., & O'Sullivan, J. (2016). *Enterprise Resource Planning Concepts.* Central Islip (USA): IMAE Publications.

Council of Supply Chain Management Professionals. (2020, October 20). *Definitions*. Retrieved from CSCMP: https://cscmp.org/CSCMP/Educate/SCM_Definitions_and_Glossary_of_Terms.aspx

European Banking Association. (2014). *Supply Chain Finance - European market guide.* Paris (F): European Banking Association (EBA).

Gleeson-White, J. (2014). *Six capital - The revolution capitalism has to have or How accountants save the planet?* Sydney (AUS): Allen & Unwin.

Hillier, D., Clacher, I., Ross, S., Westerfield, R., & Bradford, J. (2011). *Fundamental of Corporate Finance.* Maidenhead (UK): McGraw Hill Higher Education.

IIRC. (2021). *International <IR> Framework.* London (UK): Value Reporting Foundation.

Jansen, J. H. (2018). *A conceptual model of Supply Chain Finance for SMEs at operational level.* Arnhem (NL): VervoersLogistieke Werkdagen (VLW).

Jansen, J. H. (n.d.). *Principles of Supply Chain Finance.* Arnhem: Amazon.

Jonker, J., Stegeman, H., & Faber, N. (2017). *The circular economy - Developments, concepts, and research in search for corresponding business models.* Nijmegen: Nijmegen School of Management (Radboud University).

Maersk. (2022). *2021 Annual Report.* Copenhagen (DK): AP Möller- Mears A/s.

Pfohl, H.-C., & Gomm, M. (2009). Supply chain finance: optimizing financial flows in supply chains. *Logistics Reserch*, 149-161.

Philips. (2022). *Philips Annual Report 2021.* Amsterdam (NL): Koninklijke Philips NV.

Romney, M.B. & Steinbart, P.J. (2015). *Accounting information systems.* Pearson.

Ruggieri, R., Savastano, M., Scalingi, A., Bala, D., and D'Ascenzo, F. (2018). *The impact of Digital Platforms on Business Models: An empirical investigation on innovative start-ups.* Management & Marketing. Challenges for the Knowledge Society, Vol., 13, No 4, pp. 1210-1225. DOI: 10.2478/mmcks-2018-0032.

Schoenmaker, D., & Schramade, W. (2019). *Principles of Sustainable Finance.* Oxford University Press: Oxford.

Slack, N., Brandon-Jones, A., & Johnston, R. (2016). *Operations management.* Harlow (UK): Pearson.

Steeman, M. (2014). *The Power of Supply Chain Finance.* Zwolle (NL): Windesheim University.

Unilever. (2022). *Unilever Annual Report and Accounts 2021.* London (UK): Unilever PLC.

Van Aken, T., Riepma, R., & Westerdijk, R. (2018). *Het OK! model.* Groningen (NL): Noordhoff.

Van Hoek, R., & Harrison, A. (2011). *Logistics Management & Strategy - Competing Through the Supply Chain.* Harlow (UK): Prentince Hall.

Weenk, E. (2019). *Mastering the supply chain.* London (UK): Kogan Page.