

Supply Chain Finance, its Practical Relevance and Strategic Value

The Supply Chain Finance Essential Knowledge Series

Ronald de Boer, Matthijs van Bergen, Michiel Steeman
Windesheim University of Applied Sciences



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Acronyms

3BL	Triple bottom line	KYC	Know-your-customer
3WM	Three-way-match	LSP	Logistics service provider
A/P	Accounts payable	NWC	Net working capital
A/R	Accounts receivable	O2C	Order-to-cash
CCC	Cash conversion cycle	P2P	Purchase-to-pay or procure-to-pay
CFO	Chief financial officer	PO	Purchase order
COGS	Cost of goods sold	PT	Payment term
DIH	Days inventory held	RF	Reverse factoring
DPO	Days payable outstanding	ROI	Return on investment
DSO	Days sales outstanding	SCF	Supply chain finance
ERP	Enterprise resource planning	SCM	Supply chain management
FCF	Free cash flow	SPV	Special purpose vehicle
KPI	Key performance indicator	WACC	Weighted average cost of capital

Acknowledgement

This paper is a deliverable of the research program called SCF 2.0 and supported by TKI-Dinalog¹. The foundation setting nature of this paper reflects the ambition of this research project that aims to accelerate the understanding, development and adoption of supply chain finance models. The goal of SCF 2.0 is to realize substantial benefits for corporates in the areas of operational enhancement, increased supply chain output, cost reductions and risk mitigation.

1) Top consortium Knowledge and Innovation / Dutch Institute for Advanced Logistics.

1 Introduction

As a result of increased globalisation, enhanced competition and rising customer expectations, today's businesses face more complexity and uncertainty than ever before. This has intensified the need for coordination among interdependent organisations and has created the awareness that it is no longer companies but supply chains that compete. In this process, more and more companies are realising that they need to optimise not only the materials and information flows in their supply chains, but also the financial flows. Such organisations acknowledge that improving the supply and demand of finance is an effective way to increase the profitability and stability of supply chains. In recent decades, this has led to the development of a new field of research and application: supply chain finance (SCF).

Since the beginning of the economic crisis in 2008, the topic of SCF has attracted ever-increasing interest. As the scarcity of cash grew, businesses started to look for better alternatives to reduce working capital needs and to improve their return on investments without damaging the health of the supply chain or introducing new supply risks. Such alternatives were offered by SCF, that provides a wide spectrum of effective instruments, tools and models.

Although, in the last decade, a significant body of literature has become available in the form of academic articles, books, reports, working papers and manuals, this information is very fragmented and much of it is not easy accessible to a wider public. This makes that it is difficult to get a proper idea on the true scope and potential of SCF. Furthermore, the relevance of SCF at different levels of our society as well as the strategic relevance for organisations has not been displayed in a systematic and transparent way. Finally, we think much of the current literature either has a too limited scope (restricting SCF to one type of financing or, even worse to one particular instrument) or tries to include all kind of financial instruments that have nothing to do with collaboration (the 'supply chain' part of SCF). There clearly is a need for an unambiguous description of the scope and purpose of SCF.

This paper presents a comprehensive overview of the rapidly emerging SCF landscape and its broad spectrum of application. Furthermore, it displays the relevance and potential impact of SCF at all levels of the economy. Next, it provides clarity on the scope and value of SCF by carefully taking into account its theoretical foundations and current business trends and offering a new definition of SCF. Moreover, this paper provides a new classification of SCF agreements, which covers all SCF instruments that can be utilised at different phases of the source-to-pay as well as the order-to-cash process. Several of these instruments will be discussed in depth, providing insight into their implementation, benefits and drawbacks. Finally, we present insight in adoption of SCF based on new data and provide a framework for SCF strategy development.

2 The Relevance of Supply Chain Finance

SCF attempts to optimise financial flows and capital allocation in supply chains with the aim of improving the supply chain performance and stability. SCF comprises a wide range of financial instruments and techniques that supply chain partners can utilise to accomplish this goal. This means that SCF plays a crucial role in today's economy and will continue to do so in tomorrow's economy. Here, we show the significance of SCF by looking at the instrumental role it can play at all levels of the economy, ranging from the micro to the macro level.

2.1 Micro level: SCF can make a difference for individual businesses

Since the start of the financial crisis, most companies have made net working capital² (NWC) management a key priority. The scarcity of cash reduced the available options for companies to obtain capital. Simultaneously, demand volatility increased, which demanded greater investments in safety stock and holding more precautionary cash (Pezza, 2011). For many corporations, balancing operational performance and financial resilience became a challenge, which caused these organisations to start looking at their suppliers. However, the imbalance of negotiation power in most supply chains led to a skewed distribution of benefits, whereby large buyers were able to extend payment terms to their supplier without any compensation (e.g. Strom, 2015). Such a unilateral adjustment to payment terms, however, leads to a sudden increase in the NWC requirements of these suppliers, which for the most part fall in the SME³ category.

At the same time, it has become harder for this large group of companies to get their increased financing needs met. Due to higher perceived risk caused by factors such as informational asymmetry, asset structure and management experience, banks have traditionally been less eager to grant loans to SMEs. Since the credit crunch of 2008, however, banks have become even more reluctant to grant SMEs loans mainly due to stricter BASEL regulations (Angelkort & Stuwe, 2011). If suppliers manage to attain additional credit lines with banks,⁴ these are usually against much higher interest rates (OECD, 2009). Furthermore, these companies typically only can get part of their NWC needs financed due to the limited risks that financial institutions are willing to take.

2) In section 4.1.1 we describe the meaning and importance of net working capital to businesses in more detail.

3) We follow the EU definition of 2005 that classifies small and medium enterprises (SMEs) as \leq EUR 50 million revenue and $<$ 250 FTE.

4) In fact, research suggests that many SMEs had to reduce their internal savings as they were forced by banks to reduce their exposure (Snijder, 2013)

This issue has been exacerbated by the fact that the majority of invoices are being paid significantly later than the agreed payment term: research among 2712 western European companies shows that, on average, invoice payments are overdue by 21 days (ATRADIUS, 2015). This results in an additional burden on the supplier's NWC requirements, and increases cost and risk due to extra administrative efforts and uncertainty of payment.⁵

Taken together, these dynamics caused great trouble for many SMEs that sell to larger buyers. Many countries reached a record level of bankruptcies between 2009 and 2013, and although the general trend is toward improvement, for most of these countries it is still higher than before the start of the crisis (OECD, 2009 and TRADING ECONOMICS, 2015). It is estimated that one in four bankruptcies is caused by late payments (Vucheva, 2009) and data suggest that many normally viable businesses have gone into bankruptcy unnecessarily because of their lack of working capital (OECD, 2009). A recent study shows that due to late payments 49% of companies are suffering a liquidity squeeze and for 40% of companies it prohibits growth (Intrum Justitia, 2015).

Many examples are available of SCF arrangements, facilitated by creditworthy buyers that prevented the insolvency of SME suppliers (see box with Wal-Mart example).

Wal-Mart, an early adopter of SCF

In 2009, American multinational retail corporation Wal-Mart implemented the SCF solution of reverse factoring to improve the stability of the supply of merchandise. By leveraging its AA credit rating, it offered about 1,000 suppliers the opportunity to receive payment for their orders in as little as 10 to 15 days within its receipts of goods for a much lower cost of capital than they normally would. Compared to the more typical 60 to 90 days, this meant a more than 75% reduction in DSO for the suppliers (O'Connell, 2009).

2.2 Meso level: the impact of SCF for the total supply chain

Although the extension of payment terms by focal companies leads to a direct NWC reduction for these big buyers, this short-term financial benefit frequently backfires on them by creating a less stable supply chain. Many corporates that adopted a 'squeeze' strategy to trade credit (Seifert, 2010), discover that dictating payment term extensions to more vulnerable suppliers usually worsens the inter-organisational relationship. Research clearly demonstrates that strong buyer-supplier relationships, characterised by factors such as trust, information sharing, interdependence and commitment, lead to higher perfor-

5) Note that there is a similar effect at the physical supply chain: poorly integrated supply chains tend to have much inventory concentrated at organisational boundaries (McKinnon, 2001). These inefficiencies are caused by uncertainty about the behaviour of suppliers and customers.

mance, lower cost and greater buyer satisfaction (e.g. Mohr & Spekman, 1994, Johnston, McCutcheon, Stuart, & Kerwood, 2004, Li, Ragu-Nathan, Ragu-Nathan, & Subba Rao, 2006). In fact, the practice to unilaterally increase payment terms to suppliers is in conflict with the tendency among corporates to seek to improve collaborative partnerships in their supply base as they consider strategic supplier engagement a competitive advantage (e.g. Carter et al., 2007, (O'Marah, John, Blake, & Manenti, 2014).

Besides the worsened inter-organisational partnership, there are several other factors that need consideration on a supply chain level: the short-term positive effects may boomerang back on them by triggering serious supply chain risks.

A recent European study indicates that 32% of companies report that late payments are a threat to their long-term survival (ATRADIUS, 2015). Another study found that late payment put 23% of UK companies on the verge of closure (Tungsten, 2015). These figures show that a single-organisational focus on NWC is likely to increase the supply disruption risk for buyers. Experience teaches us that if this risk materialises, it can have serious financial impact: if the supplier ceases operations, the buyer incurs the cost of switching to another supplier. In many cases, however, buyers need to offer financial support to prevent the supplier's bankruptcy. An example from the automotive industry shows that the near bankruptcy of strategic suppliers can be very costly:⁶ in 2005,

Ford had to subsidise its component supplier Visteon because the latter was considering filing for bankruptcy. The total investment required for the restructuring of this strategic supplier amounted to more than \$1.6 billion (Babich, 2010).

But even if suppliers are not faced with a direct risk of bankruptcy, they need to have sufficient cash on hand in order to maintain a high level of service and quality in the supply chain. A lack of liquidity for certain supply chain partners may thus result in less than optimal supply chain performance. In a survey carried out during the financial crisis, 13% of companies said that the deterioration of their key suppliers' financial standing had caused supply chain disruptions (AberdeenGroup, 2008).

Furthermore, since 40% of companies report that late payment terms lead to increased costs (Intrum Justitia, 2015), it is likely that this will be reflected in product cost prices (COGS⁷), which will affect the competitiveness of the supply chain.

Last but not least, limited access to liquidity for suppliers, logically results in diminished innovation potential. This is likely to be a serious threat to long-term supply chain distinctiveness and may thus erode customer value.

6) Weiss (1990) shows that reorganisation cost of a bankruptcy or near bankruptcy can be more than 60% of the market value of the supplier's equity.

7) Cost of goods sold.

Summarising, taking a single-firm approach⁸ to optimizing working capital can worsen relationships, increase risks and financial costs, and reduce performance and customer value in the supply chain. In other words, a collaborative approach to optimising inter-organisational financial flows is likely to vastly improve total supply chain competitiveness and hence can create win-win situations for all stakeholders (Randall & Farris, 2009, and Walters, 2004). Two examples of corporations leveraging SCF arrangements from a supply chain strategy perspective are shown in the boxes below.

Caterpillar uses SCF to prevent supply shortages

Due to a foreseeable sudden increase in demand, the world's leading manufacturer of construction equipment – Caterpillar – expected bottlenecks and shortages in its supply chain due to many of its suppliers lacking liquidity. The fact that suppliers had reduced their inventories due to the credit crunch amplified this effect as they now suddenly had to rebuild these stocks (the 'bullwhip' effect). To prevent this major supply risk, in 2010 Caterpillar introduced an SCF scheme (Aeppel 2010, King 2012).

Intel takes minority interest in ASML to accelerate innovation

In 2012, chip producer Intel agreed to take a 15% ownership in shares in Dutch chip-equipment maker ASML. Through this investment in equity, costing US\$ 4.1 billion, plus another €800 million in cash, Intel expects to profit from faster availability of state-of-the-art manufacturing technology. This is a collaboration with Samsung and TSMC, which together agree to fund ASML's R&D in order to speed up the development of a costly, advanced chip making technique that will make semiconductors smaller and more powerful within two years (King & Rahn, 2012).

2.3 Macro level: the role that SCF can play for the national and global economy

Based on the analysis so far, it is easy to see that the way financial flows and capital allocation supply chains are managed can have a serious impact on the economy as a whole, on both a national and on a global scale. Here, we evaluate this influence from a triple bottom line (3BL) perspective, looking at financial, social and environmental factors, respectively.

8) I.e. focused only on the interest of the focal company.

2.3.1 Profit/prosperity

There is no question that SMEs play a significant role in the world's economy: they account for over 95% of the companies within the OECD and are responsible for 60%–70% of all jobs that are created (OECD, 2012). In high-income countries, the contribution of SMEs to GDP is over 51% (Edinburg Group, 2014). In China, the world's second largest economy, SMEs play an even more important role. Research shows that 99% of all Chinese firms are SMEs, responsible for 60% of the country's GDP; 70% of all jobs; 65% of patents filed; 60% of total export volume and 50% of tax revenues (Perkowski, 2012). It is evident that if this 'engine of growth' (Degryse, de Goeij and Kappert, 2012) lacks liquidity, it affects whole economies and impacts their vital indicators, such as unemployment rates. The European Commission estimates that 25% of insolvencies in the EU are due to late payments, which eventually leads to the loss of 450,000 jobs per year (Vucheva, 2009). On the flip side, one in three European businesses (of which there are 8 million) states that earlier payment of invoices would enable them to hire new personnel (Intrum Justitia, 2015).

As liquidity is required for investments and innovation, a lack of it clearly puts a brake on economic growth. If we can find ways to release liquidity that is currently unnecessarily locked up in supply chains' NWC, this will not only reduce unemployment rates, but also give a positive impulse to economies. Economists claim that technical innovation has been the most important component of long-term economic growth (e.g. Grossman & Helpman, 1994). Needless to say, such innovative activities require significant investments in time, materials and knowledge. The availability of additional cash in businesses enables such investments and hence facilitates the increase of a country's prosperity.

2.3.2 People

As more and more businesses have started sourcing their products from low-cost countries, the question arises how this can be done in a way that is fair and favourable toward labourers and their communities. Access to adequate and timely financial resources has proven a vital ingredient to increase incomes for small suppliers. However, for small producers in early-transition countries such funding is problematic to obtain: SMEs label limited access to finance as their topmost obstacle to growth and investment (OECD, 2004⁹). In particular, for millions of small rural producers, many of them active in agriculture, funding is practically impossible to get. Most regular banks and microfinance institutions avoid this type of finance as they are perceived as extremely risky and costly, due to a lack of physical collateral, political instability and covariant risk¹⁰ (KIT & IIRR, 2010). This means that we need to find new ways to get liquidity more upstream in these supply chains.

In order to improve conditions for producers in early-development countries, inventive financial schemes and services are needed that typically require support from other, more creditworthy partners in the supply chain.

⁹ This same report identifies SME development as a key instrument in poverty reduction efforts.

¹⁰ In the case of a drought or disease, many farmers will be unable to repay their loans.

SCF and sustainability – Unilever & Levi Strauss

SCF can play a crucial role in the implementation of a sustainability strategy. Unilever, for example, has supported independent tea suppliers by ensuring Kenyan financial institutions offer funding to these supply chain partners at Unilever rates. This has not only improved the economic condition of these suppliers, but has also reduced the need for these suppliers to push inventories upstream or downstream and has thus reduced the total working capital requirement in the whole supply chain by an estimated \$2 billion (Reason, 2005).

Another example is Levi Strauss & Co who rewards sustainable suppliers by providing them access to lower-cost credit. This cheaper capital is offered to 550 suppliers, located in countries like China and Bangladesh, if they abide by higher environmental, labour and safety standards. This is an effort by Levi Strauss tries to meet the demands of contemporary customers that want fashion manufactured in a social responsible way, and at the same time build stronger relationships with its suppliers (Donnan, 2014).

2.3.3 Planet

The industrial revolution, which started roughly 250 years ago, marked a major turning point in our history, as it heralded the start of new era of unparalleled economic growth. This transformation resulted in unprecedentedly high levels of productivity, consumption and living standards. However, its success has been based on a linear 'take, make and dispose' mode of production. It has become generally acknowledged that this approach is not sustainable due to resource exhaustion and environmental impact. This means increasing complexity for contemporary businesses: it is becoming harder to acquire resources and raw materials, while at the same time consumers expect 'greener' products. However, efforts in this direction are rewarded: a study among 180 US companies shows that high sustainability companies significantly outperform their counterparts over the long-term, in terms of both stock market and accounting performance (Eccless et al., 2014. See also e.g. McKinsey report: Bonini, S., & Swartz, S. 2014).

These new challenges require a completely new economic approach in which growth is decoupled from resource consumption. The circular economy concept (Ellen McArthur Foundation, 2013) combines revenue with positive environmental impact. This means a switch from the linear approach towards a 'reduce, reuse and recycle' mentality. Such a closed-loop production tactic is restorative and regenerative by design. This means a complete paradigm shift is needed in the minds of both consumers and producers. In this new economy, consumers no longer buy products that are made from virgin materials and throw them away after using them for some time. Rather, products are designed according to a cradle-to-cradle design. This means that product lifecycle is extended and materials continuously flow in cycles, based on principles like reuse, repair, refurbish and recycle. Furthermore, consumption is based on accessibility and performance instead of ownership. Thus, 'buy and own' transactions will be replaced by 'pay for use' agreements.

In order to facilitate such a transition, innovative collaborative financing solutions will be required (Hieminga, 2015). Such solutions need to be adjusted to completely transformed supply chains (or should we say supply 'circles'?) where financial collaboration and symbiotic relationships have become the standard and existing cash flow models are no longer valid.

By now, it should be clear that SCF can play a significant role at all levels of the economy. SCF offers financial tools that enable the release of a supplier's NWC in a way that is acceptable (and usually very attractive) to buyers. Furthermore, SCF supports the development of stronger and more innovative supply chains by facilitating investments that less credit-worthy businesses could otherwise never make. Finally, SCF solutions have the potential to accelerate sustainable economic growth in both developed and early-transition countries.

2.4 Governments initiatives to support SCF

As they see the potential value of SCF, governments of different nations have started initiatives to facilitate the adoption and utilisation of SCF. A remarkable illustration is the Cadenas Productivas initiative that was supported by the Mexican government (see case box opposite page). Another examples is the UK government that launched an SCF scheme expecting to release £20 billion in funding more quickly (Prime Minister's Office, 2012). Corporates like BP, Tesco, Vodafone, and GlaxoSmithKline have committed themselves to the programme. In 2014, the US started the SupplierPay Initiative (The White House, 2014), with companies like Apple, Johnson & Johnson and Coca Cola. In the same year, the Dutch government launched the BetaalMeNu (PayMeNow) initiative with the mission to generate €2.5 billion in additional liquidity for Dutch SMEs (Kamp, 2014). By now, a prominent group of corporates like Heineken, Jumbo, Friesland Campina and Randstad have committed themselves to the initiative (Verbeek, 2015).

The theme of SCF is also directly linked to the initiatives and ambitions of the Dutch government in the logistics Topsector as stated in Logistiek Topteam (2011): 'In 2020 the Netherlands will have a leading international position (1) in the transaction of shipments, (2) as a coordinator of (inter)national logistics activities and (3) as an innovative land with establishment potential for shippers and logistics business.' SCF has been defined as one of the six strategic roadmaps in this program. It is the belief that a strong knowledge base in SCF will help to enhance the country's position as a logistics world centre, attract new industries from abroad and create new employment. A wide variety of research programs were developed involving large corporates such as Heineken, Philips and Unilever. Most recently, in 2015 a new research initiative was announced focused on developing financial services for Logistics Service Providers.

Mexican SCF program by Nafin provides funding for 80,000 SMEs

Although 99% of registered Mexican firms are SMEs, almost 80% of these firms could not get any bank credit (Klapper, 2006). To turn the tide, local development bank Nafin (Nacional Financiera) created an online system in 2001 called Cadenas Productivas (Productive Chains) to provide affordable funding to SMEs that is based on the funding cost of their large, credit worthy buyers. (De la Torre, Gozzi, & Schmukler, 2007). After the supplier delivered their product with accompanying invoice to a participating large buyer, this buyer uploads the invoice data as a 'negotiable document' on the platform. Based on this document, financial institutions that joined the platform are invited to post their interest quote for this document at a maximum of 4% above the interbank rate (Cusmano, 2015). With this unique internet based platform, Nafin operates as a broker in approved invoices, allowing multiple banks and other lenders to compete for the supplier's guaranteed receivables. In addition to facilitating this relatively cheap funding, Nafin provides financial training as well as legal and technical assistance and covers all associated cost. The program became a great success as more than 455 large buyers signed up for the program, allowing over USD 60 billion in financing for over 80,000 SMEs (IFC, 2010), offered by 20 domestic lenders. The Mexican government has facilitated this program by providing the technology (e-government model that provides quicker and cheaper services) and legislation. Following the Mexican example, development banks of several other Latin American countries are considering replication of the program in their country (de La Torre, et al., 2007).

3 Definition and Scope of SCF

As a relatively new field of research, one could argue that SCF is still in its adolescence, both literally and figuratively.¹¹ In line with this analogy, in recent years, SCF experienced a growth spurt in the development: much valuable data has become available from the widespread implementation and use of SCF tools and significant contributions have been made to theory. However, as a field of research SCF has not yet reached maturity. Although there is now much more clarity on concepts and applications, the exact definition and boundaries of the discipline are still evolving.¹²

This does, however, not mean that principles of SCF have never been applied before in history. Long before the name SCF was first used, people realised that collaboration between buyers and sellers regarding finance could be beneficial for all parties involved.

In this section, we will provide a brief overview of the history and main developments that are relevant to SCF.

3.1 A brief history of SCF

The concept of financial arrangements between the various members of a supply chain in order to guarantee and/or increase future cash flows is not new. For example, in Babylonia back in the 6th century BC, tenants received not only the seed grain from the field owner, but also a pair of oxen to ensure a satisfactory yield (Dandamaev et al., 2004). Later, during the industrial revolution, buyers utilised advance payments to safeguard production capacity at small colonial manufacturers (see e.g. the case of Bengal silk weavers in Ray, 2011).

In the early 1970s, Fiat introduced a new arrangement with its suppliers. The Italian automaker discovered that by promising to approve supplier's invoices much earlier, it could negotiate better margins with them. Suppliers used this quick formal approval to get cheaper finance (Rousselot & Verdié, 2011). This idea was in fact an early form of what we today call reverse factoring (RF)¹³.

Although, this new idea originally attracted only little interest from other businesses, it was taken up in Spain 20 year later, where it was called 'confirming'. Banco Santander has offered an RF solution since 1991 (de Graaf, 2012). The popularity of RF in other countries started to grow when the economic tide turned at the beginning of the 21st century. When the crisis hit, it induced an urgent need for to improve NWC in an appropriate way. Together with the rapid development of technology (such as SaaS), this caused an upsurge in the adoption of RF¹⁴.

11) The term 'supply chain finance' came into use only in the early 2000s (the earliest mention of the term we found is from Hartley-Urquhart (2000) who registered a patent for reverse factoring).

12) See e.g. Bryant & Camerinelli, 2014.

13) See section 6.1 for more details on reverse factoring.

14) See section 9.1 on the adoption of RF.

Not surprisingly, this trend went hand in hand with an increasing interest in the field of SCF on the part of both practitioners and academics. The term SCF was first used in an academic article by Stemmler and Seuring (2003) to raise awareness that considerable cost savings can be achieved if financial flows in supply chains are optimally designed. Initially, the academic world was slow to pick up the topic. However, as of 2008, interest began to increase rapidly¹⁵.

3.2 Trends in business finance and supply chain management

It is not uncommon for a field of interest to have several differing definitions and for these definitions to evolve over time. Mentzer et al. (2001) wrote about supply chain management: 'Despite the popularity of the term supply chain management, both in academia and practice, there remains considerable confusion as to its meaning.' The same can be said about SCF: we found more than 20 different definitions of SCF (in both academic and business articles). These definitions can differ in several areas, which are shown in table 3-1. The aspects that are relevant to the definition of SCF are: type of arrangements (which type of instruments are included?), objects (what balance sheet items are in scope?), technology focus (is there a strict requirement on the use of technology?), echelons (is the scope limited to direct suppliers only or are multiple tiers included?), collaboration (is cooperation with other primary supply chain members required?), purpose (does the definition include a clear objective for SCF?). Adjacent to one end of the spectrum, we find, for example, definitions that are clearly limited to one instrument (RF), that must be offered on a technological platform¹⁶. Also definitions that lack a well-defined purpose or clear requirement on collaboration are found on this side of the spectrum. At the other end of the spectrum¹⁷, we find definitions that have an integral scope, incorporating all types of arrangements that enable the financing of all types of balance sheet objects (including equity and fixed assets). The definition we present in this paper is in the latter category (the right side-hand of the table), providing an integral scope, with clear requirement for supply chain collaboration and a comprehensive purpose.

In order to justify why we opt for the 'integral/extensive' end of the spectrum for our definition, we first look at the development of two disciplines that underlie SCF, namely corporate finance and supply chain management (SCM).

15) To illustrate: 94 of 100 academic articles about SCF we found were published after 2007. Liu et al. (2015) report similar findings for China 89.5% of 151 Chinese articles on SCF were published in or after 2008.

16) For example, Wuttke, et al (2013) who define SCF as: 'An automated solution that enables buying firms to use reverse factoring with their entire supplier base, often providing flexibility and transparency of the payment process.'

17) For example, Zhang, et al . (2008): 'Supply chain finance refers to the set of solutions available for financing the specific goods and/or products as they move from origin to destination along the supply chain'.

Scope aspects	Narrow scope	↔	Integral scope
Type of arrangements	One type only (e.g. RF)	↔	Whole spectrum of arrangements
Objects	One object only (e.g. accounts payable)	↔	Entire balance sheet (NWC + fixed assets + equity)
Technology focus	Restricted to certain technology (e.g. RF Platform)	↔	Not technology-restricted
Echelons	Single company (e.g. agreement only with a bank)	↔	Complete supply chain (including tier 1, tier 2, etc.)
Purpose & cooperation	None	↔	
Collaboration	No clear requirement	↔	Collaborative relationships
Purpose	No clear purpose	↔	Value, risk mitigation, financial performance

Table 3-1. Different perspectives on SCF and their relation to scope.

3.2.1 Corporate finance

Corporate finance looks at the financial decisions that a corporation makes with the purpose of increasing the firm's value. Essentially, these decisions answer two questions: what investments should the corporation make (management of real assets) and how should it pay for those investments (management of financial assets) (Brealey et al., 2014)?

firm's value. Essentially, these decisions answer two questions: what investments should the corporation make (management of real assets) and how should it pay for those investments (management of financial assets) (Brealey et al., 2014)?

As the name implies, classic corporate finance activities are designed for single businesses or their subunits (Hofmann, 2005). However, two interesting trends are visible.

The first trend is in the role of the CFO, which is shifting away from a more traditional role to a business partnering relationship (EY, 2015). The CFO's role is traditionally seen as a gatekeeper to investments and resource allocation. The CFO sets budgets, determines appropriate returns on investments, etc. However, investments in the supply chain are typically among the largest and most essential that any business makes. Therefore, CFOs of top-performing companies tend to be much more involved in SCM and build stronger relationships with heads of supply chain¹⁸. In order to stay competitive, CFOs and heads of supply chain need to have strong mutual understanding of key risks and opportunities and a high level of agreement on objectives and key priorities.

18) As Iacono (2011) says: 'it is important that both operational and financial managers become bilingual and understand each other's business considerations'. He argues that models like EVA (Stern, Stewart, & Chew, 1995) could help bridge the gap between the two worlds.

The increased focus on NWC has triggered a second trend.¹⁹ As mentioned, the recent credit crunch caused NWC reduction to become a major priority for most CFOs. NWC optimisation has often been realised in three phases:²⁰

1. Company internal focus. Inventory levels are reduced by implementing advance planning & scheduling (APS) tools and adopting principles like JIT, LEAN, etc. Internal processes like purchase to pay and order to cash are optimised.
2. Company interface focus. Payment terms towards suppliers are extended/harmonised. Also vendor/ supplier managed inventory, where the supplier/manufacturer assumes responsibility of the inventory replenishment at the buyer's site, becomes more popular (for example, Pohlen & Goldsby, 2003).
3. Supply chain focus. As discussed, the extension of payment terms towards suppliers often has negative side effects such as worsened relationships, negative publicity and increase supply risk. Therefore, in this phase companies realise they need to look for solutions that improve the company's NWC without weakening the supply chain.

This trend is extending even further as financial optimisation is now realised not only by collaboration between a buyer and its direct supplier, but also by going further upstream in the supply chain (supplier of the supplier) (see Steeman, 2014).

These two trends have caused most CFOs to move away from a single business focus and take a supply chain focus on finance. This means that investment and financing decision are no longer taken in isolation by one firm, but rather in collaboration with supply chain partners (Steeman, 2015).

3.2.2 Supply chain management

A driving force behind SCM is the recognition that sub-optimisation occurs if each organisation in the supply chain attempts to optimise its own results rather than integrate its goals and activities with other organisations to optimise the results of the chain.

In SCM also two trends are visible: a process of logistical integration and the involvement of all business functions in SCM.

The scope of logistics has always been the complete supply chain, from point of origin to point of consumption (Cooper et al., 1997). However, it took several stages for it to widen its scope from finished product distribution to end-to-end supply chain. McKinnon (2001) distinguishes four stages of this process, starting in the 1960s.

19) Note that working capital management is a multi-disciplinary practice and as such requires the finance department to work more closely with other internal functions.

20) The concept is similar to Frohlich and Westbrook (2011) who identify multiple phases of supply chain integration strategy, including 'inward-facing', 'periphery-facing' and finally 'outward-facing'. They found that 40% of 322 investigated manufacturers fall in the 'periphery-facing' group. For that reason, they argue that this phase could be the 'equilibrium point', from which companies may continue to evolve to a more outward-facing strategy.

The first three stages were concerned with internal integration: the integration of transport and warehousing into a single outbound function (1960s), the integration of outbound and inbound into one logistics department (1970s), and the improved coordination between logistics and other functions (1990s). Over the past 20 years, companies have sought to coordinate and optimise material flows between supply chain members in order to minimise stock levels and lead times. Clearly, IT was one of the most important enablers of this process. The introduction of enterprise resource planning (ERP) systems in the 1990s enabled companies to truly integrate different functions within one organisation. Although interfaces between the ERP systems of different suppliers and buyers were possible, they usually had limited functionality and required expensive infrastructure. The emergence of the internet and then, at the beginning of the 21st century, cloud-based collaborative systems have facilitated true global SCM.

The second trend is that SCM is no longer limited to logistics, but tries to integrate all departments. Lambert (2008) states: 'Successful management of the supply chain requires the involvement of all of the corporate business functions. A network of companies cannot be managed with fewer functions than are necessary to manage one company.' Or, as Tom Blackstock (2005), vice president of supply chain operations at Coca-Cola North America, puts it: 'Supply chain management is everybody's job.'

SCM is concerned with improving both efficiency (i.e. cost reduction) and effectiveness (i.e. customer service) in order to create customer value and satisfaction (Mentzer et al., 2001). As such, its motivation should be not only be optimisation of the physical flows (logistics) in the supply chain, but also the financial and accompanying information flows.

As Stemmler and Seuring (2003) state: 'Traditional supply chain management focuses on both materials and information flow. However, considerable cost reductions can also be achieved through optimally designed financial flows within the supply chain.' Hieminga (2012) points out that this is exactly what is happening in the development of SCM. He states that there are five distinct phases of supply chain optimisation: logistics, quality, innovation, sustainability, and now finance.

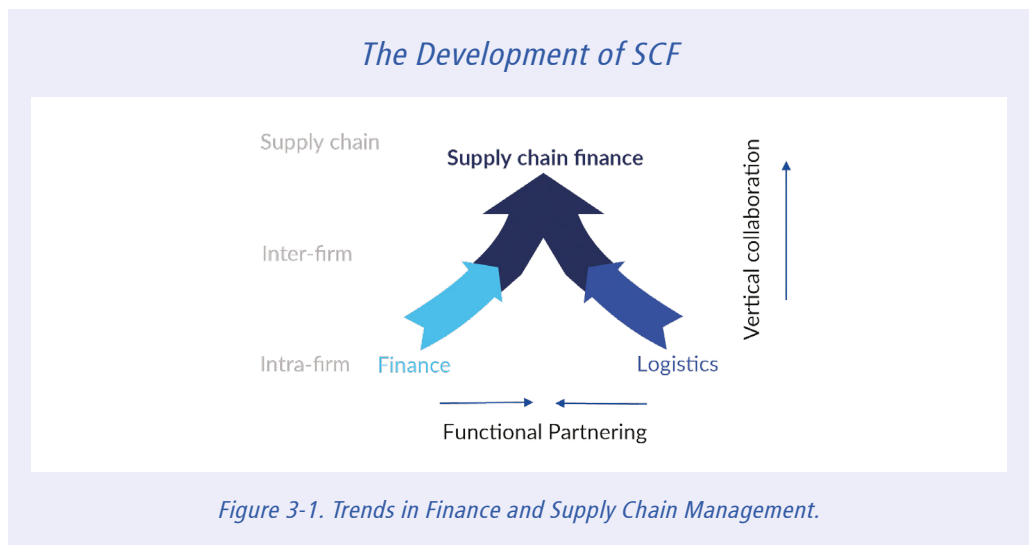
Just as logistics focuses on managing the flow of materials and products from source to consumer (Tyn dal, 1998), one could argue that the focus of SCF should be to manage the supply and demand of money in the chain. This comes very near to Hofmann's (2005) definition of SCF:

'SCF is an approach for two or more organisations in a supply chain, including external service providers, to jointly create value through the means of planning, steering, and controlling the flow of financial resources.'

3.3 Towards a definition of SCF

Figure 3-1 shows the trends we described above:

- Vertical collaboration (vertical axis): both SCM and finance are extending their scope from the organisation interface level to tier 1 supplier level and moving further up the supply chain to tier 2 level, etc.²¹
- Functional partnering (horizontal axis): there is a tendency from corporate finance side to build stronger cross-functional relationships with the supply chain function. At the same time, there is a growing awareness within the supply chain that it needs the finance function in order to be successful.



Following the above reasoning, we come to the following definition:

SCF aims at the optimisation of the flows and allocation of financial resources in a supply chain with the aim to increase value,²² requiring the collaboration of at least two primary supply chain members, possibly facilitated by external service providers. As such, SCF's purpose is to improve supply chain efficiency (financial performance), effectiveness (delivery performance) and sustainability (social performance).

This definition corresponds to the right-hand end of the SCF spectrum as we outlined in table 3-1, and thus leaves room for the whole range of agreements and tools, with a wide range of applications between all parties involved.

21) Financial collaboration is not limited to suppliers (upstream) but can also extend towards customers (downstream). See also section 4.2 on SCF actors.

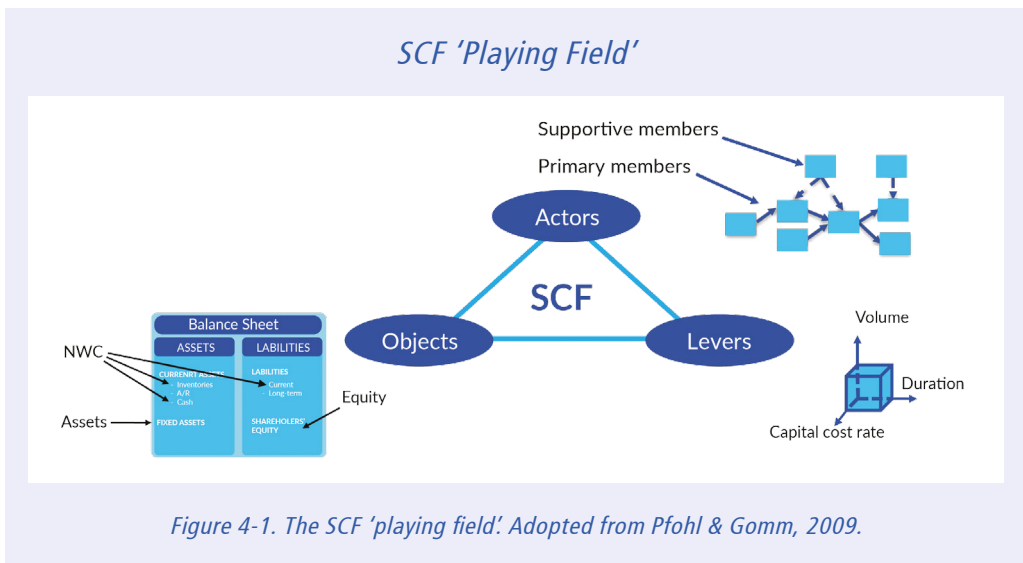
22) Here we mean value in the broadest definition, including profit, people and planet.

4 The 'Playing Field' of SCF

As we saw in the previous section, the SCF definition we presented leaves room for a myriad of solutions and arrangements, based on cooperation by all supply chain members. As such, Steeman's (2014) definition perfectly fits this category of schemes:

'Financial arrangements used in collaboration by at least two supply chain partners and facilitated by the focal company with the aim of improving the overall financial performance and mitigating the overall risks of the supply chain.'

Here, we use the framework of Pfohl and Gomm (2009) as it provides useful insight in the wide variety and different categories of instruments that SCF offers.



4.1 SCF objects

According to Steeman's definition, SCF arrangements are not limited to accounts receivable (A/R) / accounts payable (A/P) financing solutions, such as RF and Dynamic Discounting. They also include other forms of NWC financing, such as collaborative financing, typically facilitated by the most credit-worthy party.

Besides NWC financing, SCF also covers fixed asset financing, such as equipment financing, and equity-based schemes, such as minority interests. In the following section, we come back to these kinds of arrangements. Since NWC has been the focus of most companies that have implemented an SCF solution, we first zoom in on its importance and implications for supply chains.

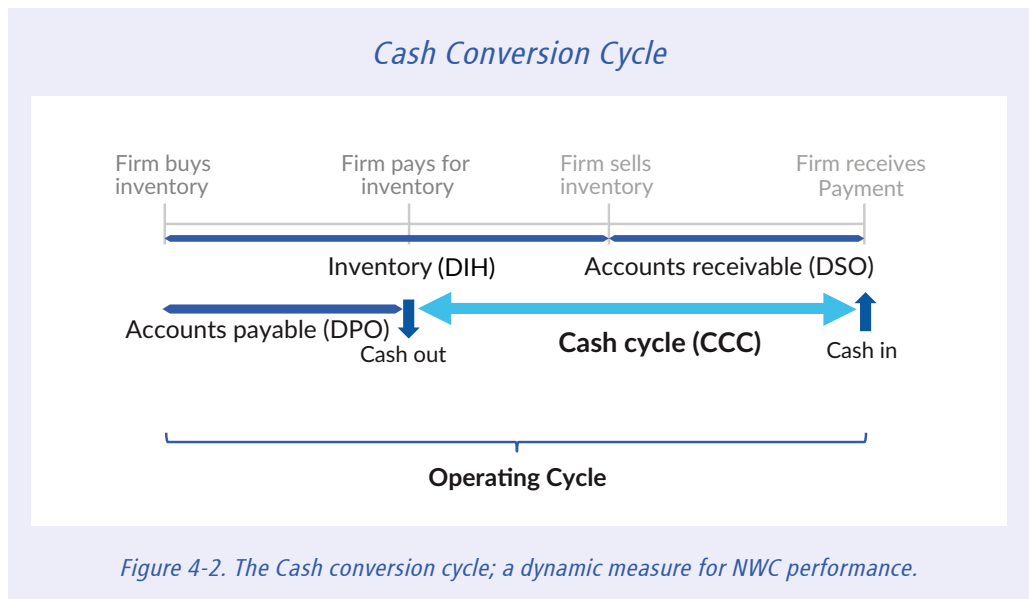
4.1.1 The value of NWC

In order to make a profit, companies need to invest capital in day-to-day operations (i.e. buying, keeping stock, selling, etc.). The cash required for this, NWC,²³ cannot be used for other purposes. On the other hand, any reduction in NWC requirements generates a positive free cash flow that the firm can distribute immediately to shareholders or invest in other projects that create a positive cash flow (Berk & DeMarzo, 2014). Empirical research has convincingly proven that NWC optimisation indeed can improve a firm's value.²⁴ Hence the increased attention it has received from corporate CFOs²⁵ in the recent decades.

Since NWC is a static measure (based on balance sheet analysis), it provides little insight into the time companies need to convert cash into cash again. Therefore, we briefly explain the cash conversion cycle, which is a dynamic measure that is widely used. One other main advantage of the cash conversion cycle is that, irrespective of the size of the firm, it makes comparison between firms easier.

4.1.2 The cash conversion cycle

The cash conversion cycle (CCC²⁶) is a liquidity indicator that takes into account the fact that four basic activities – purchasing, sales, collection and payment – create working capital flows that are non-instantaneous and unsynchronised (Richards & Laughlin, 1980). CCC measures the net average time interval between actual cash expenditures on a firm's purchases and the ultimate recovery of cash receipts from sales of finished products (see figure 4-2), or as Stewart (1995) puts it "the average days required to turn a dollar invested in raw material into a dollar collected from a customer".



23) Net working capital (NWC) is defined as current assets minus current liabilities. Although, its simplest form is also frequently used: $NWC = \text{inventories} + \text{receivables} - \text{accounts payable}$ (see e.g. Aktas et al. 2013).

24) E.g. Aktas et al, 2014, Banos, 2014, Engvist, 2014, and Hennink 2015.

25) As already mentioned several times before, the credit crunch accelerated this rise in attention. Nevertheless, theory and practice clearly show that working capital management can always be lucrative, also in economic upturn situations.

26) Also called 'cash-to-cash cycle' (C2C Cycle) or 'Cash Cycle'.

The CCC consist of three fractions, namely days sales outstanding (DSO), days inventory held (DIH)²⁷ and days payables outstanding (DPO). Below table shows how these are computed (Camerinelli, 2013).

Measure	Meaning	Calculation
Days sales outstanding (DSO)	The average number of days that it takes for a company to receive payments from	$365 \times \text{accounts receivables/net sales}$
Days inventory held (DIH ²⁷)	The sum of the average periods that a firm keeps inventory of raw materials (RM), work-in-progress (WIP) and finished goods (FG)	$365 \times \text{average inventory/cost of goods sold}$
Days payable outstanding (DPO)	The average number of days that the company waits to pay its suppliers	$365 \times \text{accounts payable/cost of goods sold}$

The CCC can now be simply calculated as follows:

$$CCC = DSO + DIH - DPO$$

This simple formula shows that from a single-firm perspective, working capital optimisation implies reducing DIH, reducing DSO or increasing DPO (Randall & Farris, 2010). Hofmann and Kotzab (2010) demonstrate that focal companies, that take a single-firm perspective, use their bargaining power to increase payment terms toward their smaller suppliers and/or decrease payment terms of smaller customers. After all, this is a quick way to decrease their own CCC and thus release liquidity that is locked up in working capital.

4.1.3 The collaborative cash cycle

However, looking at the CCC from a supply chain perspective shows that extending DPOs towards suppliers that have a lower creditworthiness and often problematic access to capital is ‘absurd’ (Hofmann & Kotzab, 2010). As cost of capital is not equal for companies that differ in creditworthiness, a change in payment terms is a non-zero sum game (Randall & Farris, 2009), meaning that the loss of one participant (namely, the supplier) is bigger than the gain of the other participant (in this case the focal company). Figure 4-3 illustrates this by showing the effect of extending the CCC of a supplier with a high capital cost: although it reduces the capital cost of one individual company (namely, the credit-worthy buyer), it increases the total capital cost in the supply chain. By taking a network perspective, it is possible to determine an optimal combination of member CCCs that outperforms a single-company perspective by leveraging the differences in capital cost between members in the chain.

27) Also called days inventory outstanding (DIO) or days in inventory (DII). Although the acronym DIO is used most frequently, we follow the practice of Hoffman & Kotzab (2010) who refer to it as DIH, as we think it more appropriately reflects the nature of the measure (the time the inventory is ‘held’ rather than outstanding [‘unpaid’]).

Supply Chain Cash Cycle

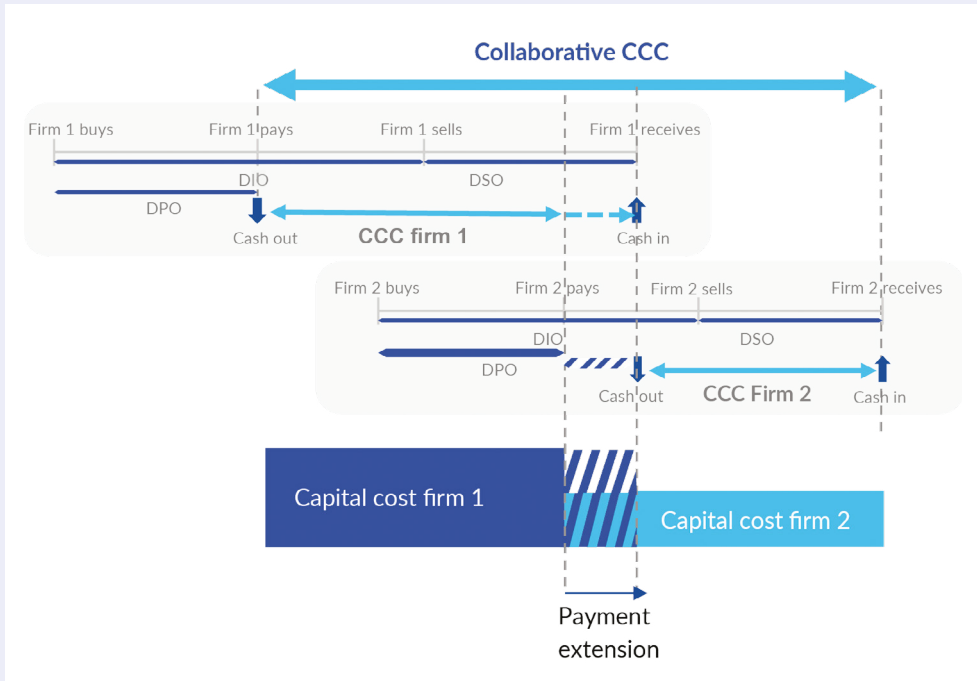


Figure 4-3. The impact of a payment term extension from a supply chain CCC perspective.

4.2 SCF actors

In the definition presented above, an essential requirement for SCF is collaboration. In our view, a financial agreement only falls under the 'umbrella' of SCF if at least two primary supply chain members cooperate. To clarify this, we will first take a brief look at the anatomy of a typical supply chain.

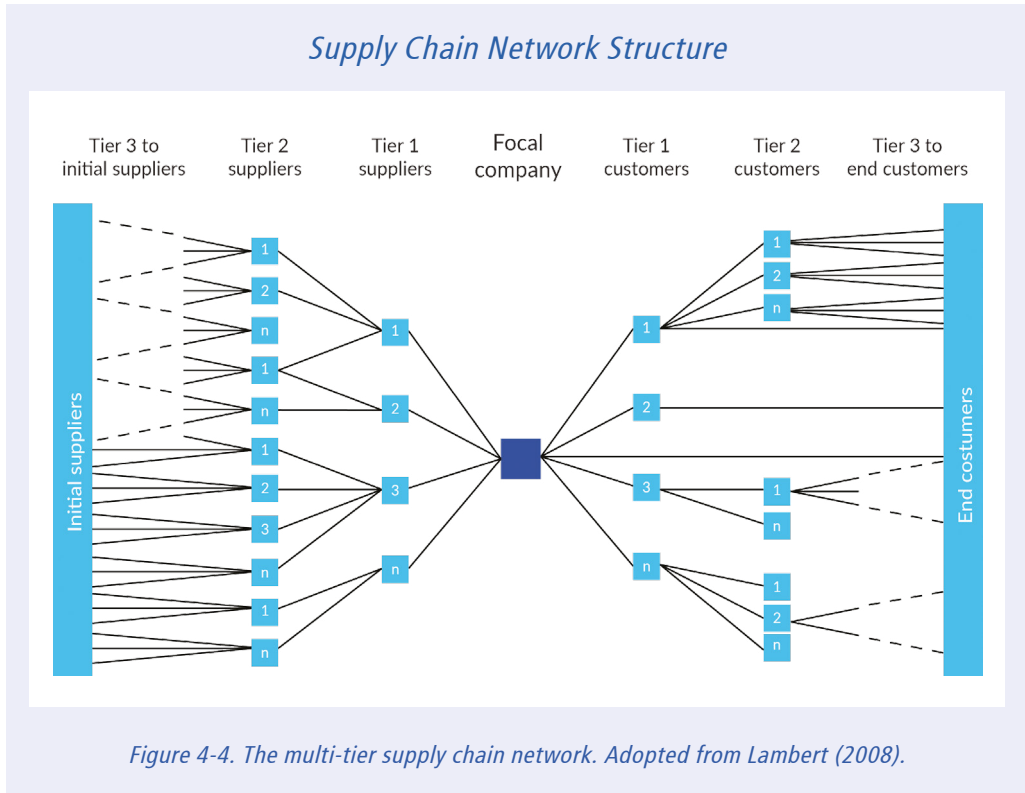
Although, the expression supply chain suggests a string of organisations with direct one-to-one relationships, in reality it is a whole network of organisations that interact directly or indirectly with the focal company²⁸ (Lambert et al., 1998). After all, most companies do not have one, but multiple direct suppliers and customers (the 'horizontal structure'²⁹). Furthermore, direct (tier 1) suppliers have their own suppliers (tier 2 or indirect suppliers³⁰), who in turn have their suppliers (tier 3), etc. (the 'vertical structure'). In other words, the network of supply chain members covers the complete end-to-end supply chain, from point of origin to the point of consumption (see Figure 4-4).

28) Some academics and practitioners have adjusted their jargon in line with this reality (e.g. Procter & Gamble has a 'Supply Networks Operations' function).

29) Lambert et al. (1998) use these terms reversely, but we think this is not coherent with general terminology like 'vertical integration' (e.g. the acquisition of a supplier) and 'horizontal cooperation' (such as a strategic alliance).

30) Note that a direct supplier can simultaneously be an indirect supplier.

This supply network consists of two categories of organisations: primary members and supportive members. By primary members, we mean the focal company and all its direct and indirect suppliers and buyers³¹. Besides these 'genuine' supply chain members, there are supporting members³², such as LSPs or financial service providers³³, that provide services, knowledge, assets, etc.



When we state that the cooperation of at least two primary supply chain members is required for SCF, this means for example that an investment grade focal company³⁴ can leverage its creditworthiness to help a direct supplier to get cheaper financing.

However, this collaboration is not limited to tier 1 suppliers, but can span multiple echelons in the supply chain. This can, for example, mean that a focal company facilitates the financing of commodity inventory at a tier 2 supplier (see e.g. Heineken case in SCM, 2014).

31) Lambert (2001) defines primary supply chain members as: 'all those autonomous companies or strategic business units who carry out value-adding activities (operational and/or managerial) in the business processes designed to produce a specific output for a particular customer or market'. Mentzer et al. (2001) calls this the extended supply chain.

32) Mentzer et al. (2001) calls the primary and supportive members together the ultimate supply chain.

33) See also Pfohl & Gomm, 2009.

34) Usually when we refer to a 'focal company', we mean the company with the strongest credit rating in the supply chain. Note however, that a company may be part of different supply chains with different focal companies. Furthermore, a focal company does not necessary need to be part of a SCF arrangement. It can also be between, for example, multiple suppliers.

Furthermore, SCF solutions are not limited to the supplier side of the supply chain ('upstream SCF'). A focal company can also extend its support to its customers ('downstream SCF', usually referred to as vendor financing,³⁵ distributor finance³⁶ or distribution finance³⁷). A form of vendor financing that is especially popular among producers of capital-intensive goods, such as automobile and agriculture equipment manufacturers, is the offering of long-term financing to customers by the company itself or, through a captive financing vehicle (Brennan et al., 1988, van der Vliet, 2015).

At the same time however, based on this requirement, many classical financing tools are not in scope of SCF. Although useful in certain situations, classical tools like 'traditional' factoring (the selling of receivables without any guarantee from the buyer)³⁸ or asset based lending that is secured by nothing else than the borrower's own collateral cannot be classified as SCF as it does not require collaboration between primary supply chain members. Although at least two primary supply chain members are required for SCF instruments, this does not mean that supporting supply chain members do not play any role. In fact, usually, at least one supporting member is involved. This can be a financial service provider (e.g. a bank) or an SCF solution provider that provides an SCF platform to support the daily processes and transactions of the SCF agreement. However, also more unusual combinations are possible, such as a LSP that not only provides logistical services, but also financial services, such as inventory financing (see e.g. Hofmann, 2009).

Chinese SCF

A recent publication by Liu et al. (2015), shows that the topic of SCF has much interest among Chinese academics: Since 2005, more than 150 Chinese academic articles have been published on this topic. The authors conclude however that SCF, as perceived by Chinese academics and practitioners, differs from the SCF view held by mature markets (i.e. the English SCM literature). They identify two main factors that drive this development: the Chinese economy (rapid expansion in a developing economy) and current Chinese banking system (SMEs face serious financing constraints³⁹ and legal restrictions⁴⁰). As thus, the typical SCF solution that is implemented in China revolves around a tri-partite agreement between a bank, an SME and an LSP. In many of these implementations, a strong focal company participates in the arrangement, enabling the SME to assess affordable funding, based on the buyer's creditworthiness⁴¹.

35) See e.g. Brennan et al. (1988).

36) See e.g. Demica (2013).

37) For example, Lamoureux and Evans (2011).

38) In certain cases, so-called 'silent' factoring (EBA, 2014), buyers are not even notified. We note however, that certain forms of factoring require at least some form of collaboration of the buyer (this could for example be the sharing of future order information). An example of factoring that is characterized by strong collaboration is so-called 'captive factoring', where the large buyer offers financial support to its suppliers through its own factoring division. This distinct form of factoring is very popular in Italy, where it covers 26% of the total factoring market (Bickers, 2003).

39) Current policy implies that state-owned organisations benefit from preferential treatment, at the expense of SMEs (Liu et al., 2015).

40) One example is the 'separated operation model', which prohibits organisations to combine logistics and financial services.

41) Examples: Li et al (2012), Leng et al (2015). Ruiyu & Yuxi (2014), Wang et al. (2013).

4.3 SCF levers

Pfohl and Gomm (2009) present the concept of the 'supply chain cube'. Where the dimensions of the cube determine the capital costs. In a formula:

$$\text{capital costs (€)} = \text{Volume (€)} \times \text{duration (years)} \times \text{capital cost rate (\% / year)}$$

Here, volume is the amount that needs to be financed (e.g. total amount of all invoices or the purchase value of a certain piece of equipment). Duration represents the time the financing is necessary (e.g. the payment term in the case of receivables or the economic life span in the case of a machine). Finally, the capital cost rate refers to the cost of financing the object. A study by Padrao & Guedes (2014) points out that almost all existing supply chain performance frameworks assumed the cost of capital as invariable parameter that is not influenced by supply chain decisions.

However, in practice this cost may vary significantly across different members of the supply chain. This differential in rates (the 'credit leverage') forms the basis of most SCF's main optimisation principles and is an important driver of SCF adoption.

The question what capital cost rate should be used (e.g. in case of SCF project evaluation) does not have a straightforward answer. Although several academic papers (e.g. Randall & Farris, 2009 and Hofmann & Kotzab, 2010) advocate using the weighted average cost of capital (WACC), in the SCF context, this does not always represent the actual situation and needs to be determined on a case-by-case basis⁴². For example, if a corporate needs additional cash for an investment with a projected value that exceeds the hurdle rate (e.g. the possibility for a promising M&A), the opportunity cost⁴³ of freed up NWC will be higher than the WACC. For a supplier, on the other hand, the cost of additional funds to finance extended payment terms dictated by its buyer may go up significantly once the required funding exceeds the advance rate on an existing line of credit.

Another complicating factor to determine the capital cost rate is that it is uncommon for supply chain members to share information on their cost of capital. This means that approximations need to be made based on estimated risk and corresponding market interest rate.

4.4 SCF technology

Our definition of SCF abandons the technology requirement as, in our view, although technology may be a great enabler to make processes and information sharing more efficient, it does not define the principles of the agreement. SCF solutions can be technology driven, and will be so more and more. However, this does not always have to be the case. There are multiple examples of SCF schemes in early-transition

42) In fact, as Padrao & Gudes (2014) argue, the WACC itself is a variable that is dependent on certain supply chain decisions.

43) Contemporary books on corporate finance agree that the proper valuation of cost of capital is the best expected net return available for the investor with similar risk (e.g. Berk & Demarzo, 2014).

countries that have been implemented without any IT facilitations. Interestingly, the initial implementations of RF in Spain (called 'confirming') could not benefit from a web-based platform as internet was not yet available on a wide scale. Thus, invoices and approvals were exchanged between participants using facsimile ('fax') transmission.

5 Classification, Implementation and Segmentation

As demonstrated in the previous section, many different arrangements can be utilised in SCF. In this section, we provide a classification of the whole spectrum of SCF instruments. A subset of this spectrum, the operation instruments, will be presented with more detail in subsequent sections (6-8). The second part of this section deals with implementation of SCF and the segmentation of the supplier base that focal companies often utilize for this.

5.1 Classification of SCF solutions

Figure 5-1 – the SCF ‘pyramid’ – shows a classification of the different instruments that are available in SCF. This classification divides them into three echelons.

The operational echelon represents all SCF arrangements that are used to finance NWC⁴⁴. These instruments, which are designed to generate liquidity for daily operations, are the most well-known and most frequently implemented in today’s supply chains. Especially RF and Dynamic Discounting have become very popular. But also inventory finance based on collaboration between buyer and supplier (such as consignment stock) is in this category. In the rest of this section, we provide an overview of the NWC solutions that are available.

The second category includes those arrangements that fall in the tactical echelon. These are SCF instruments that are used to finance fixed real assets. Examples are: a logistics service provider (LSP) that helps a subcontractor finance a new truck (Siebrand, 2015) or a pay-on-production arrangement whereby a supplier owns the machine that a cash-poor manufacturer uses in production (Decker, Paesler, 2004). These instruments will only be suitable for a subset of the supplier base as a medium to long-term relationship needs to be in place.

The third type of SCF instruments are strategic arrangements that are related to equity. Examples are minority interest (see the Intel/ASML case in section 2.2) or joint ventures. These arrangements require C-level involvement as they deal with questions of ownership of supplying / buying companies. Such arrangements are evidently made with only a select number of strategic suppliers.

The last category contains all arrangements that do not fall in the other three categories, such as collaborative insurance and risk sharing schemes.

44) Also called collaborative working capital management (Seifert, 2010).

SCF Classification

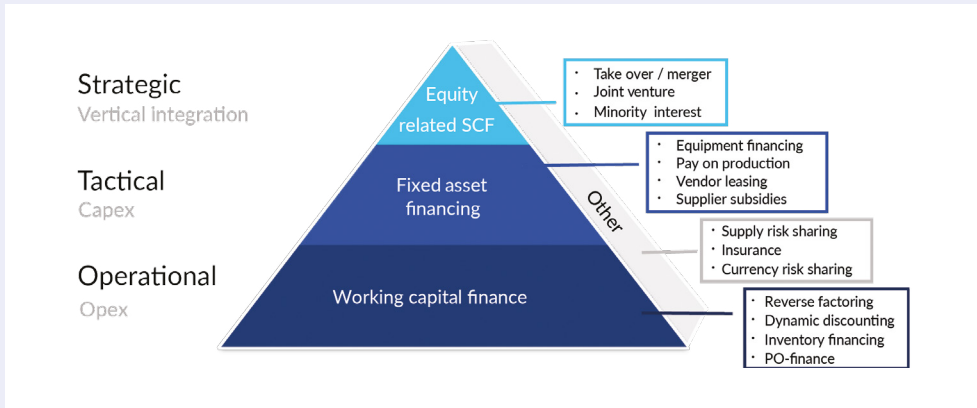


Figure 5-1. Classification of SCF instruments based on type of finance.

Net Working Capital Solutions

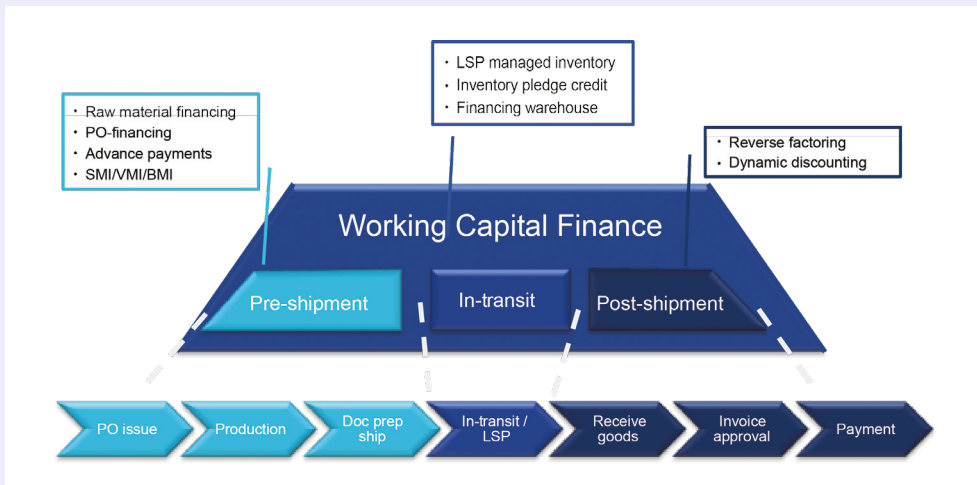


Figure 5-2. Classification of NWC SCF solutions (based on More & Basu, 2013).

As Figure 5-2 demonstrates, NWC SCF solutions can be divided in pre-shipment, in-transit and post-shipment categories (More & Basu, 2013). This division is based on the following triggers in the Purchase-to-pay (P2P) process: purchase order (PO), shipment (invoice release) and receiving of goods (goods receipt).

A sharp distinction is visible between pre-shipment financing and post-shipment financing. However, since in-transit inventory financing is also aimed at financing inventories (similar to pre-shipment financing), from a providers perspective these two types of financing intertwine in practice. However, from

a theoretical perspective in-transit financing clearly differs because it is only applicable for inventories that are being shipped or transported. Wuttke et al. (2013) define only two types of SCF-solutions; post-shipment financing (after invoice release) and pre-shipment financing (before invoice release). The latter contains more risk, but also has higher potential of financing and future interests. Demica (2007) even stated that pre-shipment financing will become more important than post-shipment financing in the future. NWC is required before suppliers send an invoice, so facilitating financing before shipment is an interesting avenue for further research.

5.2 Implementation & supplier segmentation

Implementing an SCF instrument, usually is not a simple task that requires careful planning and preparation. Experience with large corporations teaches us that such organisations often utilize a special 'toolkit' to support this task. This toolkit typically contains two relatively simple analysis models that help determining the rollout sequence among their supplier base.

The first analysis tool relies on some kind of supplier segmentation model that reveals the priority for implementation based on significance for the buyer. This priority is based on factors such as relative importance (relative contribution the supplier offers to the focal company's strategy⁴⁵) combined with supply risk (i.e. impact of discontinuation the supplier⁴⁶). Most focal companies leverage their existing supplier segmentation that is based on some evolution of the Kraljic matrix (Kraljic, 1983).

The second tool used to determine implementation sequence prioritisation focuses on the potential value that SCF could bring for the supplier and the buyer. Figure 5 3 illustrates the core principles of such an analysis. The horizontal axis of the graph shows the credit ratings of the suppliers. The left axis (corresponding to the graph in the chart) shows the capital cost rate of the supplier. The right axis (corresponding to the boxes in the chart) shows the total spend with all suppliers of that credit rating (in this example, the buyer has a AA rating). This graph gives a rough indication of the maximum total value that an SCF program could potentially bring for suppliers and the buyer together. This potential benefit can be shared between the buyer and its suppliers, or transferred totally to the suppliers, e.g. to reduce supply risk, depending on the company's SCF strategy⁴⁷. Next, this analysis can be done for individual suppliers, to determine the potential value that an SCF rollout towards that specific supplier could bring.

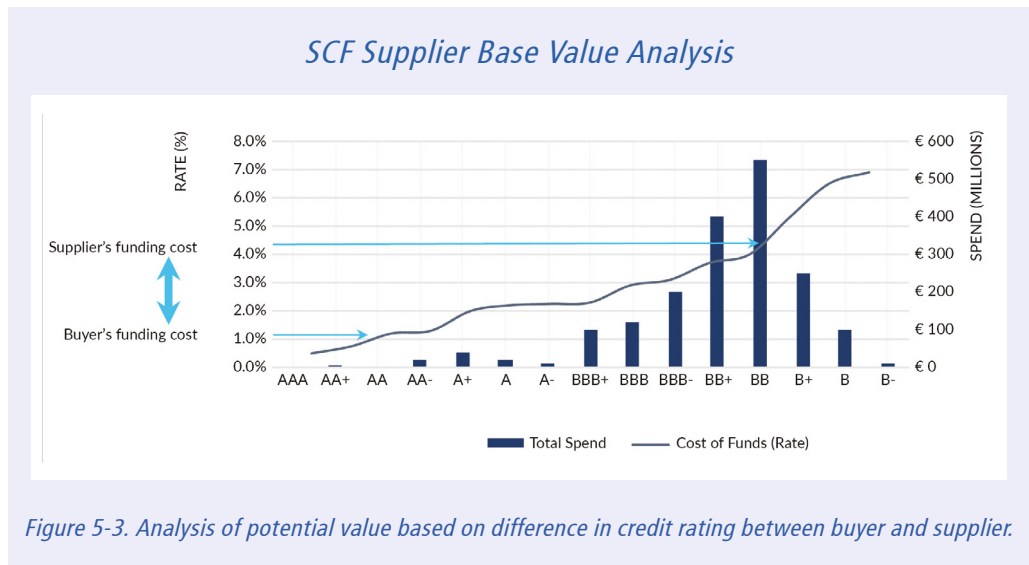
Strategic suppliers, with a large spend and substantial spread (differential between their funding cost and that of the buyer) represent a higher potential value for SCF and therefore are typically onboarded first. However, in practice, there are more aspect that are important to determine the rollout sequence of suppliers. Also suppliers that bring the most supply risk to the buyer typically get a high priority on the rollout sequence list.

45) All kind of different segmentation classifications are used, like 'platina– bronze', 'strategic – routine', 'partner – shop', etc., that all reflect this similar idea.

46) Usually the switching cost.

47) See section 9.2 for an overview of different SCF strategies that an organisation can opt for.

The above mentioned tools can support the focal company with determining a suitable SCF rollout sequence. Although other aspects⁴⁸ may play a role, suppliers with the highest prioritisation on the supplier segmentation that represent a high potential value with SCF typically are onboarded first, as they are expected to bring the quickest gains. Suppliers with little spend that are not of strategic value to the focal company on the other hand, rank lowest for a possible roll out. Most SCF providers apply a minimum spend ('threshold value') under which a supplier is refused for onboarding⁴⁹. In practice, this means that a large group of SME suppliers still do not qualify for SCF implementations (see M3 & Zanders, 2014).



In the following three sections, we give an extensive overview of the operational instruments in the SCF 'Toolbox'. We do, however, not claim to have an exhaustive list of all existing SCF working capital finance solutions. In fact, we believe that some of these solutions do not yet exist, but still have to be invented. Rather, we aim to give the reader a taste of the wide variety of options that are currently available in the SCF spectrum. In this overview, we limit ourselves to NWC SCF arrangements, as these are currently the most well-known and the most-frequently used. In future papers, we will discuss the tactical and strategic SCF solutions.

48) Such aspects may be related to urgency or expected onboarding costs. Examples are: imminent financial problems, quality of the buyer-supplier relationship, IT aspects and supplier readiness (for example, regarding the O2C process).

49) Obviously, this threshold depends on the type of SCF instrument used. Furthermore, this threshold may change over time, as is the case with RF, where we used to see thresholds of €1 million and more (see, for example, GTR, 2013), but more recently came across examples of thresholds as low as € 50,000.

6 Post-shipment SCF

Rajan and Zingales (1995) reported that among a sample of non-financial US firms, accounts payable (A/P) amounted to 15% of the assets. This indicates the volume and amount of capital tied up in A/P, making alternative financing based on invoices an interesting area. SCF post-shipment financing is always centred on the A/P of a creditworthy buyer, i.e. the accounts receivables of its suppliers. From a supplier's perspective, post-shipment financing can relieve the financial burden that is caused by buyers' lengthy payment terms. Two main supply chain financing methods within the post-shipment environment have been identified (More & Basu, 2013; He et al., 2010); these are explained in detail in this section.

6.1 Reverse factoring

Because terminology is an issue in the field of supply chain finance, many initiatives have started to define an accepted glossary of terminology (Bickers, 2015). Differences among banks, geography, regulations, etc. exist and are confusing. For reverse factoring alone there are many terms, such as confirmed payables financing, confirming, and supplier financing; in this literature study, however, the term reverse factoring (RF) is used.

RF is basically a development of conventional factoring arrangements, which are offered for a long period of time. Factoring is referred to when a firm independently sells one or more of its receivables to a financial institution against a premium (van der Vliet et al., 2015). Factoring differs from ordinary balance sheet lending or bank overdrafts, because it takes into account the risk profile and value of the receivable instead of only relying on the general financial health of the supplier. The difference between factoring and RF is that the buyer is also involved in the financial arrangement: the buyer now makes an explicit guarantee to the financial institution that payment will be made on the due date of the invoice (Klapper, 2006).

The basic principle of RF is that an investment-grade buyer cooperates with a financial institution to facilitate cheaper short-term financing for its suppliers, based on the buyer's creditworthiness. The buyer's suppliers discount confirmed invoices towards a financial institution and can obtain liquidity that was previously not available. RF often involves the actual sale of the supplier's invoice to the financial institution. There are in general two types of RF arrangements: auto-reverse factoring, which always finances invoices as soon as possible after approval, and manual discounting, which gives suppliers an option to accept early payment depending on cash flow needs.

Because the creditworthy buyer explicitly confirms the receivable, this information is made available and risk and pricing can be adjusted accordingly. The buyer has often accepted a legal obligation to pay the financial institution via a promise-to-pay and is responsible for solving any operational problems (Klapper, 2006). The critical event trigger facilitating cheaper financing towards suppliers is the explicit approval of the invoice, which is an important feature of RF that is not present in ordinary factoring.

6.1.1 Implementation

A buyer is the initiator of an RF scheme and needs to approach a commercial bank, multiple banks or a technology provider that is/are able to facilitate the technological platform. After selecting the right provider, which is very important (Seifert & Seifert, 2011), the buyer signs an agreement and can continue its implementation of RF. Buyers need to onboard suppliers one by one, which is often combined with commercial negotiations. For each supplier a know-your-customer (KYC) check has to be performed by the financial institution bringing along due diligence costs, making it most attractive for larger suppliers. After implementing a technology platform and signing the contracts, the RF process is operational. Once a supplier is on board, the regular procure-to-pay (P2P) process can be initiated and suppliers can start requesting discounted early payment, via the platform.

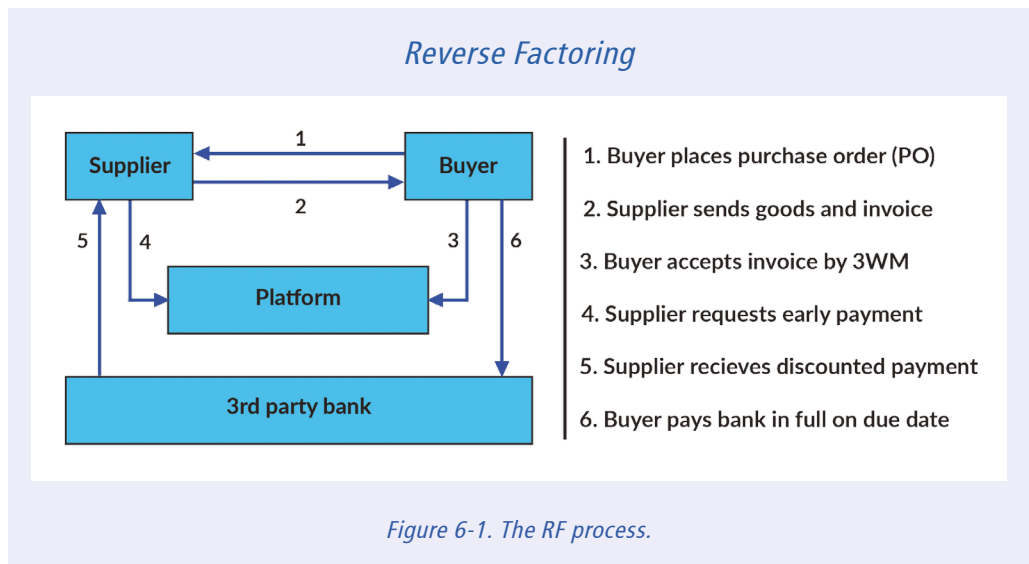


Figure 6-1. The RF process.

Figure 6-1 shows the RF process, assuming that the supplier makes use of the option to receive early payment.

- 1) The process starts with the buyer placing a PO at one of its suppliers.
- 2) The supplier sends the goods and invoice to the buyer.
- 3) Within an agreed period, the buyer accepts the invoice and makes an irrevocable agreement to pay the invoice on the due date. A three-way match (3WM) with the PO, invoice and goods receipt decreases the buyer's risk of faulty deliveries.
- 4) The platform gives the supplier an insight into the status of the invoice and the supplier can request early payment at any date, after the invoice is approved.
- 5) The supplier receives the discounted payment from the bank and the interest charged is deducted from the invoice value.
- 6) At the due date, the buyer pays the bank in full and the transaction is closed.

6.1.2 Benefits & drawbacks

RF is one the rare phenomena that can optimise and benefit all companies that are included in the arrangement. An RF arrangement is a tripartite win-win situation for buyers, supplier and banks (Seifert & Seifert, 2011). However, for all three parties the financial and operational gains need to be offset against the disadvantages and difficulties in order to draw up the balance. In this section, the benefits and drawbacks are discussed per party.

Supplier

The supplier can benefit from RF for a number of reasons. First, the supplier can reduce its financing costs, because the creditworthiness of the buyer is leveraged. This results in lower overall financing costs for the entire supply chain; however, the value is conditioned by the spread in external financing costs (Tanrisever et al., 2012). A larger spread implies more value to be gained with RF. Secondly, the approval of the invoice lowers the risk perception for the financial institution, and the buyer's non-payment risk is transferred to the financial institution. Therefore, the supplier does not need to insure the risk against non-payment, which is another benefit. Thirdly, RF can be considered an extra off-balance line of credit, and the access to liquidity is enhanced for the supplier. The more aggressive a supplier's working capital strategy and the higher the supplier's need for external financing, the more likely it is to benefit from RF (Tanrisever et al., 2012). Lastly, because of the use of a technological platform, the visibility of payments and related information is increased and cash flows become much more predictable.

On the downside, suppliers often have to agree to an extension of the payment term or provide a discount to their buyers to qualify for cheaper financing within RF. Consequently, a trade-off between 'longer' and 'cheaper' arises (van der Vliet et al., 2015). Furthermore, RF could result in extra unforeseen costs for supplier, for example legal costs, regulatory costs or costs for changed operational processes. The extension of the payment term, discount on pricing or extra costs lower the value of RF for suppliers. In addition, the lack of knowledge at some suppliers about working capital management might be harmful in the case of changed market circumstances, such as increased interest rates. The risk-free rate is an important reference in the pricing of RF, and the value of RF is bounded by the difference in deadweight external financing costs and not nominal rates (Tanrisever et al., 2012). Another drawback often quoted is that the supplier becomes dependent on the RF arrangement. Therefore, many suppliers require clarity about the duration of the arrangement, however the accounting treatment hinders the inclusion of duration of RF arrangements in contracts. Mostly the duration is agreed verbally between buyers and suppliers, but in rare cases it is contractually agreed with buyers and banks.

RF can create a win-win for both buyer and supplier

In some implementations of RF, buyers simultaneously extend the payment terms to their suppliers. We will provide an example to show that even in such cases, the supplier may benefit financially. In figure 6-2, we see the situation before and with RF. In the setup without RF, the supplier and buyer agreed on a payment term (PT) of 60 days (point C) after receiving the invoice (point A). With the implementation of RF, the bank agrees to pay invoices on day 15 (point B) and the buyer commits to approve invoices before that

RF can create a win-win for both buyer and supplier continued

time (unless there is a dispute on, for example, quality). The buyer and supplier agree on a new PT of 90 days (point D). The supplier can collect the amount (minus the program rate, including a fee for using this option) any date between point B and D. In this example, we assume he will do so as soon as possible (i.e. on B).

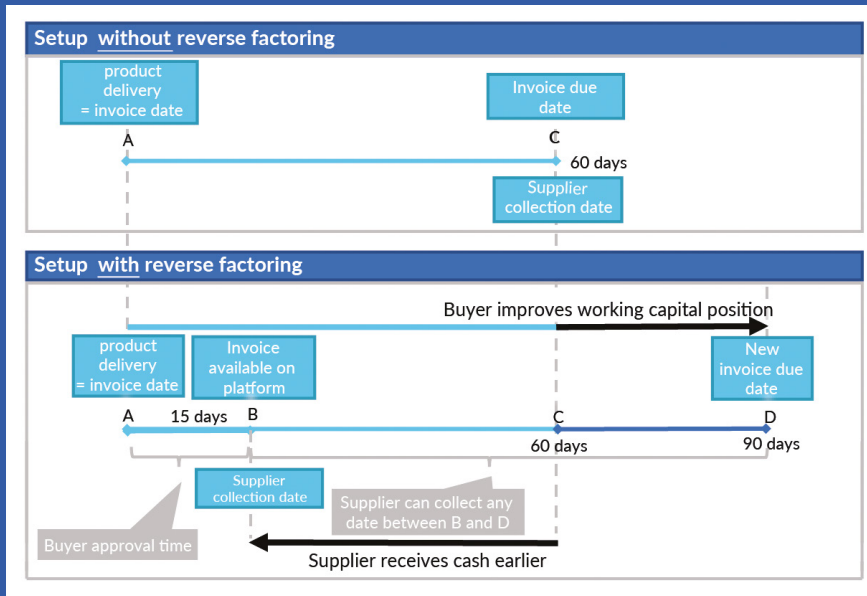


Figure 6-2. P2P triggers with and without RF.

What does this mean for the cost of financing for the supplier? Figure 6-3 shows that capital cost rate (without RF) for the supplier is 5.5%. The program rate (including fees for the RF provider) is 1.8%. Without RF, the supplier needs to finance 60 days against an interest rate of 5.5%, which results in a cost of financing of about €13,600⁵⁰.

With RF, the supplier will collect the amount at point B (day 15). This means he has to finance the invoice amount for 15 days. The RF agreement has been set up in such a way that the supplier has to pay cost of finance for the period until the bank can collect the money with the buyer. In this case that is between point B and D, thus 75 days. The total cost of finance is about €8,900. This means a cost advantage of €4,600. The free cash flow (FCF) for the supplier is €185,000⁵¹. The buyer also has a FCF advantage of 30 days. Thus, both the supplier and the buyer benefit in this case.⁵²

50) The cost of finance = $(60/365) * €1,500,000 * 5.5\% = €13,562$.

51) $(60-15)/365 * €1,500,000 = €184,932$.

52) Note that it is not always possible to extend PT and create a benefit for the buyer (especially if interest rates are high or difference between program rate and initial rate is small). In such situations, the buyer may want to negotiate a discount.

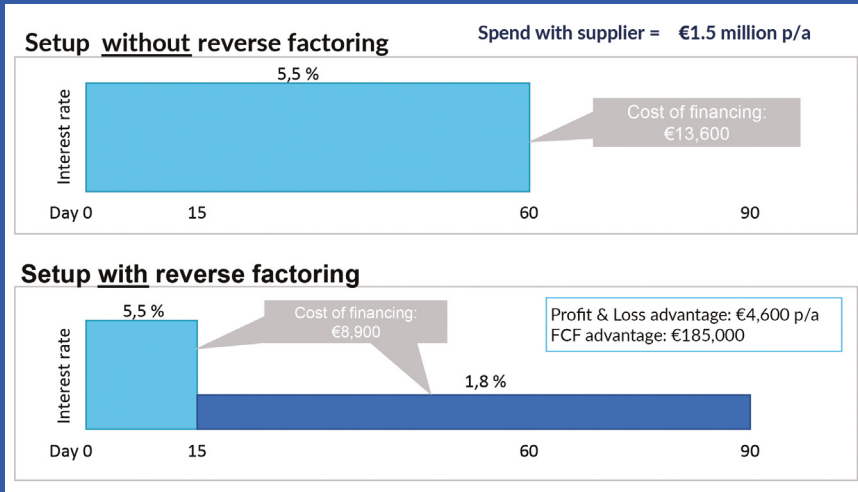


Figure 6-3. Cost of capital and free cash flow with and without RF.

Buyer

There are three main reasons for a buyer to initiate an RF scheme. First of all, the buyer could demand an extension of DPO to improve its working capital at the expense of the supplier or to share the benefit of RF. Extending payment terms is common practice among practitioners of RF. Secondly, the buyer could demand a price discount from suppliers because RF results in lower financing cost for the supplier. Finally, the buyer may strategically help suppliers to make financing available without increasing DPO or demand a price reduction. This allows for improved supplier–buyer relationships and can result in increased service levels, which ultimately benefit the buyer (Tanrisever et al., 2012). It should be noted, however, that these strategies are not mutually exclusive and a combination is possible. Other benefits are that RF can reduce payment processing costs and enable better cash flow management (Hurtrez & Salvadori, 2010).

As well as clear benefits, there are also disadvantages for buyers. The biggest hurdle identified in a survey was the ‘perceived’ need to change current processes and implement new ways of working (Demica, 2007). The main reason is that a quick approval of the invoice is required for RF and that a technological platform plays a key role in this fast approval. Furthermore, implementation costs were mentioned as a drawback and the cumbersome process of onboarding suppliers ‘one by one’.

Financial institution

In RF, financial institutions provide the funds that allow them to earn margins on capital employed in the arrangements. Since RF is considered a low risk, financial institutions do not have to maintain large capital requirements. In the light of Basel III, the low-risk character of RF matches the preferences of financial institutions. Furthermore, offering RF as a financial institution allows for development of relationships with many small firms and this provides cross-selling opportunities (Klapper, 2006).

On the downside, offering RF can result in the cannibalisation of the existing businesses of banks. Furthermore, financial institutions have to invest in technological platforms, which is not desirable as it requires large outlays of cash for investments. There is a trend for banks to not develop their own platforms, but to lease them from other banks or procure them from technology providers (Hurtrez & Salvadori, 2010). Finally, financial institutions should remain wary of fraud and legal issues in jurisdictions where there is a weak legal environment (Klapper, 2006). Although RF only requires the legal environment to sell, buy or assign invoices it remains a challenge for future growth, especially in emerging markets.

6.2 Dynamic discounting

Dynamic discounting is a specialisation and further development of early payment discounts. The existence and widespread usage of early payment discounts was demonstrated by a recent study by Xign (2006). It was suggested that 80% of vendors offer early payment discounts to suppliers. A commonly used approach is 1/10, net 30, which implies that 1% of the invoice amount is deducted if payment is made on day 10 instead of day 30. This is an example of a generic discount policy that can be applied to all customers (supplier-led) or suppliers (buyer-led). However, there is little flexibility in this generic discount policy because if payment is not made on day 10, the opportunity has been lost, which can be defined as a take-it-or-leave-it approach. Furthermore, the 'mass application' of a static discount policy precludes potential profits gained through the 'customised' application of early payment discounts (Randall & Farris, 2009). Dynamic discounting has evolved from the previously static take-it-or-leave-it 1/10, net 30 approach. In this evolved form both the buyer and the seller can propose terms, which are set in motion on a sliding scale (Gelsonimo, 2015). Comparable to RF, the critical event trigger in dynamic discounting is the approval of the invoice, signalling to suppliers they can ask for discounted payments. Two types of dynamic discounting options are possible: supplier-initiated, where suppliers can decide on competitive discounts to entice the early payment if their accounts receivables are ready, and buyer-initiated, where buyers move first to declare its acceptable discount rate (He et al., 2010).

Dynamic discounting makes use of trade process visibility facilitated by a technological platform that allows for dynamic settlement of invoices in a buyer–supplier relation (Gelsonimo, 2015). Instead of the take-it-or-leave-it approach, the dynamic arrangement includes the possibility to make the discount conditional upon the requested early payment date. A discount is thus calculated as a function of time between the payment date and the actual due date, based on a sliding scale. The buyer has flexibility within a technological platform to customise terms based on internal hurdle rates, groups of suppliers (countries, sectors, etc.) or other relevant factors. Thus, the simple practice of early payment terms has evolved into dynamic discount management.

6.2.1 Implementation

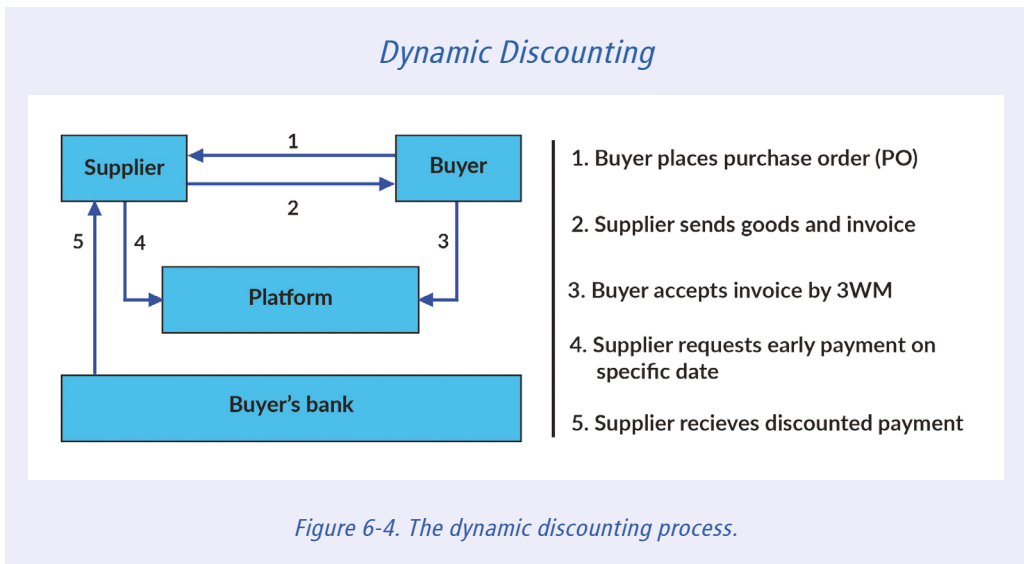
Similar to RF, dynamic discounting is a buyer-driven financial arrangement and is often facilitated by the use of a technological platform, because if processes were not automated, the key efficiencies of lending against eligible invoices would be lost in the costs of manual processing. Furthermore, the dynamic settlement of invoices without a platform would be difficult to manage. The buyer can configure the portal based on its preferences: which suppliers to include, setting customised rates for different suppliers and

setting a liquidity threshold on finance volume. Once a supplier accepts the invitation to join the platform, the dynamic discounting process can begin.

Although the financing of both dynamic discounting and RF rely on an eligible approved invoice, there is one key difference: in dynamic discounting, the funds are usually from the buyer, not from a financial institution. The financial institution was obliged to perform due diligence on each supplier due to regulation in RF. Because buyers are providing the funds no expensive KYC checks are required for dynamic discounting, as opposed to RF.

The process of dynamic discounting is shown in Figure 6-4.

- 1) The buyer places a PO at its supplier.
- 2) The supplier sends the goods and the corresponding invoice.
- 3) The buyer performs a three-way match and approves the invoice within a specified period of time.
- 4) After approval of the invoice, the supplier can select a payment date that matches its cash requirements.
- 5) On the requested date, the buyer's bank makes a discounted payment to the supplier.



6.2.2 Benefits & drawbacks

Like RF, dynamic discounting can also deliver benefits to both parties involved. However, because of the absence of a financial institution there are some key differences between dynamic discounting and RF.

Buyers can use dynamic discounting to reduce payment terms for their suppliers in exchange for price discounts, which can ultimately increase gross margins for buyers (Gelsonimo, 2015). However, because buyers have to use their own cash reserves instead of relying on external financiers, dynamic discounting does not contribute to working capital objectives. However, the investment in one's own suppliers' in-

voices can be regarded as a risk-free return and buyers can generate relatively high rates of return using dynamic discounting compared to other alternatives to cash. One advantage for buyers is that they can support suppliers by offering dynamic discounting, but will not offer attractive rates based on the buyer's creditworthiness. This fact combined with the lack of expensive KYC checks, makes dynamic discounting an interesting solution for mainly smaller suppliers.

Suppliers that are offered dynamic discounting can benefit because it helps them reduce DSO and lower working capital. The drawback is that suppliers will end up with decreased profit margins on sales to buyers that offer dynamic discounting due to the discounts they have to provide. However, depending on a supplier's creditworthiness, the discount can still offset the costs for arranging financing itself. Similar to RF, suppliers could employ dynamic discounting as a tool to manage their working capital needs and get access to liquidity with potentially lower financing rates.

7 In-transit SCF

Due to globalisation, the amount of time spent and the amount of capital tied up in transporting goods around the world is increasing (Gomm, 2010). However, many financial institutions do not include the inventory in-transit in the borrower's lending base or collateral (Cao & Zhang, 2012). This makes it difficult for smaller companies to obtain working capital to overcome the financing gap before buyers pay for the goods. Even when financial institutions do consider in-transit inventory as part of the lending base, the small company will most likely receive less than optimal interest rates. This is because financial institutions are not specialised in offering in-transit inventory financing and the risks incurred are deemed greater than the general risk appetite of financial institutions (Cao & Zhang, 2012). The two main issues are the inherent risks of global trade and the issue of claiming or seizing inventories used as collateral for providing the funds (Cao & Zhang, 2012).

In trade finance, this difficulty in financing was identified early on and pre-export finance was designed to meet the needs of small exporters and raise financing for inventories in-transit. With the increasing digitalisation of goods flows, new financing opportunities have emerged for inventories in-transit. An important role is reserved for a third-party logistic (3PL) firm or logistic service provider (LSP). These two terms are used interchangeably in this section. Because LSPs already have access to relevant information on supply chain activities and material flows, they are highly suitable for this type of financing activities (Chen & Hu, 2011).

7.1 Inventory in-transit financing

Hofmann (2009) states that little research has been done on inventory financing performed by LSPs. While this might be true for academic literature in the western world, in China this method of financing has been extensively used for over a decade. In 1999, an LSP (China National Materials Storage and Transportation Co.; CMST) joined forces with commercial banks to start China's first inventory pledge financing business (Zhou et al., 2012). Another term used for this type of financing solutions is advance-payment collection business (Cao & Zhang, 2012).

In this financing construction, the LSP not only provides transport, handling and storage services, but also takes care of inventory financing (Hofmann, 2009). The LSP procures the inventories from the manufacturer and obtains legal interim ownership of the inventories. The LSP then sells the products to the customers after a specific period and gets paid by the manufacturer's customers. In the meantime, the LSP finances the inventories at its own cost of capital.

Without accurate real-time information about shipments, banks might be reluctant to provide financing services, because banks cannot monitor the transactions. There are no control mechanisms to verify whether firms are employing loans for financing inventories in-transit or other purposes. Since the ownership over the goods serves as a collateral or security, banks want to be reassured that it is possible to seize the inventories. By integrating logistics and financing services (IFLS), 3PLs and financial institutions can collaborate to provide innovative financing solutions to credit-constrained firms

(Chen & Cai, 2011). The LSP can link the information about material flows and the status of inventories in-transit to financial institutions, to mitigate financial risk, enabling a reduction of credit risk (Chen & Hu, 2011).

Within inventory in-transit financing the involvement of the financial institution can differ; this results in various forms of financing. Three main modes of inventory financing are employed in practice: inventory pledge credit, warehouse financing and unified credit (Liu, 2013).

Inventory pledge credit is the process of assigning the inventories as collateral to a financial institution's warehouse for conservation, while an LSP often provides supervision of the inventories. The financial institution provides a loan against the collateral. Within inventory pledge credit there are static and dynamic modes. In the static mode, there are heavy restrictions on the production and operations of the supplier, because every time inventory is used in production it must be exchanged for cash. In the dynamic mode, however, the financial institutions impose threshold levels on the value of the collateral, but suppliers can freely use the inventory above this minimum pledge limit. The dynamic mode is most commonly applied (Liu, 2013), but whereas financial institutions are involved in this collaboration to a large extent, LSPs are not.

The second mode is that of warehouse financing, whereby the supplier will deposit and pledge the inventory towards the LSP, which could be either in-transit or in a warehouse. Banks merely provide the financing to suppliers based on the value of the collateral with minimum pledge limits, but are not as actively involved in the collaboration as they are in inventory pledge credit.

Finally, there is the unified credit mode where banks merely provide funds to LSPs. They provide funds directly to suppliers without the intervention of the financial institution. The process is similar to the warehouse financing mode, although banks are no longer actively involved in the process. The inventory is assigned or sold to the LSP, who is then responsible for collecting the payment from the buyer. Financial institutions only provide funds and monitor the loan process, providing the LSP with expertise.

Summarizing, there are many types of inventory in-transit financing. An important difference is which party takes the lead in the collaboration, the LSP or the financial institution. Regardless of which party takes the lead, inventory in-transit financing relies on supply chain information that can provide more insights into the risks of financing inventories. The revelation of information in the supply chain can be facilitated by the use of a platform, but it is not a prerequisite. Again, there is a critical event trigger that enables financing the inventories in-transit. For this specific type of financing, the shipment notification or bill of lading documents are the trigger, because at this specific moment the title of ownership of the inventory can be transferred as it leaves a warehouse or is loaded onto a transportation mode.

7.1.1 Implementation

The business relationship between the players is usually based on contracts that record the transfer of ownership and means of transport. In regular transactions, a LSP is compensated for the service it provides to transport the goods between firms (Selviaridis & Spring, 2007), while a financial institution will be

assigned to provide capital and settlement facilities. In inventory in-transit financing, the LSP will attract a purchase guarantee on top of the regular commercial relationship. This contract will provide the LSP with a purchase commitment (Hofmann, 2009), because the LSP does not want to end up with unsold inventories. The LSP can advance either up to 100% of the value of shipment or a certain percentage of the purchase price (Cao & Zhang, 2012).

Figure 7-1 shows the standard process of inventory in-transit financing. However, as there are many different types of inventory financing, this does not always apply.

- 1) The buyer places a PO at its supplier.
- 2) The supplier notifies the LSP of the PO (via a platform or without a platform) and instructs the LSP to transport the goods.
- 3) The LSP either pays the supplier in full for the goods or advances the supplier a certain percentage of the value of the order.
- 4) The LSP transports the goods to the buyer.
- 5) The buyer accepts the goods and can approve the invoice, although this is not a fixed requirement.
- 6) The buyer pays the LSP at the due date in full.
- 7) If the advance rate was less than 100%, the LSP pays the supplier the remaining net proceeds of the transaction.

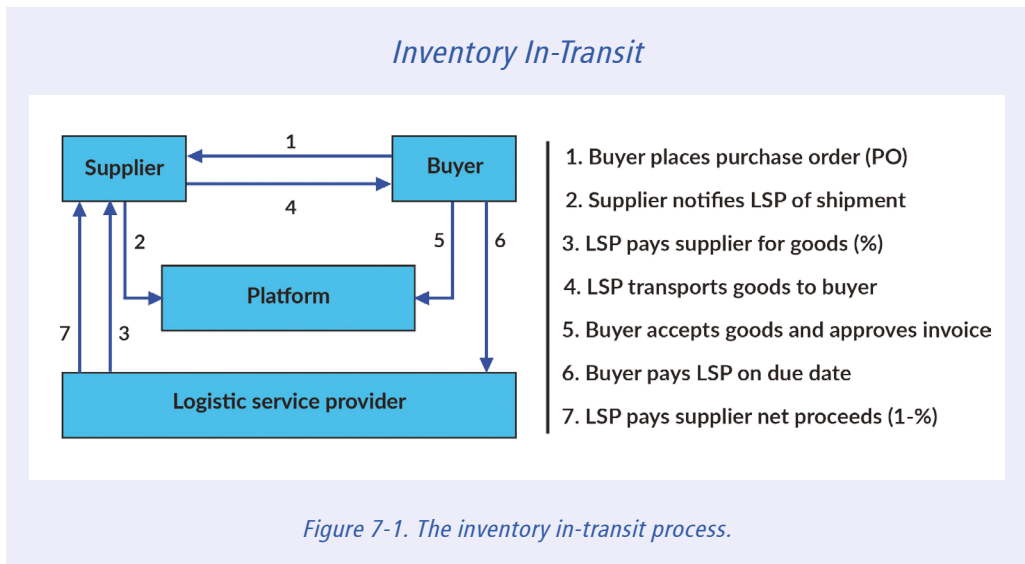


Figure 7-1. The inventory in-transit process.

7.1.2 Benefits & drawbacks

Due to globalisation the amount of inventory tied up in transport is increasing. This represents a significant outlay of funds for either buyers or suppliers. If the buyer finances the inventory in-transit, it will bear most of the risks, whereas if the supplier finances the goods, the interest rates can be significantly higher in general if goods are sourced from low-cost countries (Gomm, 2010). To solve this problem, LSPs can assist the buyers and supplier by offering inventory in-transit financing. This benefits the supply chain members in two ways: it helps budget-constrained firms secure funds and it helps firms coordinate

the material flow and financial flow in the supply chain. If the creditworthiness of the LSP is higher than that of both supply chain members, this financing instrument can not only accelerate the buyer's NWC position and improve the supplier's financial situation, but also actually reduce inventory holding costs because of the difference in interest rates at which inventories are financed (Chen & Cai, 2011).

The LSP benefits from earning interest rates for carrying inventory in addition to regular logistics services (Chen & Cai, 2011). Especially when the inventories financed are close to a commodity item, the marketability of goods increases. This could result in higher collateral value because the risk perception of the financier is reduced, in this case the LSP (Lasher, 1997). By offering inventory in-transit financing as an LSP, it can also enhance its attractiveness to both buyers and sellers. As a direct consequence the LSP can expand its market share at the expense of competitors and acquire new business revenues (Cao & Zhang, 2012).

Although inventory in-transit financing can deliver benefits to a LSP, the risks should also be managed accordingly due to the complexity. Yan and Suo (2013) identify four types of risks that are present in 'logistics finance' and should be taken into account by any 3PL that is considering offering this service.

- Credit risks: if counter parties fail to comply with contractual obligations, this can result in considerable losses. Default risks, market risks and earnings risks all come under this type of risk. Default risks are mainly caused by events that are unpredictable and have a large impact, for example natural disasters. Market risks result from price fluctuations of the goods financed, which could lead to one of the parties leaving the collaboration. Finally, earnings risks are present if margins are not sustainable and firms are exiting the business.
- Moral risks: risks that come from fraudulent transactions, where false information is provided to hide the real state of affairs.
- Legal risks: these risks stem from two main factors. First, not all laws in jurisdictions are always clear and perfect when it comes to logistics financing and illegality clauses can occur. Secondly, the ownership pledge of the 3PL can be disputed and the validity of the pledge could be doubted on occasions.
- Management risks: these risks refer to inaccurate decisions, incorrect pledge management or errors in managing the operations by 3PLs and financial institutions.

8 Pre-shipment SCF

Suppliers require working capital for A/R, as well as inventories. SCF pre-shipment financing solutions can assist suppliers in financing inventories even before the invoice is released. Aberdeen Group (2006) found that financing costs accumulate to 4% of finished goods, making it interesting for large investment-grade buyers to investigate methods to reduce upstream financing costs. Pre-shipment financing is intended to reduce financing costs or improve total supply chain performance. Emerging markets will ensure that pre-shipment financing will become even more crucial than post-shipment financing (Demica, 2011). Furthermore, Wuttke et al. (2013) indicate that if buyers implement pre-shipment finance, it is more likely that benefits will flow towards tier 2 suppliers, which can ultimately strengthen and benefit the entire supply chain.

Purchase order finance is a specific method within a set of supply chain finance arrangements (Protopappa-Sieke & Seifert, 2010; Wuttke et al., 2013). It is discussed extensively in the following section. Structured commodity finance, which is offered by commercial banks to facilitate financing in the pre-shipment environment, is also discussed. Although structured commodity finance is not often labelled as a SCF solution. However, many features coincide with the aim of SCF and therefore it is discussed in the SCF perspective.

8.1 Purchase order finance

A potential way for a supplier to cope with financing constraints is to apply for purchase order (PO) finance. The supplier can obtain the required funds to finance manufacturing expenditure, procure raw materials or the export fee before production or shipment by offering the PO contract to a financial institution. PO finance traditionally implies that a supplier offers a PO signed by a buyer as collateral to a financial institution to secure funds. Because the financial institution uses the PO as collateral, the focus is more on the buyer's credit than on the supplier's balance sheet (Wu et al., 2014). Despite having the PO contract as collateral, the financial institution is still exposed to a certain degree of risk if the supplier's operation is not perfectly reliable. Only suppliers that have good operational performance and seem stable are eligible for PO finance (Klapper, 2006). Compared to factoring, the development and offering of PO finance is still in its infancy (Wu et al., 2014), and even when PO finance is offered it is performed on a less structured basis than existing post-shipment financing solutions (Lange et al., 2012).

Given the risk profile of PO finance, banks will most likely charge high interest rates to cover potential losses arising from the transaction. It could even be the case that interest rates become so high that the transaction is no longer lucrative for the supplier. To assist its supplier, a buyer can make an irrevocable commitment to procure the goods to raise the debt levels of its suppliers (Lange et al., 2012) or provide a guarantee agreement along with the purchase order to mitigate the bank's risk (Wu et al., 2014). In both cases, the operating risk of the buyer will increase, although increased investment levels of the supplier can increase the buyer's expected profit (van Bergen et al., 2014). Table 8.1 shows the differences between traditional PO finance and PO finance backed by a buyer. This form of PO finance is called buyer-backed PO finance (BPOF). For both pre-shipment financing forms, the PO contract serves as collateral and the critical event trigger in the supply chain is the placing of a PO by a buyer.

Initiator	Type	
	Pre-shipment (Collateral: PO)	Post-shipment (Collateral: Invoice)
Supplier	PO Finance	Factoring
Buyer	Buyer-backed PO Finance	RF

*Table 8-1. PO finance options and comparison to factoring and reverse factoring
(based on Wu et al., 2014).*

8.1.1 Implementation

Although PO finance is less often offered by financial institutions and is performed on a less structured basis than other financing solutions, the basic steps are shown in Figure 8-1. In the description of the process, complex payment methods (e.g. letters of credit) are omitted and open account trading is assumed to reduce complexity.

- 1) The buyer places a PO and commits to procure the goods.
- 2) The supplier is operationally capable of delivering the order and applies for PO finance via a platform or directly at a financial institution.
- 3) The PO financier reviews the PO and evaluates the risks. If funding is approved, the PO is assigned as collateral to the financial institution and the supplier receives funds to proceed with the order (either 100% advance rate or a lower percentage of the order value).
- 4) The supplier delivers the goods and sends the invoice to the buyer.
- 5) The buyer approves the invoice by a three-way match (3WM) between the invoice, the PO and the goods receipt and reports this to the platform or to the financial institution directly.
- 6) The buyer pays the financial institution either directly (if factoring is used) or on the due date.
- 7) The financial institution pays the supplier the remaining net proceeds of the transaction, if the advance rate was not equal to 100%.

Purchase Order Finance

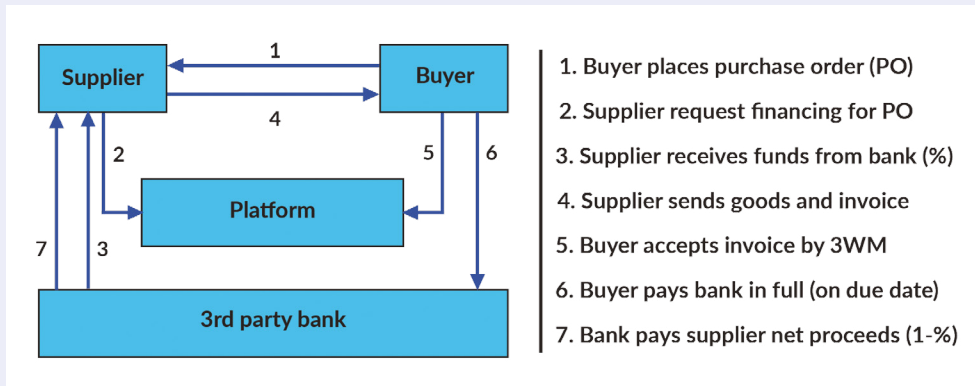


Figure 8-1. The purchase order finance process.

8.1.2 Benefits & drawbacks

PO financing is a promising alternative financing scheme and can deliver benefits for both buyers and suppliers. Two effects are triggered by the PO commitment: demand risks are transferred from the supplier to the retailer, and the debt capacity of the supplier increases. This could result in higher profits for the total supply chain compared to a supply chain without PO finance (Lange et al., 2012). However, in some situations PO finance may not be attractive for the buyer and the supplier.

Especially for credit-constrained suppliers that do not have access to traditional loans, PO finance is a highly beneficial financing solution (Wu et al., 2014): it can reduce operating risk, improve borrowing capacity and result in higher profits (van Bergen et al., 2014). Suppliers will always benefit if buyers increase PO commitments, because it shifts some of the demand risks to the buyers. Nonetheless, if the buyer has a strong credit rating, the commitment can be reduced from the buyer's perspective to achieve the same borrowing capacity at its supplier. The buyer can extract profit at the expense of the supplier in this case. PO commitments will also be reduced if the buyer is aware of the large debt capacity of the suppliers in the case it is creditworthy by itself. This reduced commitment results in less shifting of the risks to buyers, again at the expense of the supplier.

From the perspective of the buyer, PO financing increases the operating risk. The buyer takes on some of the demand risk that was previously allocated to the supplier, by explicitly committing to take-off a specific quantity. However, it can still be interesting for buyers because the PO commitment can increase investment levels or production levels or the service level. This ultimately benefits the buyer and can offset the increased risk it takes on. In general, expected profits for the buyer will increase if it offers PO finance (van Bergen et al., 2014). The retailer must decide on the optimal level of commitment to balance the potential benefits and costs in terms of risks. The buyer's expected profit function is concave in purchase order commitments, whereas it is always increasing for the supplier. A financially strong buyer will commit to lower POs, shifting demand risks to the supplier. If the buyer is aware of high debt levels

of the supplier, the commitment is also reduced, while still ensuring the same production and stocking level at the supplier. Thus, the buyer will exploit not only its strong credit rating but also the financial strength of the supplier, in order to extract profits from the supply chain.

In the case of an unreliable supplier, the creditworthy buyer should not provide PO finance because this does not improve the financial status of the supplier. Concluding, the buyer's commitment is most valuable in the case of large buyer's demand, limited financial capacity of the supplier and high interest rates (Wu et al., 2014).

8.2 Structured commodity finance

Since the 1980s, new financing techniques that are collectively known as 'structured project and trade finance' have emerged that can facilitate the financing of separate transactions. These types of financing do not rely solely on the balance sheet of a money-seeking firm. This is typical of SCF solutions, where specific transactions are financed and funding is not granted based on balance sheets. One difficulty in traditional balance-sheet-based financing is that it is difficult to assess the real value of the balance sheet. Furthermore, the profitability of specific transactions for which the funds are needed are often not taken into account in the assessment (Rutten, 2003).

As a response to this shortcoming, commercial banks have developed 'structured financing' facilities to accommodate the needs of money seekers. These facilities are often sector-specific and aimed at commodities or easily marketable finished products (Sutak, 2007). Specifically for commodities a variety of solutions have been developed, for example pre-export finance, toll finance and countertrade finance (Klaassens, 2005). Within commodity products three primary groups are identified: agricultural products, metal and mining products, and energy industry products (Sutak, 2007). Reference prices can be utilized to determine the value of the commodities, although this is not a prerequisite. One distinctive feature of structured finance is that risks can be isolated and transferred from one party that is less able to bear risks to another that is better able to carry risks (Rutten, 2003).

Risk mitigation tools used in structured commodity finance exhibit strong similarities with various structures developed in Islamic finance (UNCTAD, 2006), which does not allow financiers to charge interest rates. Financiers therefore have to generate revenue through fees, commissions and other profit-sharing mechanisms. These revenue are however often explicitly or implicitly linked to interest payments. Islamic finance can also be applied to trade, similar to structured commodity finance. The main Islamic trade finance forms are murabaha (similar to regular trade credit), salam (similar to pre-financing) and istasna, which is a type of pre-export financing (UNCTAD, 2006). Over the two past decades Islamic financing has grown tremendously, because it can offer solutions for difficult trade credit issues due to its versatility. Conventional structured financing should learn from the solutions offered in Islamic financing, and vice versa.

The principles of structured financing can be leveraged even for non-commodities. One element present in structured commodity financing is that the buyers provide a guarantee to financiers to procure the commodities. In practice, buyers provide suppliers with forecasts of their requirements, but these are often not obligatory. However, the inventories can be assigned to buyers at specific moments in time if

they become customer-specific. From a risk point of view supply chain information is leveraged to lower interest rates based on the the rating of the customer instead of the supplier. This can lead to a reduction of cost of capital, which is central in Supply Chain Finance (Gomm, 2010). Therefore structured commodity finance can be regarded as a type of SCF solution that is applicable in the pre-shipment environment.

The ultimate goal of structured commodity financing is to provide custom-made financing under non-standard conditions (Sutak, 2007). All supply chain information is leveraged, to identify key risks and attract purchase guarantees from off-takers. Assuming all information between supply members is stipulated in framework contracts, the trigger for structured commodity financing is the framework contract.

8.2.1 Implementation

Structured commodity finance loans are always based on collateral that is preferably easy to market. In devising a transaction, together with cash flow planning and financial modelling, the hardest job is to set up a financial and legal collateral system (Sutak, 2007). On top of regular commercial agreements between supply chain members, structured financing implements financial agreements and purchase commitment contracts. A separate legal entity, often a special purpose vehicle (SPV), is established to facilitate the transaction. SPVs can be created to fulfil specific, narrow objectives and can isolate and absorb transaction risks. Furthermore, the separate entity is convenient for transferring title of ownership of the commodities in transactions. Structured commodity financing can be used for seasonal commodities with fluctuating NWC requirements or for commodities that have rather stable inventory levels.

Figure 8-2 shows the process after a structured commodity finance programme has been established. This differs slightly from previous processes, because of the existence of a separate entity. However, looking more closely at the process of structured commodity finance, it clearly has similarities to other types of SCF financing options.

- 1) The SPV has arranged a credit facility agreement at the bank to be able to make advance payments for the commodities.
- 2) The SPV procures the commodities and makes payments to the supplier.
- 3) The buyer orders the commodities in the framework agreement (commercial agreement between buyer and seller).
- 4) The supplier delivers the goods to the buyer as specified in the contracts.
- 5) The buyer gradually pays the SPV for the goods, or pays for them within a certain payment term agreed upon in advance.
- 6) The SPV uses these instalments as repayment towards the bank that has facilitated the funds.

Structured Commodity Finance

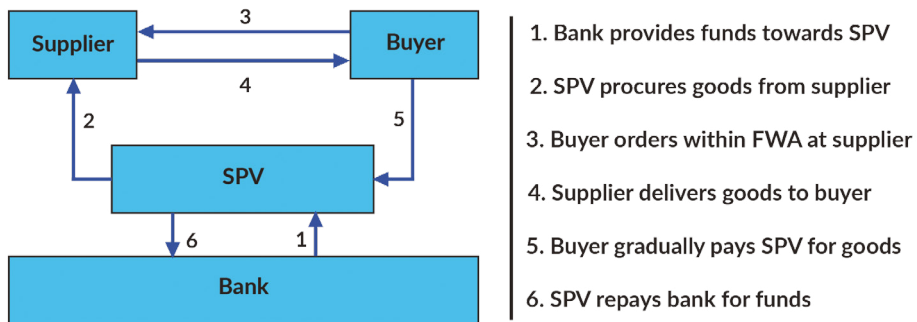


Figure 8-2. The structure commodity finance process.

8.2.2 Benefits & drawbacks

Although benefits are clearly present, structured commodity finance is not always an appropriate financing arrangement. Due to the high transaction cost of setting it up (because it is labour-intensive), it is only worthwhile for high-volume transactions.

The benefit for the supplier is that it offers the supplier access to liquidity, which was previously not available. Furthermore, the cost of capital can be reduced because the buyer provides a commitment to procure the commodities and the financial strength of the buyer is leveraged. The inflows of cash are also more predictable, because they are structured and governed by contract, which allows for better cash management by the supplier.

The buyer can profit from structured financing in two ways. First, structured commodity financing increases the reliability of delivery and strengthens the supply chain. Weaker suppliers that have good operations no longer face liquidity constraints and this will benefit the buyer in the form of better service levels and assured origin of the commodities. In addition, the buyer can negotiate better pricing of payment terms due to the intervention of the SPV. This is related to the fact that the buyer's financial strength is leveraged in this financing transaction. This could result in either a lower COGS or better working capital levels. The advantages of the structured commodity financing should outweigh the cost of setting up the arrangement to make it an attractive solution for buyers. Besides high set-up costs, it is also operationally complex to manage and requires careful attention and execution.

9 The Adoption & Strategic Reasons of SCF

Now that we have provided an extensive overview of SCF instruments, we take a look at the adoption of SCF by the market place and the predominant strategic considerations that companies have when implementing SCF solutions.

9.1 Adoption of SCF

In order to get an impression on the uptake of SCF by corporate organisations, we looked at an instrument that gained much popularity in the last decade: Reversed Factoring⁵³ (RF). For this, we investigated the first 1000 non-financial corporations on the Forbes list and extensively searched all publicly available resources⁵⁴ to find out which of these organisations had actually implemented Reverse Factoring (Teenin-ga, 2015). We realise that not all corporations publish the fact that they implement an SCF solution like RF, but we found that many do and that these data reveal some interesting results.

In total, we found evidence that 156 corporations (16% of those on the list) that have implemented Reverse Factoring. This figure evidently is a lower bound of the real number of implementations⁵⁵. In Figure 9-1, we show the measured adoption pattern over the years and the estimated curve of adoption based on these data⁵⁶. Although it is clear that the method of data collection has some limitations and thus rigid conclusions should not be drawn, a couple of careful observations can be made:

- The interest in RF among the Forbes top 1000 non-financial corporates has significantly increased in the past 11 years.
- Two peaks are clearly visible, namely in 2009 and 2014. Possible explanations for these peaks could be a corporate reaction to the effects of the financial crisis (2009) and government Initiatives launched in 2014 (see section 2.5).
- The adoption of RF among these companies is very likely to reach a peak in the coming years, after which it will most likely decline.
- Based on Roger's theory on adoption of innovation, we can divide the population into different adopter categories and fit them on the projected graph (see Figure 9-2). Based on this categorisation, one can deduce that we are currently in the Early majority phase.

53) See section 6.1 for a detailed explanation of this instrument.

54) The resources for this research included academic journals, magazines, newspapers, theses, financial reports, conference proceedings, symposium presentations, websites, working papers, reports and press releases.

55) Based on expert sensing (we showed the list to some major SCF providers and asked an experts in the field), we assume that the real number of adoptions is at least double this figure.

56) Main assumptions: SCF adoption follows a normal distribution (based on Roger's diffusion of innovation model 2003), for 50% of corporations that implemented RF have found published evidence, the other 50% follow a similar distribution, 80% of corporates in this list will eventually adopt RF (saturation level).

Adoption of Reverse Factoring

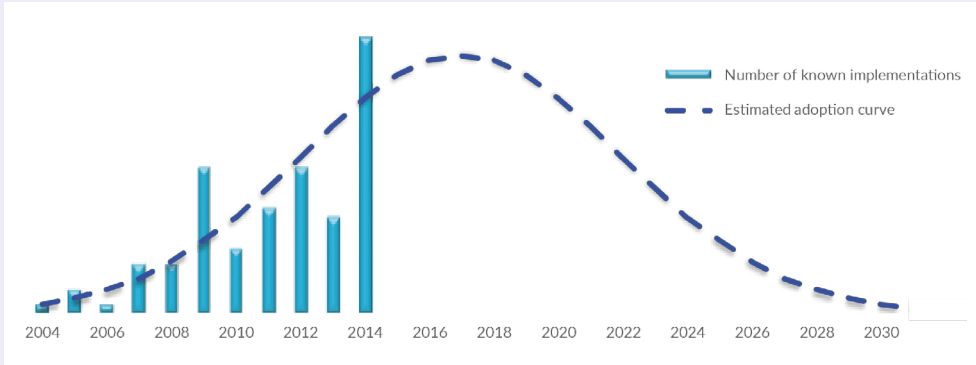


Figure 9-1. The adoption of RF among 1000 non-finance corporations on the Forbes 2000 list.

The following characteristics were found for each of the categories:

- Innovators: mainly in Europe (64%), mainly in consumer staples and industrials. Examples: Philips, Volvo, Carrefour
- Early adopters: mainly Europe (54%) & North America (24%), mainly in consumer discretionary and consumer staples (resp. 27% and 22%). Examples: Wal-Mart, Bayer, Caterpillar Heineken, Siemens, Unilever
- Early majority: largest group North America (24%), followed by Europe and Asia (resp. 30% and 26%). Much wider spread between all sectors. IT and industrials have grown. ASML, Procter & Gamble and SABMiller are examples in this category.

Adoption Categories of Reverse Factoring

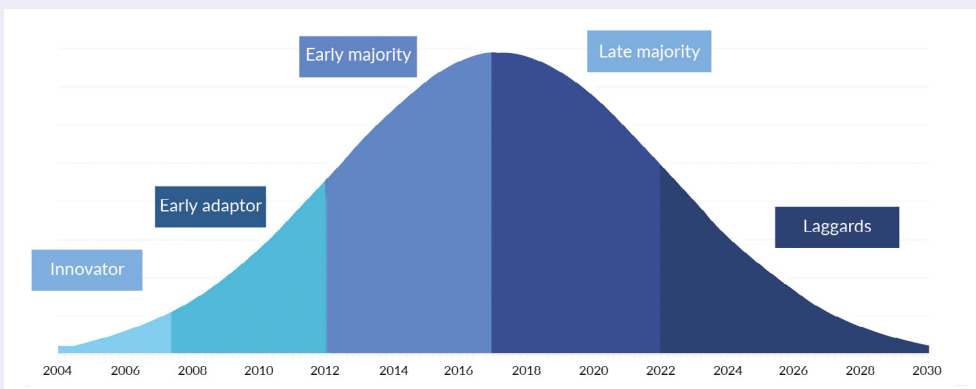


Figure 9-2. RF adoption categories (based on Rogers, 2003).

As this research indicates that RF has been embraced by the world's biggest public companies, it is probable that a similar trend will be visible in the entire domain of larger focal companies. Due to their huge size, Forbes 2000 corporations, are expected to be ahead⁵⁷ of other focal companies in implementing this kind of relatively complex innovations. However, as RF and SCF become more familiar concepts, solution providers continue to improve their platforms and more efficient implementation and rollout methodologies become available, other large and mid-size organisations are likely to follow their example⁵⁸. Furthermore, it is also not implausible that other innovative SCF instruments will be piloted by some of these corporates and, in the case of success, will be imitated by large groups of other focal companies.

9.2 Strategic reasons for SCF (the '6R' model)

Padrao and Guedes (2014) state that thus far, SCF has had mainly a tactical and operational focus. Similar to SCM (Christopher, 1992), we expect that this emphasis will shift to a strategic focus that underscores value creation and customer service.

In order to develop a coherent and effective SCF strategy, companies should observe the following principles:

- Top-down principle: The SCF strategy should evolve from the supply chain strategy, which in turn should be derived from corporate strategy (see Figure 9-3).
- Alignment principle: The strategy should be based on an integrated attempt to optimise all main business flows simultaneously. In other words, logistics, information and financial flows should not be considered in isolation but be aligned and geared to one another.
- Synergy principle: The SCF strategy should be synergetic, that is, it must create value for all collaborating parties⁵⁹ (the joint value principle).
- Consumer focus principle: During the strategy development process, the organisation leadership should always have the end-customer/consumer in mind. This means that it should aim at global, rather than local optimisation, which requires an end to end view on the supply chain.
- Measurement principle: in order to monitor the effectiveness of a formulated strategy, the organisation must define relevant and clear key performance indicators⁶⁰ (KPIs).

57) Most large corporates, typically enjoy good credit ratings and have a large spend with buyers, hence greater potential benefits of an RF implementation. In addition, they are able to invest more resources in an instrument that requires a fair amount of time and expertise to implement and roll out.

58) Initial findings of a multiple case study among Dutch mid-corps suggest that this is indeed the case.

59) Padrao and Guedes (2014) call this the 'dyadic approach', that is, the collaborative strategy's joint value creation should exceed the sum of the expected value when both parties act separately.

60) Such KPIs must be clearly linked to the strategy, easy to understand, based on valid data and lead to intended action (Gerke, 2007).

SFC Strategy

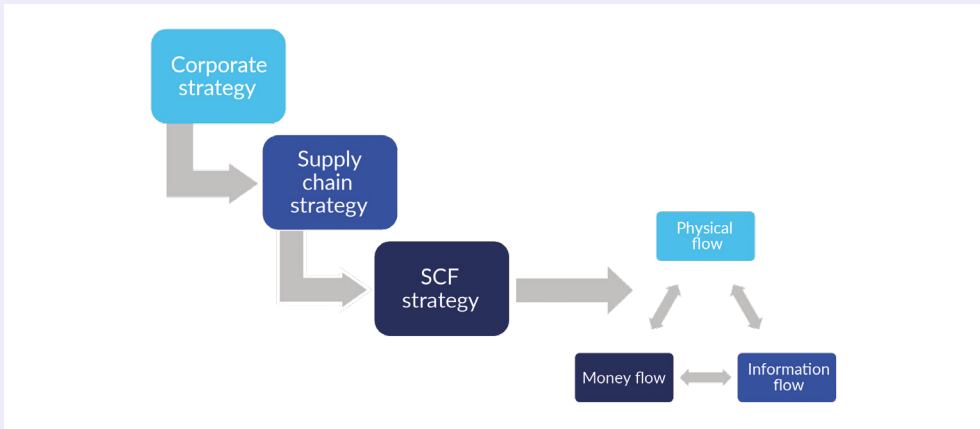


Figure 9-3. The SCF strategy development process.

From literature and based on interviews we performed with over 17 companies, we identified six main strategic drivers for SCF.⁶¹ Each organisation we interviewed mentioned at least one of these drivers, but usually a combination of these drivers were indicated.

SFC Strategic Framework

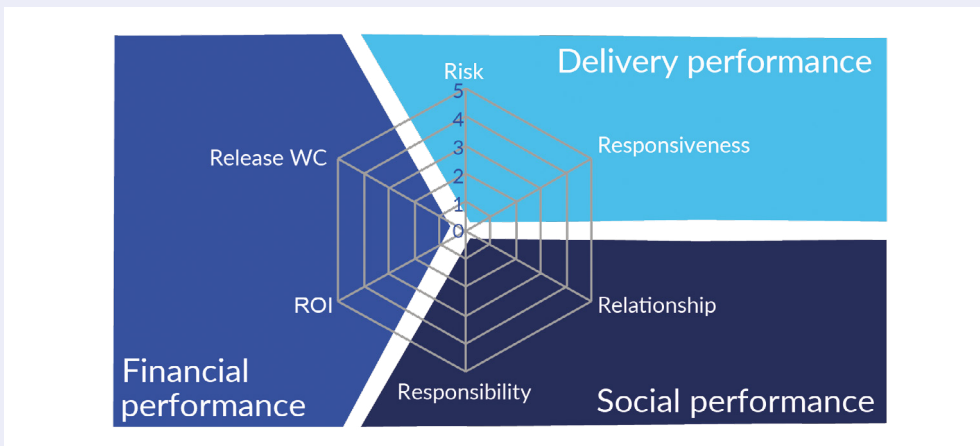


Figure 9-4. The six main SCF strategic drivers.

61) Note that there is a noteworthy overlap with the future 'desired supply chain outcomes' as describes by Melnyk, et al. (2010). This should not surprise us as SCF and SCM are very much interwoven and as such strive for similar goals (see section 3.2.2). There are, however, some fundamental differences. For example, where Melnyk, et al. only have 'Cost' as a desired outcome, we make a distinction between NWC and ROI improvement strategies as these require a different approach and often different SCF instruments.

The figure above (Figure 9-4) shows the six main strategic drivers that we identified:

1. Release working capital: One of the main drivers for organisations to consider, implement and roll out SCF solutions is the optimisation of NWC. SCF enables the organisation to reduce the CCC without introducing unwanted supply risks⁶².
2. ROI: By leveraging SCF, organisations can reduce the cost of goods sold (COGS) and thus improve the Return on Investment. This can be done by, for example, leveraging the creditworthiness of the focal company in such a way that suppliers cost of finance is reduced. When implemented correctly, this can lead to a lower COGS.
3. Risk management: Most SCF instruments are great tools to mitigate risks in the supply chain. In section 2.2, we showed the example of Caterpillar, which was able to avert the risk of suppliers not being able to source due to a lack of funds. SCF not only assists in preventing supply risks to occur, but also ensures the supply chain can recover quickly and cost effectively from disruptions, thus achieving a more resilient supply chain.
4. Responsiveness & Innovation: In the case of high demand fluctuations, the focal company can leverage SCF to ensure its direct and indirect suppliers have enough funds to invest in spare production capacity or advanced innovative technology to be able to quickly respond to ramping up demand. An example is the Intel/ASML case presented in section 2.2.
5. Relationship: As mentioned before, strong buyer–supplier relationships are an essential ingredient for high performing supply chains. SCF instruments can serve to enhance trust and commitment by, for example, providing transparency and flexibility⁶³.
6. Responsibility & Reputation: As discussed in sections 2.3.2 and 2.3.3, consumers no longer look only at price, quality and service: they also want a product that respects nature and human beings. When sourcing from developing countries, we would argue that it is almost impossible to do so in a truly sustainable way without the necessary supporting capital. It seems inevitable that SCF tools will play a fundamental role in this area.

Logically, these six strategies can be grouped into three main categories: the first category zeros in on the optimisation of NWC and ROI (financial performance), while the second category is about ensuring a resilient and responsive supply of innovative, high quality products and services (delivery performance). The final category contains strategies that focus on corporate social responsibility, sustainability and supplier loyalty (social performance). It is important to note that these categories are not mutually exclusive. However, we expect that many organisations will adopt an SCF strategy where one category is the most dominant.

In figure 9-5, we show the '6R' model for three examples of organisations we interviewed: a large, fast-moving consumer goods company, a Dutch local government organisation and a large Western European hi-tech corporation. As can be clearly seen from this picture, they all have a different SCF strategy.

62) For instance, RF enables companies to extend the payment terms to suppliers without causing funding issues for them.

63) An example is SCF platforms that enable suppliers to get early visibility in invoice approval and provide them with the choice of when to receive the payment.

The FMCG corporation's key priority for SCF is to reduce cost and release NWC, while the local government has plenty of cash, but a very strong drive to make sure its suppliers are paid on time. The cash rich high tech company on the other hand wants to ensure suppliers can respond rapidly to a sudden increase in demand for new products that require significant investments in innovation.

Three Organisations with a Different SCF Strategy

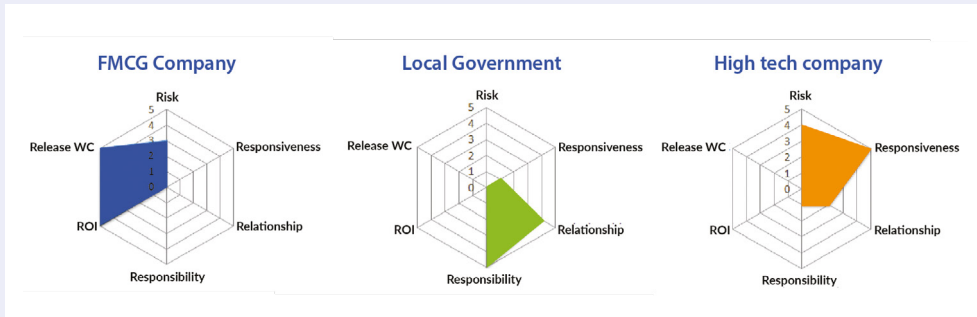


Figure 9-5. The '6R' profile displaying SCF strategic focus for three different cases.

With this strategic framework and accompanying charting tool (the '6R model'), we have provided a tool that enables companies to efficiently map their current SCF strategy and support them in reformulating it.

9.3 Future Developments

During a global study among 322 manufacturers, Frohlich and Westbrook (2001) found that companies that implement multi-echelon supply chain integration strategies are among the top-performers in their industry. They present persuasive evidence that an increased degree of integration (both upstream as well as downstream) leads to a higher performance.⁶⁴ Although the majority of companies in their study demonstrated a low degree of integration, there is clearly an increased interest in this topic in both the business and the academic world. Therefore, we expect that in the coming years, companies will intensify and expand the collaboration among supply chain members. There is no reason why this integration should be limited to the physical flow (and related information flow) only. On the contrary, we expect that in the foreseeable future, intensified integrated physical and financial collaboration will be high on the agenda of virtually every successful company. Companies will want to be able to select from a wide range of SCF instruments to improve the supply chain in collaboration with not only their direct supply chain partners, but also tier 2, tier 3, etc. partners, both upstream and downstream.

⁶⁴) Looking at performance measures like company value, profitability, productivity and customer service.

10 Conclusions

This purpose of this paper was to give a clear insight in the scope, the relevance and potential value of SCF by placing it in an economic context and providing a strategic framework. Furthermore, it aimed to offer a systematic overview of current SCF instruments and provide a classification of the full spectrum of all possible types of SCF agreements.

The findings in this study clearly subscribe the significance of this relatively young field of investigation and application. SCF's toolbox offers a variety of instruments that, if utilized properly, have the potential to support myriads of business by unleashing affordable capital to them. Such a financial injection, that would otherwise be impossible or at least be very costly to obtain, enables supply chains to become more resilient, more innovative, more sustainable and thus more competitive. This will create a ripple effect that will stimulate the flourishing of whole industries, which has, in turn, the potential to improve the financial, social and environmental health of whole economies.

This study offers a clear positioning of SCF by more strictly defining its boundaries and intended objective. Furthermore, it provides a classification of SCF instruments into operational, tactical, and strategic agreements, of which many are described in a systematic way, discussing their implementation, benefits and drawbacks. Additionally, this paper shows the adoption of reverse factoring by large corporations, based upon research among the Forbes 2000 companies. The presented results show significant increase in the adoption among those companies in the past years, that is likely to result in a peak in the coming years and foreshadows a much broader adoption and variety of application of SCF in the decades to come. Finally, this paper presents a strategic framework that supports the leadership of organisations by effectively formulating a coherent SCF strategy that enables the realisation of profit, people and planet goals.

Clearly, this study had several major restrictions. First, an overview paper like this can impossibly cover all aspects and instruments of such a broad field. Second, we did not explain in detail nor discuss the implementation, benefits and drawbacks of SCF instruments in the tactical and strategic echelon. As mentioned, we will do so in a future paper. Third, the research is based on a wide array of literature, desk research and the experience in several case studies with large and mid-size organisations. In order to better quantify the adoption as well as the (potential) impact of SCF, more empirical data will be needed. Fourth, the strategic framework is a first attempt to develop theory that is useful for the leadership of focal companies. More research will be needed to test and improve this framework, as well as find the best combinations between different strategic profiles and subsets of SCF instruments that are most effective for these profiles.

It will be evident to the reader that there is an abundance of research opportunities related to SCF. Although popular instruments like reverse factoring and dynamic discounting have abundantly proven their value for many multinational corporations and their strategic suppliers, only fragmented and verified data is available about the factual number and segmentation of suppliers as well as total invoice volumes and actual collection terms. Moreover, large groups of smaller suppliers do not reap the benefits of these solutions. One of the reasons is that many national and regional mid-corporate focal companies have very little understanding of the possibilities of SCF. Furthermore, the onboarding of the long tail of

smaller suppliers on such tools is still very time consuming and therefore almost never done. Research is needed in this area to establish a base line and monitor the progress and actual impact on national and international level. Additionally, research is needed to develop models and tools that help accelerating the implementation of SCF tools at focal companies and facilitate them to onboard a supplier in a few hours or even less.

Regarding the less familiar SCF instruments representing the great majority of the SCF toolbox: initial research shows that at least several of these tools have much potential in real business life. However, much more research is required to test, compare and improve these instruments. Furthermore, most SCF applications are limited to first tier suppliers. Widening the scope to multiple tiers is more difficult and brings usually greater risk, but may also generate significant greater value. Existing theory has to be perfected and new theories and models will have to be developed in order to better predict the value, usefulness and potential risks of these instruments in different circumstances and make efficient implementations possible.

Also the role of other supportive supply chain members, such as LSPs, is underexposed in literature. Such supply chain members could play a much more important role in SCF (see e.g. Hofmann, 2009, Chen & Cai, 2011). Finally, many instruments of the SCF toolbox have hardly been used in practice, let alone have been part of any research. Also new concepts like the Internet of Things, combined with the advance of new developments, such as blockchain technology, may provide new opportunities. As embedded devices (smart objects) collect real time data about movement, usage and physical conditions of objects, this may eliminate the asynchronicity and asymmetry of some crucial information, reducing financing risks. In other words, there is still much room for improvement and innovation in the SCF toolbox: This requires curious, open minded and creative researchers that are willing to take risks. We think it is not unlikely that the best SCF tools still have to be developed.

Finally, we want to remark that the full potential of SCF as painted in the paper can never be realized by academics in isolation. As SCF touches many business areas, it will require collaboration of multiple academic disciplines, even disciplines that are currently hardly involved. Of course, businesses, both large and small, need to be involved in all types of empirical research, in order to ensure the practical relevance and usefulness of the research. But also SCF providers need to support such research by providing actual (anonymized aggregated) data regarding numbers of buyers and suppliers as well as invoice and collection data. Last but not least, governments can play a crucial role in creating awareness, providing education and supporting adoption of SCF. What is more, they can be great role models by adopting SCF instruments themselves. After all, governments are (very) large buyers and have the opportunity to support huge numbers of suppliers themselves. It is unmistakable that SCF requires the cooperation of businesses (both large and small), governments, financial institutions, and SCF providers. We trust that this paper inspires these parties to do so.

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About the SCF Essential Knowledge Series

The Supply Chain Finance Essential Knowledge Series is a collection of papers providing valuable and applicable insight in the current world of SCF to both practitioner and researcher. This series covers all major aspects that contemporary managers face when attempting to optimize the financial flows in the supply chains their organisation is part of. In doing so, this series brings relevant up-to-date knowledge from both academic and business world in a way that is practical and understandable to readers active in various functions and with different backgrounds. True to the nature of SCF, this series does not take a narrow, single disciplinary focus, but looks at all its relevant facets, including finance, supply chain management, legal, accounting, risk management and IT. Its practical and accessible style makes this series an indispensable item at the bookshelf of every CFO and supply chain leader.

The Supply Chain Finance Community

The Supply Chain Finance Community is a not-for-profit association of all those involved in supply chains: manufacturers and technology vendors in 31 countries around the world. Its founder members are 23 business schools across Europe supported by corporations, banks, consultancies and technology vendors. The SCF Community supports and enables transfer of knowledge as well as research in the innovation and adoption of SCF solutions. As such, the community provides a place to discuss and drive relevant SCF and working-capital initiatives that play an important role in the international corporate and financial industry. As a country-neutral association it is well positioned to support practitioners in building a common glossary for SCF and to study the SCF market and its opportunities.

Authors



Michiel Steeman

Michiel Steeman was recently selected as the inaugural holder of the Supply Chain Finance Professorship at the Windesheim University of Applied Sciences in The Netherlands. He is also the founder and chairman of the Supply Chain Finance Community that has already brought together over 30 leading business schools from more than 20 countries around the world who actively collaborate with companies, banks and governments in the developing field of Supply Chain Finance.

In 2012 he launched The Cool Connection, a business simulation and training tool that bridges the physical and financial supply chain by bringing together finance, sales, procurement and supply chain in a virtual decision making environment.

From 2009 to 2012 Michiel was elected into the Executive Committee of Factors Chain International, a worldwide organisation with more than 300 member in over 65 countries. He holds a Master's degree in Financial Economics from Erasmus University in Rotterdam.

His working experience includes a variety of roles for Deutsche, NIB Capital, NMB-Heller such as relationship management, risk management and marketing. In his last role at ING he was member of the Management Team and responsible for product development and strategy for leasing and factoring with operations in 14 countries and almost 3000 employees.

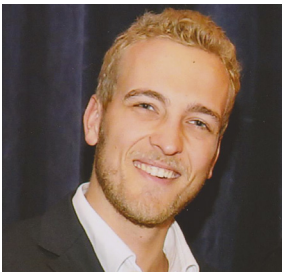
Michiel has also been the driving force behind the Rainbow Homes through his Chairmanship of the Partnership Foundation. This foundation has introduced a ground breaking franchise formula to help street-children in India. This Rainbow Home model is a scalable solution based on the belief that each and every school can be transformed into a home for street-children.



Ronald de Boer*

At the beginning of 2015, Ronald de Boer was appointed Associate Professor Supply Chain Finance (SCF) at the Strategic Entrepreneurship Research Centre of Windesheim University of Applied Sciences (Zwolle, The Netherlands). In this role, he is responsible for leading several prominent national and international research programs, such as SCF 2.0 (piloting innovative corporate SCF solutions), cross regional research (to improve the adoption of SCF for Dutch SMEs) and SCF impact analysis (based on SCF platform provider data). As such, he is closely working with a broad variety of organisations, including corporates (Philips, Unilever, Heineken, etc.), banks and other SCF providers, mid-size corporations and small and medium enterprises.

Ronald holds an MSc in Industrial Engineering as well as a PhD in Operations Management & Logistics from the University of Twente and studied International Business at the Loughborough University School of Business and Economics. Before he joined Windesheim, Ronald worked at Procter & Gamble as global program manager in Supply Network Optimisation and at ORTEC as senior consultant in advanced planning and optimisation systems.



Matthijs van Bergen

In september 2015, Matthijs started to work as a part-time researcher Supply Chain Finance at Windesheim University of Applied Sciences. In this role he is responsible for the setting up and supervising business cases within the SCF 2.0 research program in cooperation with Corporates such as Heineken, Unilever & Philips. Furthermore, he has been responsible for project management of an Open Request for Information (RFI) process on behalf of four large Corporates to release liquidity for (Dutch) SMEs, where eventually 23 SCF solution providers participated in.

In June 2015 Matthijs graduated for a dual-degree program Operations Management & Logistics at the Technical University of Eindhoven and Finance at Tilburg University. He performed his thesis project at Heineken Global Procurement, where he also developed a business case on inventory financing in the barley-malt supply chain. During his studies he conducted an internship at ING Corporate Finance and has experience as independent consultant for over 5 years.

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